Food: Just Grow It!

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University of Hawaii
College of Tropical Agriculture and Human Resources
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Hawaii State Department of Education
Food: Just Grow It!

… a supplementary compendium of teaching-learning activities designed to enhance secondary students’ thinking and reasoning skills …
# Food: Just Grow It!

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FOOD: “JUST GROW IT”

OVERVIEW:

FOOD: “JUST GROW IT” is a supplementary compendium of teaching-learning activities that are designed to enhance students’ thinking and reasoning skills. The desired outcome of the compendium is for students to make sound decisions and choices in their adult lives that will lead to healthy individuals, communities, and environments. The contexts of the activities are relevant to the real world concern for sustainable production of food.

Teachers from various disciplines are invited to use the activities in an integrated manner with their content and/or to join other teachers in presenting the activities or their extensions as part of team or thematic teaching.

GOALS:

The overall goal as stated earlier is for students to make sound decisions and choices in their adult lives that lead to healthy individuals, communities, and environments. This goal is directly related to the skills of “communicating, reasoning, and investigating which characterize a health-literate person.” (Health Content Standards, Department of Education, State of Hawaii. August 1999, p.1)

In support of the overall goal, the activities were designed to address the four General Learner Outcomes of the Department of Education:

- The ability to be responsible for one’s own learning.
- The understanding that it is essential for human beings to work together.
- The ability to be involved in complex thinking and problem solving.
- The ability to recognize and produce quality performance and quality products.

CONTENT STANDARDS:

The activities address the content standards from Health Education, which are listed below. (See Appendix I for the Benchmarks.)

- Students comprehend concepts related to health promotion and disease prevention.
• Students access valid health information and health-promoting products and services.
• Students practice health-enhancing behaviors and reduce health risks.
• Students analyze the influences of media, culture, technology, and other factors to enhance health.
• Students use interpersonal communication skills to enhance health.
• Students use goal-setting and decision-making skills to enhance health.
• Students advocate for personal, family, and community health.

In each activity, relevant content standards from different subject areas are identified, together with the specific benchmarks. Asterisks indicate that the benchmarks were taken from a grade group below the 9 - 12 group.

**LIFE SKILLS:**

To attain the goals of this compendium, the activities focus on the content standards listed above, but they also incorporate life skills as identified in the Dimensions of Learning instructional framework (Marzano, R. A Different Kind of Classroom: Teaching with Dimensions of Learning. 1992). The selected skills fall into the following categories: (See Appendix B for the Life Skills Standards.)

• Complex Thinking
• Information Processing
• Effective Communication
• Cooperation/Collaboration
• Habits of Mind
THEMES/FOCI:

The instructional activities are grouped around universal themes/concepts, applied to the context of food and sustainability. These themes are:

- Interdependence
- Unity and Diversity
- Wellness - Nutrition
- Wellness - Mental Health
- Safety
- Service and Stewardship
- Sustainability

The activities provide hands-on, authentic experiences for the students. The experiences are, in most cases, applications within a microcosm or subsystem readily recognized by the students. Teachers are encouraged to have students pursue their interest in the themes more in-depth or in other context where they can extrapolate what they have learned. For example, one of the activities has students identify “—cides” in their immediate environment. More in-depth learning can be facilitated in a biological science or chemistry class. Similarly, interested students may want to conduct research on the worldwide use of “—cides” and the current/future impact on the environment.

METHODOLOGY:

The instructional activities have been developed based on the assumptions that:

- the learner generally goes through three phases in the learning cycle — Exploring, Processing, and Applying;
- the teacher conducts on-going assessment of the learner’s knowledge, skills, and interests.

Therefore, the teacher will determine if an activity will be appropriate as an exploratory activity, one that introduces students to a full-blown lesson on a discipline-specific set of concepts. For example, the activity that has students “create” soil may be an exploratory activity that leads into students doing more extensive soil analysis. On the other hand, the teacher may determine that an
activity may be an application of a major lesson taught in his/her class. An example in a science class is the activity on identifying “pests or partners”, which may serve as an application of the recently learned scientific classification system, where students are able to understand why certain insects share parts of their scientific names.

The activities vary in difficulty or intensity, but they all reflect the project-based learning model that focuses on a central concept or principle, involves students in problem-solving or other meaningful tasks, allows students to work autonomously to construct their own learning, and culminates in realistic, student-generated products. The materials do not constitute a “curriculum;” they are not designed to be used in a set sequence nor do they constitute a "recipe book" for the teacher. In designing the activities, we attempted to:

- Make project work central to the instruction, rather than peripheral;
- Hold students accountable to themselves and their peers;
- Incorporate authentic tasks related to the world outside the classroom, which result in valuable products;
- Respond to issues or questions that relate to important topics in today’s community and tomorrow’s world;
- Provide students with opportunities to learn from experience as they complete presentations, exhibits, and peer assessments;
- Make some impact on life skills and process skills such as self-management, self-assessment, group-process, and problem-solving skills.

FORMAT:

Based on trying to design project-based learning experiences, the activities were developed according to the format suggested in Project Based Learning: A Handbook for Middle and High School Teachers, Buck Institute for Education, 1999. Each learning activity is organized around: Content, Driving Questions, Components, Strategies, and Assessment. Teachers may choose to add or delete tasks, depending on their students.

**Content:** Activities and the projects focus on ideas that are central to concepts within or across subject-matter areas. The activities are constructed to incorporate the Hawaii Content and Performance Standards and related life skills.
Driving Questions: These questions focus student efforts on investigations and other critical learning experiences. The students are challenged to gather information, investigate, or solve a situation. Many of the driving questions have pre-questions that students need to answer (or learn about) before they can get to the main question.

Components: Each activity attempts to have at least three parts. One is the inclusion of generative, constructive tasks. That is, the students need to focus on transforming, creating, and constructing ideas and information. They gather information, solve problems, overcome obstacles, look for resources, and make decisions.

Second, the activity is seldom straightforward. It may take a lot of time, and almost always has many phases and a variety of activities within it.

Thirdly, the activity tries to involve an authentic task that is modeled after the work of professionals, or business or community organizations. Teachers can enhance the activity by adding to any of these parts.

Supportive Strategies: The activity may describe a variety of learning arrangements. That is, students may work alone, on their own time, or may work in a group. It is hoped that use of the activities will stimulate students working independently, as well as those interacting with other students in order to carry out their projects.

Most instruction is not planned as “lectures,” but rather occurs as support in the context of other activities. For example, teachers may support student learning by conducting on-the-job training, providing written handouts to accompany a task, and organizing consultations with or talks by experts.

Feedback is an important supportive strategy. The activities provide students the opportunities to learn by doing, but they benefit most by receiving feedback about their accomplishments from both peers and members of the community.

Assessment: Assessment is integral to each activity and emphasizes realistic products. The outcomes are valuable and often reflected in professional activities related to the topic. There are multiple outcomes, including
knowledge and skills central to the problem or situation, as well as skills and habits that are essential for success in the world.

Assessment is built in, together with the opportunity to be engaged, to produce meaningful products, and to be successful. Students are made responsible for their own assessments; as such, they are encouraged to coach each other and provide feedback.

Traditional assessment modes are not included since they are commonplace in classrooms. What are included are sample rubrics (descriptions of four levels of performance for a given standard) that support the performance tasks in the activities and parallel the Marzano’s Dimensions of Learning Model. The rubrics are based on recommendations in Assessing Student Outcomes by Robert J. Marzano, Debra Pickering, and Jay McTighe, 1993.
“Rot for Your Plot”

INTRODUCTION:

The activities in this thematic unit use the context of soil, a natural resource upon which much of our food production around the world depends. Interdependence is illustrated in activities that focus on the relationships among natural systems, interacting with human decisions that affect this limited and fragile resource.

CONTENT STANDARDS:

Across the activities in this unit, several content standards provide the thrust for the student learning tasks. Specific references are made to directly related standards and their respective benchmarks. At the same time there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

**Health Education**
- Students access valid health information and health-promoting products and services.
- Students use goal-setting and decision-making skills to enhance health.

**Science Education**
- Malama i ka ‘Aina: Sustainability. Students make decisions needed to sustain life on Earth now and for future generations by considering limited resources and fragile environmental conditions.
- Interdependence: Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
- Cycle of Matter and Energy: Students trace the cycling of matter and the flow of energy through systems of living things.
- Forces that Shape the Earth: Students analyze the scientific view of how the Earth’s surface is formed.

**Social Studies**
- Geography: Places and Regions. Students understand how distinct physical and human characteristics shape places and regions.

**Career and Life Skills**
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work and at home: thinking and reasoning skills, personal qualities, skills for managing...
resources, interpersonal skills, skills for managing information, and skills and knowledge related to systems.

LIFE SKILLS:

Although a range of life skills is reflected among the activities in this unit, particular focus should be on developing the skills for Information Processing. The standards and the performance indicators for information processing include:

Effective Interpretation and Synthesis of Information
• Students accurately interpret information gathered for a task and concisely synthesize it.

Effective Use of a Variety of Information-Gathering Techniques and Information Resources
• Students use the important information-gathering techniques and information resources necessary to complete the task.

Accurate Assessment of the Value of Information
• Students accurately determine whether the information is credible and relevant to a specific task.

CONCEPTS:

Understanding of the theme of interdependence is developed in the activities through concepts such as:

• Formation of soil is dependent on natural forces.
• Regional differences in the natural environment determine the people’s activities; e.g., food production.
• Plants are dependent on the natural systems.
• Soil amendments have benefits beyond the “plot” (e.g., recycling to reduce landfills, reducing chemical usage).
• Enhancing soil quality with compost helps protect water quality from excessive fertilizer use.
ACTIVITY NAME: CREATING SOIL

Subject Area(s): SCIENCE, AGRICULTURE, SOCIAL STUDIES

Duration: Three class periods

PROJECT SUMMARY:

Students observe the effects of water, wind, and temperature on rocks. From the activity, the students can generalize how soil may be formed. They should be able to find examples in the real world; each of the islands has locations where various stages of soil formation are evident. Maui and the Big Island would have evidence of the effect of cold temperatures on the rocks.

CONTENT STANDARDS:

Science Education: Earth Systems and the Universe

- Forces that Shape the Earth. Students analyze the scientific view of how the Earth’s surface is formed.
  - Compare the different kinds of soil and their formation.*
  - Analyze how any of the Earth’s Systems shapes the Earth.

Social Studies: Geography

- Physical Systems. Students understand how physical processes shape Earth’s surface, create, sustain, and modify the ecosystems.
  - Give simple explanations of earth’s physical systems (water, air, and land), physical features, and ecosystems.*

Life Skills: Complex Thinking

- Induction. Creating a generalization from implicit or explicit information and then describing the reasoning behind the generalization.
  - Makes and articulates accurate conclusions (inductions) from selected information or observations.

Life Skills: Information Processing

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including
interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.

- Effectively uses a variety of information-gathering techniques and information resources.

**DRIVING QUESTION(S):**

- How is soil formed in nature?

**MATERIALS:**

- Rocks (porous), heavy cloth, hammer, empty jar (quart size or larger), and water.

**ACTIVITY PROCESS:**

- Have students share their ideas on how soil is formed.
- Divide class into teams, each should have a set of the needed materials.
- The teams are to use the materials to demonstrate how soil is formed.
- Each team will be responsible for preparing a verbal report and an exhibit to demonstrate their theory on soil formation.
- Allow time for research.
- Teams present their report and exhibit.
- Each student submits a paper describing how soil is formed, including appropriate references and description of the hands-on process used.

**CONTENT:**

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<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock fragments settle in layers in water.</td>
<td>Report writing</td>
<td>Work in groups</td>
</tr>
<tr>
<td>Weathering is a key process in soil formation.</td>
<td></td>
<td>Oral communication</td>
</tr>
<tr>
<td>Water expands when it freezes.</td>
<td></td>
<td>Induction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information Processing</td>
</tr>
</tbody>
</table>
STRATEGIES:

- **Grouping**: Students may work in small teams (3 to 4). Each team member should have an “assignment” in completing the project. For example, the team members could be assigned roles such as researcher, presenter, writer. The teams should write an outline of the tasks, responsibilities, and time line for completing the group project. The time line should also allow time for members to complete individual reports.

- **Information Sources**: Reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

- **Products**: This activity has three required products.
  - Oral presentation of what the group concluded
  - Physical exhibit of models or results from hands-on trials
  - Written report done by each individual

- **Student Learning Tasks**: In order to complete the products, the students should be guided through tasks that will enhance their products and their learning.
  - Planning: Developing steps to be taken, responsibilities, and time lines.
  - Conducting research: Locating and collecting information, synthesizing information.
  - Experimenting: Conducting demonstration of an experiment.
  - Composing: Developing oral and written reports.

- **Instructional Support**: The activity can be supported by providing students with prompts or guide questions such as the following:
  - What are some ways that rocks or lava are worn down in the environment?
  - What may cause pounding effects on rocks or lava in the environment?
  - What may cause cracking or splitting effects?
  - Where might you look for information to confirm your ideas?
  - Who might you interview or ask?
  - How can you simulate the effects using the materials available?
  - What conclusions can you make based on the information you collected?
ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics or criteria established by the teacher/class. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The three products may be assessed using rubrics or criteria established by the teacher/class. For the oral presentation and the exhibit, the teacher and peer groups may do the rating. For the individual reports, it is recommended that the teacher do the rating.

NOTES:

Soils are formed in nature in two primary ways. First, rain and wind wear away the rocks and break them into smaller pieces. The pounding of waves helps in this process that has been going on for millions of years. The finest rock particles, carried away and deposited by water, form soil. Dead plants and animals decay and make this soil fertile. Secondly, rock is also broken up by heat or cold. Water from melting snow and rain enter cracks in the rock and remains there. When the temperature drops low enough, this water will freeze and expand. The expanded water or ice will act as a wedge in the cracks and split the rock apart. Piles of rock at the foot of a cliff were caused by effects such as freezing and thawing. In Hawaii, weathering from the hot sun, rain and water, and wind has similar effects on the porous lava-base of the islands.

Extensions to this activity may focus on driving questions such as:
- What are the effects of erosion?
- How do soils differ?
- What are the consequences of people’s decisions to destroy forests? (Select other decisions that impact the environment or the natural resource of soil, such as testing bombs that result in radioactive contamination, etc.)
- How renewable is soil as a natural resource?

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Projects:

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<tbody>
<tr>
<td>1. The visual and written presentations were comprehensive.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The visual and written presentations reflect high standards of quality.</td>
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<tr>
<td>4. Optimum use of team members' strengths were evident in the products.</td>
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<td>Outstanding</td>
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<td>4. Optimum use of team members' strengths were evident in the products.</td>
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Content Knowledge:

- Student explains the earth’s physical systems (water, air, and land) and analyzes the interaction among them.
  
  4  Demonstrates a thorough understanding of how the natural elements on earth interrelate (e.g., water, air, sun, rocks) to form soil.
  
  3  Displays a complete and accurate understanding specific to the project.
  
  2  Displays an incomplete understanding and has some notable misconceptions.
  
  1  Demonstrates severe misconceptions about the interrelationships of earth’s systems and the outcomes of the project.
PROCESS OUTCOMES:
Observation rating:

- Student makes and articulates accurate conclusions (inductions) from the selected information or observations.

  4 Draws conclusions that reflect clear and logical links between the information or observations and the interpretations made from them. The rationale for the interpretations shows a thoughtful and accurate attention to the process of induction.

  3 Presents conclusions that, with few exceptions, follow logically from the selected information or observations.

  2 Presents some conclusions that reflect erroneous interpretations made from the information or observations.

  1 Draws many erroneous conclusions and cannot satisfactorily describe the rationale behind the conclusions.

- Student effectively uses a variety of information-gathering techniques and information resources.

  4 Uses the important information-gathering techniques and information resources necessary to complete the activity. Identifies little-known information resources or uses unique information-gathering techniques.

  3 Uses the important information-gathering techniques and information resources necessary to complete the activity.

  2 Fails to use some significant information-gathering techniques and resources.

  1 Fails to use the most important information-gathering techniques or information resources.
Self Assessment:

- I make general conclusions from the specific pieces of information or observations.
  
  4  I make clear, general conclusions from the specific pieces of information or observations; the conclusions make sense and show that I understand how to think about and combine specific information and observations to come to interesting general conclusions.
  
  3  I make general conclusions from the specific pieces of information or observations; the conclusions generally show I have used the information or observations in a way that makes sense.
  
  2  I make conclusions from the specific pieces of information or observations and describe how I used the information, but some conclusions and descriptions don't make sense.
  
  1  I make conclusions that don't make sense, and I can't really describe how I used the information and observations.

- I use a variety of methods and resources when gathering information for my task.
  
  4  I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don't think of or don't know about. My methods are unusual but effective.
  
  3  I use important information resources and useful methods when I gather information for my activity.
  
  2  I miss some important information resources and fail to use some of the best methods when I gather information for my activity.
  
  1  I do not use important information resources or the best methods when I gather information for my activity.
ACTIVITY NAME:       **HOT SPOTS**

Subject Area(s):   SCIENCE, AGRICULTURE, SOCIAL STUDIES

Duration:       Five class periods

**PROJECT SUMMARY:**
Students observe the different rates of warming and cooling of water and soil. Since water will not cool as rapidly as the soil and the rocks on the land, the temperature of the land will be lower at night and cool season than that of the water. The water will warm the air above it and when this warm air moves over the land, it can warm the land also. This is an important phenomenon in Hawaii where we are surrounded by water.

**CONTENT STANDARDS:**

**Science Education:**   Earth Systems and the Universe  
- **Earth in the Solar System:** Students discuss how the Earth-moon-sun system causes seasons, moon phases, climate, weather and global changes.  
  - Explain the role of the sun as the major source of energy for plant growth, weather systems, ocean currents, and the water cycle.*  
  - Analyze energy transfer and its effects on global climate, aquatic and terrestrial processes.

**Social Studies:**   Geography  
- **Places and Regions:** Students understand how distinct physical and human characteristics shape places and regions.  
  - Use physical and human characteristics of places and regions to evaluate how regional systems are structured, connected, and change over time.

**Life Skills:**   Complex Thinking  
- **Induction.** Creating a generalization from implicit or explicit information and then describing the reasoning behind the generalization.  
  - Makes and articulates accurate conclusions (inductions) from selected information or observations.
Life Skills: Information Processing

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
- Effectively uses a variety of information-gathering techniques and information resources.

DRIVING QUESTION(S):

- How does heat affect water and soil?
- What food production patterns (kinds of products, growing periods, etc.) are related to different regions around the world?

MATERIALS:

- Soil, water, two containers about the same size, and two thermometers. (Each team will need a set of these.)

ACTIVITY PROCESS:

- Have students describe areas that have farms and areas that do not appear to be conducive to farming. What are the variables that affect the growing conditions? Did they know that soil temperature is a factor?
- Divide class into teams. Decide if the hands-on portion of the activity will be done by each team or conducted as a demonstration for the entire class. If the teams are to do the experiment, each should have a set of the needed materials.
- The teams are to use the materials to determine the rate of warming and rate of cooling of water and soil.
- Once they determine the rates, the teams are to identify how their conclusions affect food production (growing) around the world.
- Allow time for research.
- Teams present their report and a static exhibit that illustrates their findings.
- Each student submits a paper describing the rates of warming and cooling and their relationship with farming around the world, including appropriate references and description of the hands-on process used.
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<th>Content Skills</th>
<th>Process Outcomes</th>
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<tbody>
<tr>
<td>• Water warms up and cools down more slowly than soil.</td>
<td>• Experimenting</td>
<td>• Work in groups</td>
</tr>
<tr>
<td>• Regions around the world are affected by their proximity to large bodies of water.</td>
<td>• Report Writing</td>
<td>• Oral communication</td>
</tr>
<tr>
<td>• Farming practices are determined by weather factors.</td>
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<td>• Induction</td>
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STRATEGIES:

• **Grouping**: Students may work in small teams. Each team member should have a role and assignment in completing the project. The activity also requires that each student submit a written report. The time line should allow time for the students to complete their individual reports, including any special interest findings.

• **Integration**: This activity is one that may serve as the basis for teachers from different content/subject areas to work together. Working together may entail something as simple as agreeing to schedule related activities in their individual classes (e.g., common themes like natural systems on Earth; supporting skills like conducting research; studying the same regions of the world). They may work together by team teaching. If they do not share students, the teachers may round-robin teach each other’s classes during one period. This or other arrangements may be possible, depending on the willingness of the teachers involved.

COMPONENTS:

• **Products**: This activity has three required products.
  • Oral presentation of what the group findings.
  • Static exhibit.
  • Written report by each individual.
• **Student Learning Tasks:** The first task for the students will be experimenting with water and soil. The procedure involves the following:
  • In one container, put some soil and place a thermometer in it.
  • In the other dish, place some water and the other thermometer. Make sure both thermometers show the same temperature. (The temperature of the water may be changed by adding hot or cold water, as needed.)
  • Place both containers in the sunlight for ten minutes. Record the temperature of the water and soil.
  • Leave both containers in a shady spot until their temperature is the same again.
  • Place both containers into a refrigerator (or cooler) for about twenty minutes.
  • Remove the containers and record the temperature of the soil and water.

The second task is for the students to develop a hypothesis or to extrapolate about the temperature effects on soil and water in large areas (regions) around the world. Begin with Hawaii, where our islands are surrounded by water and the sun shines all year round and expand to an area that is land-locked. Then they are to conduct research in order to substantiate or disprove their prediction.

The third task is for the students to plan, prepare, and present what they have learned based on their experiment and research. In all tasks, students may want to make special effort to collect information on questions that are unique to them individually. This information may be presented in their individual report.

• **Instructional Support:** Support to the students should include prompts or guide questions as they conduct the experiment or begin planning their research. These may include the following:
  • What do you think the experiment will show? Which temperature will be higher? Lower?
  • What are key steps you took in conducting the experiment? What did you find? How would you state these clearly in your report?
  • How do the heating and cooling processes affect the ocean around us and our islands? Other bodies of water and the lands adjacent? What about areas that are not close to water?
  • What regions will probably have similar weather conditions? Why? Which ones will differ? Why?
  • If you selected two (or more) areas to compare and contrast, what kinds of food would the people have in their diets? How are these foods produced?
• What food production practices are evident in different regions of the world? How do the heating and cooling processes you studied affect these production practices?

**ASSESSMENT:** Samples attached.

• **Product Outcomes:** The products may be assessed by individual teachers, or between teachers. For example, they may receive credit as an English assignment, Science project, Social Studies report, and/or Agriculture research. Working together, teachers can recognize students’ learning of content through multiple contexts. This will help students understand that their learning is “authentic” in the sense that it relates to the comprehensive picture of the world, rather than to an isolated discipline area.

**Process Outcomes:** Group and individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate groups and individuals as they engage in completing the project. Students may also be asked to do a self-assessment.

**NOTES:**

The experiment should show that water warms up and cools down more slowly than soil. This is the explanation for cooler summers and milder winters in regions near the ocean compared to areas in the interior. It takes a longer time for the sun to heat up water than to heat up land. Since the water stays cooler, it helps to cool the air above it. This cool air moves over the neighboring land and we feel cooler near the shore.

The types of food grown in different regions are influenced by this warming and cooling effect. The growing seasons are also affected. Different growing practices are interesting, especially when compared to Hawaii. The concern for when the soil will “warm up” enough to plant crops is certainly alien to us.

Extensions to this activity may focus on driving questions such as:
• How have the diets of people in the different regions been affected by modern transportation?
• What changes have occurred historically in food production in a selected region?
• What effects have the warming and cooling of water and land had on development/industries in coastal countries?
• What chain reactions are occurring that result in the "Earth is getting warmer" observation?

RESOURCES:
**ASSESSMENT RUBRICS: Samples**

**PRODUCT OUTCOMES:**

**Projects:**

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<thead>
<tr>
<th>Criteria</th>
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<tr>
<td>4. Optimum use of team members' strengths were evident in the products.</td>
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</table>

**Content Knowledge:**

- Student explains the natural energy transfer effects on terrestrial processes and physical characteristics of places and regions.

  4  Demonstrates a thorough understanding of how the natural elements on earth interrelate (e.g., water, air, sun) and affect regional climate and characteristics.

  3  Displays a complete and accurate understanding specific to the project.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the interrelationships of earth's systems and the outcomes of the project.
PROCESS OUTCOMES:

Observation rating:

- **Student makes and articulates accurate conclusions (inductions) from the selected information or observations.**

  4 Draws conclusions that reflect clear and logical links between the information or observations and the interpretations made from them. The rationale for the interpretations shows a thoughtful and accurate attention to the process of induction.

  3 Presents conclusions that, with few exceptions, follow logically from the selected information or observations.

  2 Presents some conclusions that reflect erroneous interpretations made from the information or observations.

  1 Draws many erroneous conclusions and cannot satisfactorily describe the rationale behind the conclusions.

- **Student effectively uses a variety of information-gathering techniques and information resources.**

  4 Uses the important information-gathering techniques and information resources necessary to complete the activity. Identifies little-known information resources or uses unique information-gathering techniques.

  3 Uses the important information-gathering techniques and information resources necessary to complete the activity.

  2 Fails to use some significant information-gathering techniques and resources.

  1 Fails to use the most important information-gathering techniques or information resources.
Self Assessment:

- I make general conclusions from the specific pieces of information or observations.

  4  I make clear, general conclusions from the specific pieces of information or observations; the conclusions make sense and show that I understand how to think about and combine specific information and observations to come to interesting general conclusions.

  3  I make general conclusions from the specific pieces of information or observations; the conclusions generally show I have used the information or observations in a way that makes sense.

  2  I make conclusions from the specific pieces of information or observations and describe how I used the information, but some conclusions and descriptions don’t make sense.

  1  I make conclusions that don’t make sense, and I can’t really describe how I used the information and observations.

- I use a variety of methods and resources when gathering information for my task.

  4  I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don’t think of or don’t know about. My methods are unusual but effective.

  3  I use important information resources and useful methods when I gather information for my activity.

  2  I miss some important information resources and fail to use some of the best methods when I gather information for my activity.

  1  I do not use important information resources or the best methods when I gather information for my activity.
ACTIVITY NAME: POROUS OR POOR-US

Subject Area(s): SCIENCE, AGRICULTURE,

Duration: Two - three weeks

PROJECT SUMMARY:
Students observe that soil contains water. Also, there are different types of soil; the type determines the water “holding” capacity. From the science perspective, particulate interactions affect the amount of water available in the ground and the soil, and the movement of water molecules into the roots of plants. From the agricultural perspective, the soil conditions determine the arability of the land and the possible needs for soil enhancements.

CONTENT STANDARDS:

Science Education: Earth Systems and the Universe
• Forces that Shape the Earth: Students analyze the scientific view of how the Earth’s surface is formed.
  • Compare different kinds of soil and their formation.*

Social Studies: Geography
• Physical Systems: Students understand how physical processes shape Earth’s surface, and create, sustain, and modify the ecosystem.
  • Explain how physical processes affect formation and distribution of climates, natural resources, and ecosystems.

Life Skills: Complex Thinking
• Induction. Creating a generalization from implicit or explicit information and then describing the reasoning behind the generalization.
  • Makes and articulates accurate conclusions (inductions) from selected information or observations.

Life Skills: Information Processing
• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including
interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.

- Effectively uses a variety of information-gathering techniques and information resources.

**DRIVING QUESTION(S):**

- What happens to water in the soil?
- What effects do texture, structure, and permeability of soil have in the immediate environment?

**MATERIALS:**

- Scale, soil, bowl, clear plastic cylinder (cut both ends of bottled water container), small glass pan, glass tube, and water.

**ACTIVITY PROCESS:**

- Students discuss what they think makes one area better than another for growing plants. This activity has the students looking at the characteristic of soil, specifically its water holding capacity.
- **Task 1: Soil Contains Water**
  - Divide class into teams. Decide if the hands-on portion of this task will be done by each team or conducted as a demonstration for the entire class. If the teams are to do the experiment, each should have a set of the needed materials.
  - The students observe the difference in weight of garden soil taken directly from the ground and a week later, after the soil has been set to dry in the sun:
    - Weigh a pound of garden soil (before watering!) and place the soil into a bowl that is left in a sunny spot for a week.
    - The soil is then weighed again. The dried soil will weigh less than a pound.
    - Variations in this task may be made by taking different types of soil (e.g., sandy soil and clayey soil) and observing the differences in weight after the same period of drying.
  - Once they determine the differences in weight, the students are to record their findings and formulate possible explanations as a team.
• **Task 2:** Water Rises in Soil
  - The second activity involves a hands-on portion also. It may be done by some students as a demonstration, but everyone will be responsible for recording individual observations.
  - Some water should be poured into a pan. The glass tube is inserted into the water. Question: What do you observe about the water level in the pan and in the tube?
  - If there are different sized tubes (diameter), each could be inserted into the water and its level marked. Question: What do you observe about the water levels of the different sized tubes?
  - Place the plastic cylinder in an empty pan. Fill the cylinder with dry soil.
  - Then pour water into the pan. Question: What do you observe about the water?
  - Each student is to record what is observed and some explanation or hypothesis.
  - Variations of this task may be made, again, using different types of soil.

• **Task 3:** Physical Features of the Soil
  - Have students work in teams of three or four, wherein each member has a responsibility: Collecting soil sample, Conducting research/interview, Testing, and Completing Report.
  - Assign each team an area for soil sampling, insuring that the areas will yield a range of samples.
  - Teams are to collect the sample from the assigned area, research the area (description/characteristics, type of human activity, etc.) which may include interviews, and “test” the soil sample for:
    - Texture
    - Structure
    - Permeability (using Task 2 methods)
  - Teams are to present a written report and make an oral presentation. A static display or multi-media presentation should be encouraged.
**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
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<tbody>
<tr>
<td>• Soil contains water.</td>
<td>• Experimenting</td>
<td>• Work in groups</td>
</tr>
<tr>
<td>• Water rises in soil.</td>
<td>• Report Writing</td>
<td>• Oral communication</td>
</tr>
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<td>• Permeability refers to the ability of soil to transmit air and water.</td>
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<td>• Induction</td>
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**STRATEGIES:**

- **Grouping:** Students work in small teams. Each team member should have a role and assignment in completing the project. The activity may also require that each student submit a written report. The time line should allow time for the students to complete this individual report, including any special interest findings. Group presentations may be video taped.

- **Extensions:** This activity has many possible extensions within the content areas of agriculture, science, and, to some extent, social studies. Task 3 is taken in part from "A Guide for Conservation Awareness Contests in Hawaii." Therefore, one major extension may be preparing the students to participate in the conservation contests.

**COMPONENTS:**

- **Product:** This activity has a major product required by the end of Task 3. The teams are to produce a written report on soil, as well as make an oral presentation. The results of tasks 1 and 2 should help them think about the importance of soil characteristics in relation to water.

- **Student Learning Tasks:** Task 1 presents the students with what might be an “obvious” fact: there is water in soil. However, it isn't often that students have the opportunity to verbalize this notion. Nor do they delve further into what is happening. That is, they readily acknowledge that when rain falls, it sinks into the ground, but are they aware of what is occurring when the water accumulates between the particles of the soil? Varying the types of soil will also add another dimension to their speculations.
The second task seeks to have students start thinking about what happens to water in the soil. In a science class, this task may be expanded into the physics of the activity. In the agriculture context, study of topics such as function of roots and capillary action can serve as extensions.

The third task is for the students to learn some terminology, apply the concepts to authentic samples, and develop understandings about their island environment. They learn from each other through the team presentations. The written reports may be required of individuals as well as team reports.

- **Instructional Support:** Support to the students should include prompts or guide questions as they conduct the experiment or begin planning their research. These may include the following:
  - What do you think the experiment will show?
  - What are key steps you took in conducting the experiment? What did you find? How would you state these clearly in your report?
  - What happens to water in sand? In clay?
  - How do the soil conditions from the different areas of the island relate to the vegetation? The rainfall? The kinds of human activity?

Prior to Task 3, a UH Extension or Soil Conservation Specialist may be invited to talk about soil properties. The speaker can help the students relate to conditions around the island that give clues as to the types of soils in particular areas.

**ASSESSMENT:** Samples attached.

- **Product Outcomes:** Video taping the presentations may be used as part of a portfolio. Students’ growth and improvement in oral communications, learning and thinking skills, and research become evident in these presentations. Also, the final presentations, including static displays may be of such high quality and depth that they could serve as a science fair entry.

- **Process Outcomes:** Group and individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate groups and individuals as they engage in completing the project. Students may also be asked to do a self-assessment.
Soil contains water: Water such as rain sinks into the ground and accumulates between the particles of soil. At certain depths, all the spaces between the soil particles are filled with water. The soil is said to be saturated. The depth at which the soil is saturated with this ground water is called the water table.

The particles of soil above the water table are also surrounded by a film of water. It is this soil water that enter the roots of plants. Some soils have too much sand while others have too much clay. Sandy soils have too much sand while others have too much clay. Sandy soils do not hold enough water for most plants. Clay soils hold too much water and do not permit proper drainage. Plants develop best in a soil that contains the proper quantity of water. For students seeking to expand on their reports, the Textural Triangle is included with this activity.

From a science perspective, the movement of water may be addressed in terms of capillary action (similar to Task 2). The molecules of water inside the thin tube attract one another. But the water molecules are also attracted by the glass molecules of the tube. This causes the water to stick to the sides of the thin tube and to rise in it. The thinner the tube, the stronger the capillary action. Likewise, the tiny spaces between the soil particles act as very thin tubes. The water molecules in these spaces are attracted to the soil molecules. Water rises in the soil due to capillary action.

Gravitational movement of water is downward and away from the surface. As water moves through soil, it leaches nutrients, flowing right down past the roots of plants. Hygroscopic water is water that is held so tightly in soil that it is unavailable to plants. This situation occurs often in clayey soils.

Physical properties of soil, therefore, affect the amount of water in soil. Students should become familiar with the terminology:

- **Texture**: The proportion of sand-, silt-, and clay-size particles in soil. Texture can be determined by rubbing a small amount of moist soil in the hand. Use your thumb and fingers to rub and feel the soil particles. Sand feels gritty when rubbed; silt feels smooth and buttery when moist; and clay is sticky when wet and forms a flexible “ribbon” when squeezed between thumb and forefinger.
• **Structure:** Soil structure is the shape and arrangement of soil particles into larger units or aggregates. Soil structure is best observed in the soil profile (layers in the land). The type of structure is determined by observing the shape of the aggregates in the soil and by breaking them apart along the natural lines of breakage or separation. The common types of structure in Hawaiian soils are granular (round), blocky, and subangular blocky (blocklike). Less common are platy (plate-like) and prismatic. Also found in Hawaiian soils are two conditions called structureless because they do not form aggregates. These are the single grain and massive (dense mass, very clayey) soils.

• **Permeability:** Refers to the ability of the soil to transmit air and water. It is expressed as inches per hour of water movement through the soil. Two soil properties that have most to do with permeability are texture and structure. The amount of organic matter in the soil and presence of alternating layers of contrasting textures in the soil profile also affect permeability.

**RESOURCES:**

ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Projects:

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</table>

Content Knowledge:

- Student explains the key properties of soil and relates these properties to areas on the island and human activities.

4 Demosntrates a thorough understanding of how soil is formed, characterized, and relates to water.

3 Displays a complete and accurate understanding specific to the project.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about the interrelationships of soil properties and water movement within it.
PROCESS OUTCOMES:

Observation rating:

- **Student makes and articulates accurate conclusions (inductions) from the selected information or observations.**
  
  4  Draws conclusions that reflect clear and logical links between the information or observations and the interpretations made from them. The rationale for the interpretations shows a thoughtful and accurate attention to the process of induction.

  3  Presents conclusions that, with few exceptions, follow logically from the selected information or observations.

  2  Presents some conclusions that reflect erroneous interpretations made from the information or observations.

  1  Draws many erroneous conclusions and cannot satisfactorily describe the rationale behind the conclusions.

- **Student effectively uses a variety of information-gathering techniques and information resources.**

  4  Uses the important information-gathering techniques and information resources necessary to complete the activity. Identifies little-known information resources or uses unique information-gathering techniques.

  3  Uses the important information-gathering techniques and information resources necessary to complete the activity.

  2  Fails to use some significant information-gathering techniques and resources.

  1  Fails to use the most important information-gathering techniques or information resources.
Self Assessment:

- I make general conclusions from the specific pieces of information or observations.
  
  4  I make clear, general conclusions from the specific pieces of information or observations; the conclusions make sense and show that I understand how to think about and combine specific information and observations to come to interesting general conclusions.

  3  I make general conclusions from the specific pieces of information or observations; the conclusions generally show I have used the information or observations in a way that makes sense.

  2  I make conclusions from the specific pieces of information or observations and describe how I used the information, but some conclusions and descriptions don't make sense.

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- I use a variety of methods and resources when gathering information for my task.

  4  I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don't think of or don't know about. My methods are unusual but effective.

  3  I use important information resources and useful methods when I gather information for my activity.

  2  I miss some important information resources and fail to use some of the best methods when I gather information for my activity.

  1  I do not use important information resources or the best methods when I gather information for my activity.
**ACTIVITY NAME:**  
*TASTE OF DIRT?*

**Subject Area(s):** SCIENCE, AGRICULTURE

**Duration:** Three - five class periods

**PROJECT SUMMARY:**
Students address the question of acidity or alkalinity of soil. The activity leads students to understand that plants “taste dirt” just as humans can distinguish acidity of lemons from that of a food such as bread.

**CONTENT STANDARDS:**

**Science Education:** Earth Systems and the Universe
- **Forces that Shape the Earth:** Students analyze the scientific view of how the Earth’s surface is formed.
  - Compare different kinds of soil and their formation.
- **Nature of Matter:** Students examine the nature of matter.
  - Explain common chemical reactions (e.g., electrolysis, replacement in acid/base reactions, oxidation).

**Career and Life Skills:** Skills for Life and Work
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  - Managing Information: Use computers and a variety of other resources to acquire and evaluate, organize and maintain, interpret and communicate information.

**Life Skills:** Complex Thinking
- **Problem Solving:** develop and test a method or product for overcoming obstacles or constraints to reach a desired outcome.
  - Identifies viable and important alternatives for overcoming the constraints or obstacles.
Life Skills: Information Processing

• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.

• Recognizes where and how projects would benefit from additional information.

**DRIVING QUESTION(S):**

• How does the acid or alkaline level in soil affect the growth of plants?
• How can the level be changed to meet the requirements of certain plants?

**MATERIALS:**

• Three samples of different soils, three glass jars, red and blue litmus paper, water, and agricultural lime.

**ACTIVITY PROCESS:**

• Have students describe the “taste” of something high in acidity. They could be asked to place some familiar foods on a continuum from most to least amounts of acid. Use this as a transition into soil contents. We will test for level of acid in the soil, rather than taste the dirt.

• Decide if the hands-on portion of the activity will be done by each team or conducted as a demonstration for the entire class. If the teams are to do the experiment, each should have a set of the needed materials.

• Put each soil sample in one of the jars. Add water and shake. After the soil has settled, test the water above it with the blue litmus paper. If the litmus paper turns pink, the soil is acid. If the blue litmus paper does not change color, test with the red litmus paper. The red will turn blue if the soil is alkaline.

• Take the jar with acid soil, add some lime and shake. Test again with the blue litmus paper.

• Explain that soils are regularly tested because plants have different “tastes.” Introduce the value of pH used to indicate level of acidity/alkalinity.

• Provide students with the opportunity to observe soil/water testing (site visitation to a laboratory or to a hydroponics farm). If the site visitation is not possible, bring a specialist or farmer in to demonstrate the process and discuss the reasons for the testing.
• Students work in teams to formulate questions for the experts, and collect information from various sources.
• Students are to submit individual reports on pH testing and its importance in growing plants. They are to add a section on what can be done to change the level of acidity.

**CONTENT:**

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<tr>
<td>The pH indicates soil’s acid or alkaline level.</td>
<td>• Testing for Acidity</td>
<td>• Work in groups</td>
</tr>
<tr>
<td>Plants have acid-alkaline requirements.</td>
<td>• Report Writing</td>
<td>• Problem Solving</td>
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</table>

**STRATEGIES:**

• **Grouping:** Students may work in small teams. Each team member should have a role and assignment in completing the project. The activity also requires that each student submit a written report. The time line should allow time for the students to complete this individual report, including finding viable solutions for changing the acidity levels of the soil to meet plant requirements.

• **Questioning:** This activity tries to get students to ask good questions in order to complete a comprehensive report. For example, the student who is interested in strawberries and stops at the point of learning that strawberry plants grow well in acid soil has missed the question: “What if the soil is highly alkaline?”

**COMPONENTS:**

• **Product:** This activity requires a written report by each individual.

• **Student Learning Tasks:** The first task for the students will be testing or observing the simple litmus paper test of water and soil. Skills such as predicting and questioning should be encouraged.

Formulating good questions to pose to experts is an important part of this activity. Students need to be sure they ask questions that will get them responses, which will contribute to their report.
Observing the testing process will be helpful to most students, especially when the process is authentic; that is, it occurs as a regular part of the world of work. Student will also have an opportunity to explore possible careers or jobs that are in the community.

- **Instructional Support:** Support to the students should include prompts or guide questions as they conduct the experiment or begin planning their research.

As mentioned above, onsite visitations are highly instructive and the authenticity will have significant benefits to the students. Experts coming into the class will also support the students' learning.

**ASSESSMENT:** Samples attached.

- **Product Outcomes:** The products may be assessed by individual teachers, or between teachers. For example, they may receive credit as an English assignment, Science project, and/or Agriculture research. Working together, teachers can recognize students' learning of content through multiple contexts. This will help students understand that their learning is “authentic” in the sense that it relates to the a comprehensive picture of the world, rather than to an isolated discipline area.

- **Process Outcomes:** Group and individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate groups and individuals as they engage in completing the project. Students may also be asked to do a self-assessment.

**NOTES:**

Farmers and scientists, working together, have found out how to make the best use of land. Recognizing that different plants need different types of soil leads to matching the right crop to the right soil.

All soils have various minerals but the amounts are different in different soils. Soils can be analyzed more formally. One of the areas is the acid-alkaline levels. Plants grow best when their acid-alkaline requirements are properly met. As the students observed, there are things that can be done to adjust the levels, such as adding lime. (See pH Chart at the end of this activity.) Most horticultural crops “like” a range just below neutral (6.0 to 7.0). Plants such as primrose and prickly pear like neutral soil.
(pH of 7). Many plants grow faster and produce more fruit in a slightly acid soil because plant food elements are more available at 6.0 – 7.0 pH levels. These include strawberry, pomegranate, azalea, and broccoli. Alkaline soil (pH above 7) support plants like the wild rose, carnation, cabbage, beets, squash, iris, daffodils.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

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<td>ORGANIZATION: At least three main ideas with elaborate supporting details provided. Transitions are smooth.</td>
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<tr>
<td>MECHANICS: Word usage, sentence structure, punctuation, spelling, capitalization.</td>
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<tr>
<td>VOCABULARY: Word choice, accuracy, appropriate selection.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains the acid-alkaline levels in soil and their effect on plant growth.

4 Demonstrates a thorough understanding of how the soil’s acid-alkaline level affects plant growth. Gives examples of ways that the level can be altered to meet the requirement of a plant.

3 Displays a complete and accurate understanding specific to the project.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about the soil composition and the outcomes of the project.
PROCESS OUTCOMES:
Observation rating:

• **Student recognizes where and how the project would benefit from additional information.**

  4  Insightfully determines the types of information that will benefit the written report and effectively seeks out that information, including formulating appropriate questions.

  3  Accurately assesses the information needs for the written report and the clarification or support needed. Seeks the needed information.

  2  Does not accurately assess the information needs for the written report or fails to seek out needed information.

  1  Makes little or no attempt to assess whether the report would benefit from additional information.

• **Student identifies viable and important alternatives for overcoming the mismatch between a plant and the soil.**

  4  Identifies plausible solutions to the problem. The solutions address the central difficulties posed by the mismatch between the soil and the plant’s requirements.

  3  Proposes alternative solutions that appear plausible and that address the most important constraint.

  2  Presents alternative solutions for dealing with the problem, but the solutions do not all address the important difficulties.

  1  Presents solutions that fail to address critical parts of the problem.
Self Assessment:

- **I recognize when more information is needed and explain how the new information would improve the completed project.**
  
  4 I recognize when more information is needed, even when other people may think the project is fine. I explain how the report would benefit from additional information and I formulate appropriate questions to get that information.

  3 I recognize that more information would make the completed project better and explain how additional information would improve it. I then find the information.

  2 I do not recognize when a project needs more information. Even if I decide more is needed, I do not find the information.

  1 I do not try to recognize when a project needs more information.

- **I suggest workable and effective solutions for dealing with the mismatch between the soil and the plant so that the plant can grow successfully.**

  4 I suggest a number of interesting and workable solutions. My suggestions show I have thought carefully and done sufficient research; the solutions relate directly to all of the possible problems.

  3 I suggest a number of workable solutions. My suggestions will help improve the growing conditions for the plants.

  2 I suggest several solutions, but some of them do not help solve the important problems.

  1 I suggest solutions, but my suggestions do not relate to the problems.
pH levels of Soil

- If pH value is too low, plants cannot absorb aluminum and iron from the soil. If pH value is too high, nitrogen and phosphorus are not available to the plant.

- To lower pH if soil is too alkaline, add Sulfur or Aluminum Sulfate.

- To raise pH if the soil is too acid, add Gypsum or Agricultural Lime
ACTIVITY NAME: DIRT RICH

Subject Area(s): SCIENCE, AGRICULTURE, FOOD SCIENCE

Duration: Three class periods over a couple of weeks

PROJECT SUMMARY:
Students learn that plants are part of the food cycle and that the soil provides essential food for plants. They start to explore what can be done to keep the soil rich and viable to support plant growth.

CONTENT STANDARDS:

Science Education: Earth Systems and the Universe
• Interdependence: Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
• Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*
• Describe the process of photosynthesis and the transformation of energy.

Career and Life Skills: Skills for Life and Work
• Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
• Interpersonal Skills: Participate effectively in varied roles as a member of a work team.

Life Skills: Collaboration/Cooperation
• Requires commitment to the group goal and effectively carry out assigned roles.
• Effectively performs a variety of roles within a group.

Life Skills: Information Processing
• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
• Effectively uses a variety of information-gathering techniques and information resources.
DRIVING QUESTION(S):

• What part does soil play in the food cycle?

MATERIALS:

• Large carrot, water, glass jar, red ink (or food coloring), black ink, knife;
• Rich soil containing humus, builder's sand (free from all humus), distilled water, corn kernels, flower pots.

ACTIVITY PROCESS:

• Have students share their ideas on the food cycle. Question: What part does soil have in the food cycle?
• Task 1: The Plant as Consumer and Cook
  • The teacher may want to do this demonstration due to time and equipment concerns, although it is simple enough for teams of students.
  • Cut a little hole into the top of the carrot.
  • Place the carrot into the jar containing red solution.
  • Fill the hole at the top with black ink.
  • As a demonstration, the above steps can be shown with one carrot. Meanwhile another carrot should have been prepared several hours earlier.
  • Students are asked to predict what will happen.
  • After sitting in the solution for a few hours, cut the carrot in half lengthwise.
  • Students are to individually observe the outcome and speculate what happened.
  • Share the story of Van Helmont's experiment and his conclusion compared to what is known today.
• Task 2: Food Cycle
  • Divide class into teams.
  • Half of the teams will be provided the humus-rich soil, the other half the sand and distilled water.
  • A flower pot should be filled with the assigned medium, and 2-3 kernels of corn planted. Teams should clearly label their pots and all pots should be placed where they have the same amount of heat and light.
  • Teams with sand-filled pots are to use distilled water; the other teams are to use regular tap water. Watering should be done about the same time and in the same amounts each day.
• At the end of two weeks (or less), teams are to observe the results of their efforts. Comparisons may be made across plants of other teams.

• Allow time for research.

• Teams with the sand medium share their findings and information with each other. These teams select a representative group to present their report.

• Likewise, the teams with the humus-rich soil will meet and share their information. And they will select their representatives to make the presentation.

• An exhibit prepared by others on the teams will add to the presentations.

• Each student submits a paper describing what they learned from both tasks.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants consume food from the soil and air, and resources that they use to produce food.</td>
<td>Report writing</td>
<td>Work in groups</td>
</tr>
<tr>
<td>Minerals are needed by plants for growth. These are found in humus and ordinary water.</td>
<td></td>
<td>Oral communication</td>
</tr>
<tr>
<td>Decaying bodies and plants provide new minerals in the soil for plants to grow; animals feed on plants; thus the dependence on each other for survival forms a food cycle.</td>
<td></td>
<td>Information Processing</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

• **Grouping:** Students work in small teams (3 to 4). Each team member should have an “assignment” in completing the project. For example, the team members could be assigned roles such as researcher, waterer, observer/recorder. The teams also
have the opportunity to meet as a larger group. Skills in interpersonal relating and leadership become important as this larger group needs to plan a presentation.

- **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review.

**COMPONENTS:**

- **Product:** This activity has three possible products.
  - Oral presentation of what the group concluded
  - Physical exhibit of models or results
  - Written report done by each individual on what was learned

- **Student Learning Tasks:** In order to complete the products, the students should be guided through tasks that will enhance their products and their learning.
  - Observing: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  - Conducting research: Locating and collecting information, synthesizing information.
  - Experimenting: Conducting simulation.
  - Collaborating: Understanding and being sensitive to others; clarifying goals.
  - Composing: Developing oral and written reports.

- **Instructional Support:** The activity can be supported by providing students with prompts or guide questions such as the following:
  - What do you think will happen?
  - What are some influencing factors, including those that are not “visible?”
  - What would happen if …? 
  - Where might you look for information to confirm your ideas?
  - Who might you interview or ask?
  - What conclusions can you make based on the information you collected?

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.
- **Product Outcomes:** The presentations and individual reports may be assessed using rubrics or criteria established by the teacher/class. For the oral presentation and the exhibit, the teacher and peer groups may do the rating. For the individual reports, it is recommended that the teacher do the rating.

**NOTES:**

Green plants make their own food from water and carbon dioxide with the help of chlorophyll and sunshine. Plants take minerals and water from the soil through its roots (stomates) to the leaves. The sugar and starch that are produced help to build new plant tissues and are also stored in the roots of plants. This process is quite visible in Task 1.

Van Helmont, a Flemish scientist, first conducted the experiment of weighing a young willow tree and placing it in a tub of soil that had also been weighed before. After five years of adding only water, he carefully weighed the tree and soil again. The tree had gained 2,637 ounces, but the soil had lost only 2 ounces. This made him believe that the tree did not get its food from the soil.

However, we now know that trees do take minerals from the soil. These minerals do not weigh much, but are very important for the plant. The minerals are taken with the water to the leaves, where the stomates let in air. The water combines with carbon dioxide of the air to form starch and sugar. These basic foods are then combined with the minerals from the soil to form fats, proteins, and vitamins.

The question now is how minerals get back into the soil? As shown in Task 2, the humus and ordinary water are rich in minerals. So, if the natural process is permitted to continue, the minerals in the soil would never be used up because the decaying bodies of dead animals and plants provide new minerals. Animals then feed on the growing plants. The dead bodies of these animals become the food for the plants, thus each depends on the other for survival. This simplistic explanation describes the food cycle. Humans use both plants and animals for growth and as a source of energy, so humans also participate in the food cycle.

But what about soil? What part does it play in the food cycle? If we studied soil and all the activity that is going on in it, what would we see?

**RESOURCES:**

- Food: Just Grow It! ROT FOR YOUR PLOT
PRODUCT OUTCOMES:

Projects:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The visual and written presentations were comprehensive.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The visual and written presentations reflect high standards of quality.</td>
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<tr>
<td>4. Optimum use of team members' strengths were evident in the products.</td>
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</table>

Content Knowledge:

- Student explains the relationships among producers, consumers, and decomposers in a food web.

4 Demonstrates a thorough understanding of the different players and the process occurring in a food web or cycle. Is able to elaborate beyond the demonstrations in the activity.

3 Displays a complete and accurate understanding specific to the activity.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about the interrelationships in the food cycle.
PROCESS OUTCOMES:
Observation rating:

- **Student effectively performs a variety of roles within a group.**
  
<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Effectively performs multiple roles within the group.</td>
</tr>
<tr>
<td>3</td>
<td>Effectively performs two roles within the group.</td>
</tr>
<tr>
<td>2</td>
<td>Makes an attempt to perform more than one role within the group but has little success with secondary roles.</td>
</tr>
<tr>
<td>1</td>
<td>Rejects opportunities or requests to perform more than one role in the group.</td>
</tr>
</tbody>
</table>

- **Student effectively uses a variety of information-gathering techniques and information resources.**
  
<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Uses the important information-gathering techniques and information resources necessary to complete the activity. Identifies little-known information resources or uses unique information-gathering techniques.</td>
</tr>
<tr>
<td>3</td>
<td>Uses the important information-gathering techniques and information resources necessary to complete the activity.</td>
</tr>
<tr>
<td>2</td>
<td>Fails to use some significant information-gathering techniques and resources.</td>
</tr>
<tr>
<td>1</td>
<td>Fails to use the most important information-gathering techniques or information resources.</td>
</tr>
</tbody>
</table>
Self Assessment:

- I perform a variety of jobs in my group.
  4  I perform many jobs in my group and do them all well.
  3  I perform two jobs in my group and do both well.
  2  I try to perform two jobs in my group but don’t perform both well.
  1  I don’t even try to perform any more than one job in my group.

- I use a variety of methods and resources when gathering information for my task.
  4  I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don’t think of or don’t know about. My methods are unusual but effective.
  3  I use important information resources and useful methods when I gather information for my activity.
  2  I miss some important information resources and fail to use some of the best methods when I gather information for my activity.
  1  I do not use important information resources or the best methods when I gather information for my activity.
ACTIVITY NAME:  UNDER-COVER CRITTERS AND CREATURES

Subject Area(s):  SCIENCE, AGRICULTURE,

Duration:  Three class periods over a couple of weeks

PROJECT SUMMARY:
Students learn that composting involves many “critters and creatures,” each performing a valuable role in the process of transporting, eating, excreting, and decaying.

CONTENT STANDARDS:

Science Education:  Earth Systems and the Universe
- Interdependence:  Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
  - Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*
  - Identify and describe the biotic and abiotic factors that affect the carrying capacity of a specific niche.

Language Arts:  Reading and Literature
- Comprehension Processes:  Use strategies within the reading processes to construct meaning.
  - Generate questions, identify issues or problems, and investigate answers or solutions using general and specialized information sources.

Life Skills:  Habits of Mind
- Controls own behavior and thought processes.
  - Makes effective plans.
  - Is aware of and uses necessary resources.

Life Skills:  Information Processing
- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
  - Effectively interprets and synthesizes information.
DRIVING QUESTION(S):

- What is happening in the process of composting?
- What are the relationships among biotic and abiotic factors in the composting pile?

MATERIALS:

- List of Critters and Creatures (attached)

ACTIVITY PROCESS:

- Have students feel and observe the sample compost. Question: What do you think is happening?
- Students may be paired for this “I-Search” project.
- Explain that in a larger pile of compost, there are many “critters and creatures.” Distribute the list.
- Have the students choose (or assign) a critter or creature study.
- Reports by the individuals (or dyads) are to be submitted including information addressing:
  - What is it?
  - What does it do under cover of the pile?
  - How does it get there?
  - What is the process that is occurring under-cover?
  - Where in the process does the critter/creature come into play?
  - How does it contribute to the process?
  - What is the final result?
  - What happens to the critter/creature?
### CONTENT:

<table>
<thead>
<tr>
<th><strong>Content Knowledge</strong></th>
<th><strong>Content Skills</strong></th>
<th><strong>Process Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decaying bodies and plants provide new minerals in the soil for plants to grow.</td>
<td>• Research</td>
<td>• Planning</td>
</tr>
<tr>
<td>• Decomposing organisms produce compost within a balance of water-air and carbon-nitrogen.</td>
<td></td>
<td>• Reporting</td>
</tr>
<tr>
<td>• Decomposing organisms produce heat in the process.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

### STRATEGIES:

- **Grouping**: This is primarily an individual activity, although it may be accomplished with dyads (pairs of students). Pairing may be helpful in heterogeneous situations.

- **Information Sources**: Reference books or Internet addresses may be made available in the classroom for students to review.

### COMPONENTS:

- **Product**: This activity calls for individual (or dyad) research.

- **Student Learning Tasks**: In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - **Observing**: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  - **Planning**: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - **Conducting research**: Locating and collecting information, synthesizing information.
  - **Composing**: Developing written report, seeking feedback, assessing own work.

- **Instructional Support**: The activity can be supported by providing students with prompts or guide questions such as the following:
What do you think is happening?
What other organisms or things are involved?
What are some influencing factors, including those that are not “visible?”
What would happen if .... ?
Where might you look for information to confirm your ideas?
Who might you interview or ask?
What conclusions can you make based on the information you collected?

ASSESSMENT: Samples are attached.

- Process Outcomes: Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- Product Outcomes: The individual reports will probably be rated by the teacher.

NOTES:

The activity precedes the actual production of compost. The idea on “replenishing” the valuable nutrients in soil through natural means requires an understanding of what is happening in this natural process. Under the cover of dirt and dead plants and other “stuff” there is a myriad of activities that illustrate complex interdependence and interrelationships.

The focus is on decomposers (critters and creatures); however, there are other factors that are as important in the production of compost. Water is required by all living things, including decomposing organisms. Likewise, oxygen is essential. Together, there needs to be a balance between water and air. Not too much water and the right amount of circulation. Carbon is broken down by decomposers to create food-energy, but nitrogen is needed to assist digestion of carbon-rich materials. So a balance is also needed between carbon and nitrogen.

Briefly, the “critters and creatures” listed for study by the students are part of the composting process. Their roles in the process are summarized in the FJGI: Partial Reference in the appendix.

A bulletin board display may be developed with the studied organisms and a brief description of each prepared by the students on colored paper. These would be
posted and colored yarn may be used to connect each to the related factors or organisms. Be sure to add "commons" such as decaying vegetation, excrement, dead insects, etc.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
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</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains the relationships among decomposers and other biotic and abiotic factors in compost production.

  4 Demonstrates a thorough understanding of the different players and the process occurring in compost production. Is able to elaborate beyond the assigned organism.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the interrelationships in the compost production.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**
  
  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**
  
  4  Interprets the information gathered for the report in accurate and highly insightful ways. Proves a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- I plan carefully before I begin my project.

  4 I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

  3 I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

  2 I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

  1 I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I find meaning in information and then combine and organize information to make it useful for my project.

  4 I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

  3 I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

  2 I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

  1 I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
## CRITTERS AND CREATURES UNDERCOVER

<table>
<thead>
<tr>
<th>Organism</th>
<th>Assigned To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td></td>
</tr>
<tr>
<td>Actinomycetes</td>
<td></td>
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<tr>
<td>Fungi</td>
<td></td>
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<tr>
<td>Flies</td>
<td></td>
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<tr>
<td>Sowbugs</td>
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<td>Springtails</td>
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<td>Amphipods</td>
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<tr>
<td>Flatworms</td>
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<td>Earwigs</td>
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<tr>
<td>Millipedes</td>
<td></td>
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<tr>
<td>Snails and Slugs</td>
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<tr>
<td>Mites</td>
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<tr>
<td>Termites</td>
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<tr>
<td>Centipedes</td>
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<td>Spiders</td>
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<td>Beetles</td>
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<td>Cockroaches</td>
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<td>Ants</td>
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<td>Nematodes</td>
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<tr>
<td>Earthworms</td>
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</tbody>
</table>

**Food: Just Grow It! ROT FOR YOUR PLOT**
ACTIVITY NAME: COMPOST COOK-OFF

Subject Area(s): SCIENCE, AGRICULTURE,

Duration: Two - four weeks

PROJECT SUMMARY:
Students study composting—what slows the process, what accelerates it. This activity challenges teams of students to produce rich, disease-suppressing, plant nurturing, soil-improving substance.

CONTENT STANDARDS:

Science Education: Malama i ka 'Aina
• Sustainability: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
  • Conservation of Resources: Explain how methods for obtaining and using resources such as water, minerals, and fossil fuel have consequences on the environment.
  • Interdependence: Students describe, analyze, and give examples of how organisms are dependent on one another and their environment.
• Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*

Career and Life Skills: Skills for Life and Work
• Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  • Managing Resources: Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Life Skills: Habits of Mind
• Controls own behavior and thought processes.
  • Makes effective plans.
  • Is aware of and uses necessary resources.
Life Skills: Information Processing

• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
  • Effectively interprets and synthesizes information.

DRIVING QUESTION(S):

• What is happening in the process of composting?
• What factors affect the speed of composting? The richness of the compost?

MATERIALS:

• Depends on the recipes and methods to be used by the teams.

ACTIVITY PROCESS:

• Pre- Information Presentation: Have students discuss compost utilizing discussion questions such as:
  • How does it enhance soil?
  • How does it save our environment?
  • How is it made?
• Take the students to a site where compost is being produced and used. If an excursion is not possible, a walking tour to the agriculture department will suffice. Invite an extension specialist or organic farmer to make a presentation to the students. Have the guest share how compost is produced and what it is used for.
• Post - Information Presentation: Have students discuss other methods of replenishing nutrients in the soil. Discuss advantages and disadvantages of these methods compared to using compost.
• Divide students into Compost Teams for the Cook-off. Teams will be working on producing the best compost in the shortest time.
• Share Composting Information from the CTAHR with each team.
• Provide study and planning time for the teams. Encourage the teams to do research and/or interview practitioners. In the process of planning for their production, the students should address the following:
  • What is the total amount of time we have?
• What is the average time recommended in compost production information?
• What causes delays in the process? What accelerates the process?
• What ingredients should we have in our batch? How much of each?
• How will we set the process up? On the ground? In a container? Covered?
• Where will the composting be set up?
• Who will be responsible for what? Daily schedule of activities?

• Teams are to submit plans on specified date. Inform teams that “judging” will be done by experts from the community.
• Each team will submit a final report, describing the methods, ingredients, amounts, and changes occurring over time. The report should also identify problems faced and alternatives/solutions implemented.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compost is a dark, crumbly, earthy-smelling form of decomposing organic matter.</td>
<td>• Research</td>
<td>• Planning</td>
</tr>
<tr>
<td>Composting is important because it returns nutrients to the soil by recycling.</td>
<td></td>
<td>• Reporting</td>
</tr>
<tr>
<td>A well-managed pile can yield rich compost in a reasonable time.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** Each member’s diligence in completing his/her responsibility, as well as in taking ownership of the project will be important.

• **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review.
COMPONENTS:

- **Product**: This activity calls for individuals to work in teams over a rather prolonged period of time. The team’s plans, schedule, and assignment of responsibilities will be critical to its success.

- **Student Learning Tasks**: In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Observing: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Conducting research: Locating and collecting information, synthesizing information.
  - Monitoring: Daily assessment of developments, reflecting on cause and effects, modifying process as needed.
  - Composing: Developing written report, seeking feedback, assessing own work.

- **Instructional Support**: The activity can be supported by providing feedback to students with prompts or guide questions such as the following:
  - What do you think is happening?
  - What do you smell?
  - How much heat is being generated?
  - What animals or critters are being attracted that you don’t want?

ASSESSMENT: Samples are attached.

- **Process Outcomes**: Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes**: The team reports will be provided to the community experts to be considered as part of the overall judging. Criteria such as time, cost, phase of completion, and quality of compost should be shared with the students before the project starts.
In 1996, ORGANIC GARDENING conducted a search among its readers for the “speediest” compost methods. Ingredients ranged from various combinations of seaweed to horse urine-soaked sawdust. The winners reported having compost within 14 days and up to a month.

RESOURCES:

- FJGI: Partial Reference (appendix)
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided shows careful documentation.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains the ingredients and methods used in compost production.

  4 Demonstrates a thorough understanding of the different factors and the process occurring in compost production. Is able to explain problems encountered and solutions.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the interrelationships in the compost production.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4 Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3 Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2 Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1 Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**

  4 Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3 Accurately interprets information gathered for the report and concisely synthesizes it.

  2 Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1 Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- I plan carefully before I begin my project.

  4 I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

  3 I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

  2 I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

  1 I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I find meaning in information and then combine and organize information to make it useful for my project.

  4 I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

  3 I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

  2 I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

  1 I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
“Why Organic Growing?”

INTRODUCTION:

The theme of sustainability is taken from the Science Content Standards: Malama i ka ‘Aina. Activities for this component provide students with understandings relating to organic alternatives to producing food.

CONTENT STANDARDS:

Across the activities in this unit, several content standards provide the thrust for the student learning tasks. Specific references are made to directly related standards and their respective benchmarks. At the same time there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

Science
- **Historical Perspectives- Malama i ka ‘Aina: Sustainability.** Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- **Organisms and Development: Interdependence.** Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.

Health Education
- **Concepts: Community and Environmental Health.** Students comprehend concepts related to health promotion and disease prevention.
- **Advocacy:** Students advocate for personal, family, and community health.

Social Studies
- **Geography: Environment and Society.** Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.

Career and Life Skills
- **Individual, Family and Community Development:** Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
LIFE SKILLS:

Although a range of life skills is reflected among the activities in this unit, particular focus should be on developing the skills for Problem Solving. The standards and the performance indicators for problem solving include:

**Identification of constraints or obstacles.**
- Students accurately identify the most important constraints or obstacles.

**Identification of alternatives for overcoming constraints or obstacles.**
- Students propose alternative solutions that appear plausible and that address the most important constraints or obstacles.

**Selection and trial of alternatives.**
- Students engage in valid and exhaustive trials of the selected alternatives to determine their utility.

CONCEPTS:

Understanding of the theme of sustainability as it applies to food production is developed through concepts such as:

- Our early Hawaiian ancestors understood the fragility of the island environment and practiced sustainable growing strategies.
- The agricultural use of synthetic controls and enhancements in the past have residual effects on us today.
- Many obstacles and conflicts on organic or sustainable growing practices are based on limited knowledge.
- The community of consumers is becoming more health conscious and the demand for organically grown food is increasing.
ACTIVITY NAME: MALAMA I KA ‘AINA

Subject Area(s): AGRICULTURE, SCIENCE, SOCIAL STUDIES

Duration: Four class periods

PROJECT SUMMARY:
Students read about early Hawaiians and their sustaining practices of food production. They then visit a modern grower to collect information on today’s practices in growing the same plants. Ancient and modern philosophies are reported by the students on growing practices and uses of the product.

CONTENT STANDARDS:

Science: Historical Perspectives
• Malama i ka ‘Aina: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
• Sustaining Food Supply: Trace food technology from planting to human consumption.*

Social Studies: Geography
• Environment and Society: Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.
• Explain how people depend on, adapt to, and modify the physical environment in their community, and demonstrate stewardship of a local environment.

Health Education:
• Students comprehend concepts related to health promotion and disease prevention.
• Describe the short and long term benefits and consequences of community and environmental health practices.

Life Skills: Information Processing
• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information.
• Effectively uses a variety of information-gathering techniques and information resources.
Life Skills: Complex Thinking

- Problem Solving. Developing and testing a method or product for overcoming obstacles or constraints to reach a desired outcome.
  - Accurately identifies constraints and obstacles.

DRIVING QUESTION(S):

- How did the ancient Hawaiian farmer grow food?
- How are similar plants grown today?
- How have the farming practices and use of products changed? What are some of the influencing factors.

MATERIALS:

- Reading excerpts from Plants in Hawaiian Culture by Beatrice Krauss, 1993
- Hawaiian Moon Calendar

ACTIVITY PROCESS:

- Pre-arrange for students to visit farms that are growing plants such as taro, awa, noni, ti, sweet potato, banana, yams, sugarcane or flowers such as 'ilima, 'awapuhi. If onsite visits are not possible, arrange for the growers to visit the class on different days.
- Have students read the attached introductory excerpt as a homework assignment.
- Have students identify and discuss the important beliefs and strategies of the ancient Hawaiian farmer.
- Divide the class into groups by interest. That is, each group will study one of the plants grown by the ancient Hawaiian farmer that is still being grown today. Have them choose from a list of plants that have links in the farming community.
- Distribute a summary sheet of the selected plant to the respective group, if available.
- Each group is to do preliminary research on the plant selected. Information should cover the growing and use of the plant in ancient times and in modern times.
- Should onsite visitation be possible, the students will have the opportunity to see how a modern farmer propagates, grows, harvests, and prepares the plant product for use. This information should be added to the students' research.
• If onsite visitations are not possible, arrange for the farmers to come to the class to share information (on different days). In this case:
  • Each group will be responsible for making a short, introductory presentation on the information the group gathered about the plant on the day the farmer is scheduled to speak.
  • The group will then introduce the speaker to the entire class and help him/her as needed throughout the presentation.
  • Each group will be responsible for sending the farmer an appropriate letter of appreciation.
• The activity is completed with each group (or each member of the group) submitting a report on the plant studied, the comparison of ancient and modern growing practices and uses.
• If onsite visitations are taken, each group will share the final report by making a presentation to the whole class. This presentation should include pictures and illustrations. In some cases, the products may be shown.
• Each group is to develop three “test” questions from the information in the group report. These questions are to be turned into the teacher before the group presentations are made. The questions will become a test for the class after the activity is completed.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The Hawaiian farmer, <em>mahī’ai</em>, was an excellent horticulturist.</td>
<td>• Problem solving</td>
<td>• Working in groups</td>
</tr>
<tr>
<td>• The ancient Hawaiians developed knowledge about the natural systems, the plants, and each locality, which they used to increase and improve their harvests.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>
STRATEGIES:

- **Grouping:** Students will be working in groups activity. Group members should have individual assignments.

- **Information Sources:** The use of a local farmer will provide the students with information, as well as the opportunity to find out about other sources of information. With “live” experts, the students may be able to ask questions to determine what the experts’ perspectives are and how they came about.

COMPONENTS:

- **Product:** The students gather information, synthesize and compare data, and prepare a report. The report will be shared with the entire class.

- **Student Learning Tasks:** In this activity, students’ learning tasks run the gamut from reading to onsite visitation. Basically an information gathering opportunity, the activity attempts to have students think about consequences by having them compare the ancient and modern practices and the factors influencing change.

- **Instructional Support:** Instructional support will include facilitation and coaching by the teacher, authentic demonstrations, and accessibility to information sources.

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The group products may be assessed using rubrics or criteria established by the teacher/class. For the oral presentation, the teacher and peer groups may do the rating. Declarative (knowledge) learning of each student is tested using the questions developed by the groups.
NOTES:

Each island has some farming and production activity relating to “native” plants. There has been a recent resurgence of interest in “native” plants with the marketing of health-related products such as mamaki tea, awa potions, and noni drinks.

Some food products such as taro and banana have been facing difficulties involving space and water restrictions, pests, and decreasing interest in the labor intensive practices. These difficulties have occurred while the market demand remains high. As farmers address these and other natural constraints (e.g., drought), changes are often needed. For the students, they need to see how the changes affect the present and future environment of our islands.

There are many extensions possible from this activity. For example, as students share information on ancient and modern uses, there may be interest expressed in the medicinal values of certain plants. Inviting a la‘au lapa‘au may be appropriate. Students may be interested in other cultures, which may lead to an international study. Japan would be a good example.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Projects: Group Report

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
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</thead>
<tbody>
<tr>
<td>1. The written and oral presentations were comprehensive and informative.</td>
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<tr>
<td>2. The information showed that a range of resources was used.</td>
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<tr>
<td>3. The report and presentation reflect high standards of quality.</td>
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<tr>
<td>4. Optimum use of team members' strengths were evident in the report.</td>
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</table>

Content Knowledge:

- Student explains ancient and modern farming practices and compares and contrasts them.

  4  Demonstrates a thorough understanding of the farming practices used in ancient and modern times for growing the selected plant. Explains changes in growing practices and uses.

  3  Displays a complete and accurate understanding specific to the project.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the growing practices and changes occurring over the years.
PROCESS OUTCOMES:

Observation rating:

- **Student effectively uses a variety of information-gathering techniques and information resources.**
  
  4 Uses the important information-gathering techniques and information resources necessary to complete the task. Identifies little-known information resources or uses unique information-gathering techniques.
  
  3 Uses the important information-gathering techniques and information resources necessary to complete the task.
  
  2 Fails to use some significant information-gathering techniques and information resources necessary to complete the task.
  
  1 Fails to use the most important information-gathering techniques or the major information resources necessary to complete the task.

- **Student accurately identifies constraints and obstacles.**
  
  4 Accurately and thoroughly describes the relevant constraints or obstacles. Addresses obstacles or constraints that are not immediately apparent.
  
  3 Accurately identifies the most important constraints or obstacles.
  
  2 Identifies some constraints or obstacles that are accurate along with some that are not accurate.
  
  1 Omits the most significant constraints or obstacles.
Self Assessment:

- I use a variety of methods and resources when gathering information for my task.

  4 I use important information resources and useful methods when I gather information for my task. I even find resources that other people don't think of or don't know about. My methods are unusual but effective.

  3 I use important information resources and useful methods when I gather information for my task.

  2 I miss some important information resources and fail to use some of the best methods when I gather information for my task.

  1 I do not use important information resources or the best methods when I gather information for my task.

- I accurately recognize and describe the limits or barriers that made it difficult for the farmers to achieve their goal.

  4 I accurately recognize all the important limits or barriers that made it difficult for the farmer to achieve his/her goal. I describe, with details, how the limits or barriers made it difficult. I even recognize and describe lesser limits or barriers that caused difficulty.

  3 I accurately recognize and describe the major limits or barriers that made it difficult for the farmer to achieve his/her goal.

  2 I recognize and describe some of the major limits or barriers that made it difficult for the farmer, but I miss some important ones or inaccurately describe them.

  1 I describe what I see as limits or barriers but do not recognize or describe any of the major limits or barriers that made it difficult for the farmer.
FOOD

When the first Polynesian voyagers landed and settled in Hawaii, they would have found many things to their liking: no inhabitants to conquer or make peace with, ample fresh water in streams and springs, forested mountains, and an abundance of fish in both streams and ocean. On the other hand, there were no plants to use for food, although later they were to find a few, of little value, in the forests. However, an exploratory/settler group would have carried planting material for both food and other plants with them besides what they needed to eat on the journey.

These settlers first established settlements along the shoreline, preferably at the entrance to valleys. Here the mouth of the stream furnished fresh water, the ocean a plentiful supply of fish. As a stream nears its mouth in wide valleys, it becomes more shallow and spreading; this often makes for a marshy area ideal for growing taro, the settlers' main food crop. On nearby hillocks they planted sweet potatoes, and coconuts along the strand. Sugarcane was planted near houses, yams in nearby woods, breadfruit at the edge of these woods, and bananas in sheltered areas nearby.

The Hawaiian farmer, mahi'ai, was a horticulturist par excellence; would that the agriculturist today were as skillful a planter! They demonstrated great ability in systematic differentiation, identification, and naming of the plants they cultivated and gathered for use. Their knowledge of the gross morphology of plants, their habits of growth, and the requirements for greatest yields is not excelled by expert agriculturists of more complicated cultures. They worked out the procedures of cultivation for every locality, for all altitudes, for different weather conditions and exposures, and for soils of all types. In their close observations of the plants they grew, they noted and selected mutants (sports) and natural hybrids, and so created varieties of the plants they already had. Thus over the years after their arrival in the Islands, the Hawaiians added hundreds of named varieties of taro, sweet potatoes, sugarcane, and other cultivated plants to those they had brought with them.

They recognized the value of what today is known as “organic farming”: incorporating into their cultivated areas such plant materials as weeds that grew during fallow periods and unused leafy portions of food plants, a type of green-manuring. No other types of fertilization such as the use of animal excreta was practiced.

All the many tasks associated with the preparation of the soil, planting, and often, harvesting, were performed with the use of a simple, crude tool, the 'o'o, or
digging stick, used to dig up the soil to make it fine; to make the holes and trenches for planting various crops; and finally, to dig up the root crops such as taro, sweet potatoes, and yams. The hands were used for weeding, clearing, raking, and shoveling; the feet, to shovel and push soil around maturing sweet potatoes and dry taro; to stamp or tramp the bottom soil of the lo'i, the flooded taro terraces and to make mounds on which the taro cuttings, huli, or shoots, pohuli, were planted in the taro patch.

Weather wisdom was of major importance to the Hawaiian farmer, not only from season to season, but from day to day. Weather was associated with two seasons: kau, summer, which began in May and was dry and hot; and ho'oiio, winter beginning in October, when it became rainy and chilly. The seasons were further divided into moon months; and as with many other native people, preparing the soil, planting, harvesting, and processing of plant materials were all performed according to the phases of the moon. Even the time of day was supposed to have an influence on such procedures. For example, the favored time to plant bananas was at noon, when the sucker cast no shadow but "rested" or "retired" within the plant; thus all the strength went into the trunk and fruit and the latter matured rapidly.

The food plants of old Hawaii can be divided into three groups: those known as staple foods, the principal starchy foodstuffs; those of lesser importance but still of significance because of their nutritive value and because they added variety to the diet; and those known as famine food plants.

Among the first group the most important was taro, kalo. Sweet potato, ʻuala; breadfruit, ʻulu; and yam, uhi, are also starchy food plants but were less important than taro in the amounts consumed as sources of carbohydrates.

Food plants such as banana, mai'a; sugarcane, ko; coconut, niu; candlenut, kukui; Polynesian arrowroot, pia; and ti, ki, belong to the second group: those plants whose primary value was to provide nutrients not present in the staple foods and to add variety to an otherwise bland diet.

It was primarily the wild plants in the forests that provided food during times of famine, although some of the less important of the second group of plants became important when the staple food crops failed.

The Polynesian explorers who discovered these Islands found no important food plants; they had some food plants with them, and settlers who followed them probably brought more. These early introductions, which have come to be known as "Polynesian introductions," are taro, sweet potatoes, breadfruit, yams, bananas, coconuts, sugarcane, and Polynesian arrowroot; but the most important was taro.
ACTIVITY NAME: VICTORY GARDENS

Subject Area(s): AGRICULTURE, SOCIAL STUDIES, FOOD SCIENCE

Duration: Two - three class periods

PROJECT SUMMARY:
Students take a walk back in history, during World War II when families were called upon to conduct patriotic activities such as having a Victory Garden. Some research is done to understand the role of the government in these activities during the war. But more importantly, students are asked to gather an oral history from a family member or friend who contributed to the war effort by helping with a victory garden.

CONTENT STANDARDS:

Social Studies: History

- Historical Empathy: Students learn to judge the past on its own terms and use that knowledge to understand present day issues, problems, and decision making.
- Develop historical empathy-analyzing the past on its own terms, not judging solely by present-day norms and values.

Career and Life Skills: Individual, Family, and Community Development

- Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
- Analyze the roles and responsibilities of communities in strengthening the well-being of individuals and families.

Life Skills: Complex Thinking

- Historical Investigation: Constructing an explanation for some past event for which an explanation is not readily available or accepted.
- Accurately identifies what is already known or agreed upon about the past event.

Life Skills: Communication

- Students communicate to gather information and to share information.
- Effectively communicates in a variety of ways.
**DRIVING QUESTION(S):**

- What are Victory Gardens? How did they get started?
- What were the purposes of victory gardens?
- How were victory gardens developed, maintained?

**MATERIALS:**

- Read to the students a simple story such as *Don’t You Know There’s a War Going On?* by James Stevenson. (Or one of the students with a dramatic flair may volunteer to do the reading.)
- Have students share what they know about World War II and the home effort. Ask the students to identify family members or friends who were children or teenagers during the war. (Some arithmetic will be needed!)
- The first assignment will be for each student to identify a family member or friend who helped with a victory garden during World War II. The students are to arrange to “talk story” with those individuals.
- Have the students read about Victory Gardens in World War II: What was the purpose of the activity? Who urged citizens to start gardens? Where could victory gardens be found? What resources were available?
- Discuss the upcoming “talk story” event that each student arranged. Brainstorm on what questions the students could ask to be sure that key information is gathered. For example:
  - Where were victory gardens planted?
  - What kinds of plants were grown?
  - Were seeds or seedlings distributed? By whom?
  - What kind of fertilizer was used?
  - How were weeds and bugs controlled?
  - What did people do with the products?
  - How long were these gardens kept?
- After the session, students are to write up their reports on Victory Gardens, based on their research and interview. Reports may include pictures, illustrations, and tape recordings, if available.
- Groups may be formed with members sharing and combining their information. Each group develops a static display and written report with the combined information.
CONTENT:

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<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Victory gardens were patriotic means of uniting people and providing food.</td>
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<tr>
<td>Victory gardens were “organic” gardens.</td>
<td>Orval history</td>
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<tr>
<td></td>
<td>Communication</td>
<td>Historical Investigation</td>
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</table>

STRATEGIES:

- **Grouping:** Most of the work in this activity is done independently. Each student will have a unique source of information. There is a suggestion at the end of the activity for students to work in groups to produce a composite report, combining all the information collected by group members and creating a report and exhibit.

- **Communication:** Because this activity depends on getting information from a person, students are placed in the position of both listening and asking questions. Their ability to relate to the “story teller” and to ask good questions will determine the extent to which they are able to get the information needed.

COMPONENTS:

- **Product:** The activity produces a documentation of Victory Gardens’ oral history. The documentation will be done individually, as well as in groups.

- **Student Learning Tasks:** The students learn through the experiences of others. Gathering the information through listening to and talking story with a person with a historical experience is the beginning of working with oral history.

**Instructional Support:** Students are provided with some information on victory gardens. Leading them to other references or resources will be additional support for the students who are seeking comprehensive information about the context within which victory gardens developed.
ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. Two teachers (e.g., Social Studies and Agriculture) may want to make and rate the same assignment in their respective classes.

NOTES:

There were many projects that were encouraged during the war. Among these were the victory gardens that produced food, as well as kept people busy. The value of these gardens was multi-dimensional; it reflected pride in country, willingness to contribute to the war effort, constructive and productive work, and camaraderie, among others.

There were victory gardens across the country and even in Europe. Food was being produced without sophisticated technology. Plants were grown with organic enrichment and mechanical pest controls. The products were healthy and contributed to the health of children and families on the home front.

Although canned foods were rationed items, there were relatively few food shortages in America during this time. The call to plant a victory garden was answered by nearly 20 million Americans. These gardens produced 40% of all that was consumed.

After the war, several cities and counties encouraged the people to continue their victory gardens for recreation as well as food. The idea persists in today's community gardens (county programs).

RESOURCES:

Food: Just Grow It! WOG
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
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<th>Deficient</th>
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</thead>
<tbody>
<tr>
<td>CONTENT: All essential, relevant information included.</td>
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<tr>
<td>ORGANIZATION: At least three main ideas with elaborate supporting details provided. Transitions are smooth.</td>
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<tr>
<td>MECHANICS: Word usage, sentence structure, punctuation, spelling, capitalization</td>
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<tr>
<td>VOCABULARY: Word choice, accuracy, appropriate selection.</td>
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</table>

Content Knowledge:
- Student explains how victory gardens came about and the purpose(s) they served.

4 Demonstrates a thorough understanding of victory gardens and their history. Explains how a victory garden was started and maintained.

3 Displays a complete and accurate understanding of the history and contributions of victory gardens.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about victory gardens and the purpose(s) they served.
PROCESS OUTCOMES:

Observation rating:

- **Student accurately identifies what is already known or agreed upon about the past event.**

  4 Presents a thorough and correct account of what is already known. Supplies information that may not be commonly known, but that has some bearing on the topic being studied.

  3 Presents an accurate account, with no important omissions, of what is already known or agreed upon about the topic being studied.

  2 Presents information on what is already known or agreed upon; however, the information may not be complete in all particulars, or the student may introduce some inaccuracies.

  1 Presents little or no accurate and important information about what is already known or agreed upon about the topic.

- **Student effectively communicates in a variety of ways.**

  4 Uses multiple methods of communication, applying the conventions and rules of those methods in highly creative and imaginative ways.

  3 Uses two different methods of communication, applying the conventions and rules of those methods in customary ways.

  2 Attempts to use two methods of communication but does not apply the conventions and rules of those methods.

  1 Uses only one method of communication when more than one method is clearly needed or requested and does not correctly apply the conventions and rules of that method.
Self Assessment:

- **I find and explain the information that everyone agrees is clear or known about victory gardens.**
  
  4  I find and accurately describe as much as possible about what is already clear or known about the topic. I check my information carefully to make sure it is correct. I even find information that very few people know and show why it is important to my topic.

  3  I find and accurately describe the important information that is already clear or known about the topic I am investigating.

  2  I find some important information that is already clear or known about the topic, but I miss important information or inaccurately describe my topic.

  1  I find little or no information that is already known about the topic.

- **I communicate well using a variety of media.**
  
  4  I use many methods of communication and I follow the correct processes and use the accepted standards of these mediums. I also use the mediums in new and different ways.

  3  I communicate using two mediums and follow the correct process and use the accepted standards for both of those mediums.

  2  I try to communicate using two mediums, but I make errors in the processes and misunderstand the accepted standards of the mediums I am using.

  1  I do not even try to communicate in more than one medium.
VICTORY GARDENS

"Prize Central Union Victory Garden Gone..."
by Peggy Hickok (Star Bulletin, 3/26/46 p. 1)

Some 487 brides have walked down the traditional aisle right into the vegetable gardens during the past three years.

It happened at Central Union church whose once rolling green lawn was turned into cabbage patches right after the blitz hit Hawaii. The only victory garden operated in a churchyard was a familiar sight during the blackout years but now it is gone and with it the hobby of some 15 men who worked the land and won many blue ribbons for their crops.

Gone too are the bomb shelters at Central Union with the only vestige left in the Rev. Allen Hackett’s office, a piece of rotted wood with “62 persons” painted on it.

Today the war memento is inscribed with the names of the persons in the church who helped pull down the bomb shelters in preparation for the peacetime garb of the grounds.

Inside a few months, Central Union’s lawn will be green again and the grounds, now bereft of the oldtime kiawes which were recently burned, will be like new again. Where the vegetables grew a new chapel will be built.

On January 1st a crew of volunteers from Central Union began to clean up the historic victory garden. Everyone worked hard including the pastor, organist R. Kenneth Holt and head usher Larry Mason.

Taking out the piping system used to water the three acres of gardens was another tough job for the ground crew a few weeks ago. But it took a 10 ton jack to jerk the side walls of the bomb shelters out before all was ready for the plowing of the field.

It was almost sad talking to some of the “farmers” who had worked their gardens there since 1942. Eugene Salyards, maintenance mechanic at the Honolulu Gas Co., was the first and last victory gardener at Central Union. He claims his parsnips raised there were the only ones ever produced in Hawaii and proudly displayed numerous blue ribbons for his products during the last three years.

The gardeners at the church were neighborhood men whom Mr. Salyards rounded up in February of ’42. They enjoyed their outside recreation after a full day’s work in town and became close friends under the spire of Central Union.
Community “Victory” gardens, a project that began as a wartime necessity, will continue indefinitely as peacetime recreation, officials of the board of agriculture and forestry announced yesterday.

The gardens were started at 11 locations during the war, and although seven were abandoned, residents of two other communities asked that new ones be inaugurated, so that six are now operating and will be kept up indefinitely.

About 160 persons are now responsible for plots.

The newest, located on Waiakamilo rd., is now open for “tenants”—30 persons who are willing to take care of a 20 by 40 foot plot, which agriculture officials say is large enough to raise vegetables to supply an average family. The plot was recently cleared of kiawe trees and has not yet been planted.

Tenants are asked to pay a small fee, usually about $2 per year depending on the location of the lot, and cost of the water used.

Other community gardens now being farmed are located at Auld Lane, one of the two new ones, and N. Vineyard St., Kapalama St., Dillingham Blvd, and Kapiolani Blvd.
ACTIVITY NAME: WHAT GOES DOWN STAYS AROUND!

Subject Area(s): SCIENCE, AGRICULTURE, SOCIAL STUDIES

Duration: Three - five class periods

PROJECT SUMMARY:
Students learn about the interrelatedness of natural systems, in particular the hydrologic cycle. They study the impact that human decisions have on the fragile balance in nature, such as in high-intensity agriculture.

CONTENT STANDARDS:

Science: Historical Perspectives
- *Malama i ka 'Aina:* Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- *Sustaining Food Supply:* Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology.*

Social Studies: Geography
- *Environment and Society:* Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.
  - Analyze the consequences of human modification of the physical environment in Hawaii, the United States, and other parts of the world, and implement a plan of action to address the consequences.

Health Education:
- *Students advocate for personal, family, and community health.*
  - Apply accurate health information to persuade others to make health enhancing choices as appropriate.

Life Skills: Complex Thinking
- *Constructing Support:* Developing a well-articulated argument for or against a specific claim.
  - Accurately qualifies or restricts the claim.
• **Problem Solving:** Developing and testing a method or product for overcoming obstacles or constraints to reach a desired outcome.
  • Identifies viable and important alternatives for overcoming the constraints or obstacles.

**DRIVING QUESTION(S):**

• How clean is your water?
• What’s going into the water system?
• What’s still found in the water?

**MATERIALS:**

• “How Clean Is Your Water?” article (OG, April 1998)
• Excerpts from *The Pesticide Conspiracy* by Robert van den Bosch (1978)
• “The Greening of the Green Revolution,” by David Tilman
• Labels from fertilizers, pesticides and herbicides containing chemicals such as atrazine, metachlor, prometon, simazine, diazinon, chlorpyrifos, cabofuran and carbaryl

**ACTIVITY PROCESS:**

• **Task 1:** What Goes Down?
  • Have students read the article, “How Clean Is Your Water?” (attached).
  • Invite students to share what they read and what they think.
  • Write their conclusions on the chalkboard or poster paper.

• **Task 2:** What Goes In?
  • Have students study the chemical labels. A summary of basic explanations is attached, if needed.
  • Invite Cooperative Extension Agent or Agricultural Specialist to share information with the students on the most widely used chemicals on the island, their purpose and use.
  • Provide students with information or have them access information (fact sheets or test results) from the National Quality Water Assessment.
  • Go back to their conclusions of Task 1 and entertain additional conclusions or summary statements.
• **Task 3:** What Stays Around?
  - Have students (individually or in small groups) find out what requirements or regulations are in place on your island to protect the water and environment from situations described in the readings.
  - Students are to submit a written report on: What have we learned?; Were our class conclusions valid?; What recommendations do we have for the problems?

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unintended adverse effects of pesticides include contamination of the Earth’s hydrological systems.</td>
<td>• Information Processing</td>
<td>• Constructing Support</td>
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<tr>
<td></td>
<td></td>
<td>• Problem Solving</td>
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**STRATEGIES:**

- **Grouping:** The activity can be done well by individuals. For students who have reading difficulties, pairing up will be more helpful. The opportunities for working together, discussing information, sharing ideas, and interacting with expert information sources will reinforce the complex thinking demands of the activity.
- **Feedback:** In the process of reviewing information and trying to put things together, students will benefit from feedback in the form of guide questions such as:
  - What conclusions/generalizations can you draw from this, and what support do you have for these conclusions?
  - What’s wrong with this? What specific errors have been made?
  - What is the support for this argument? What are the limitations of this argument?
  - What do you think about this issue? On what do you base your opinion?
  - Is there another way of looking at the issue?
  - What would happen if …?”
  - What’s the obstacle or barrier? How can we overcome this obstacle? This barrier?
  - Do we need more information?
COMPONENTS:

- **Product:** Through a written report, the students’ product will be a summary of what they have learned and what thoughts and recommendations they have relating to a major concern in our environment.

- **Student Learning Tasks:** This activity requires students to practice many complex thinking skills that are critical to learning and to problem solving. From the cues presented in the “How Clean Is Your Water” article, students begin inferencing (induction) and formulating conclusions. Reviewing product labels provides the students with additional information to strengthen their inferences. With reports such as the National Quality Water Assessment, they have access to findings and facts that they need to integrate into their formulation and refinement of conclusions. In reading other articles, the students need to distinguish and analyze perceptions as opposed to facts. The most difficult task to arrive at a comfortable conclusion, one that is sound and free of error or inaccuracies.

**Instructional Support:** Instructional support in the form of facilitating (providing access to information sources), coaching (helping develop strategies), and “leading from behind” (asking probing questions) will be very important in this activity. It takes the students from a hands-on environment into the rather abstract, regulatory realm of the real-world. The glue for stick-to-it-ism in this activity is the gravity and pervasiveness of the problem.

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. Or an arrangement with a Social Studies or Science teacher could be made where the students would also submit the paper for credit in more than one class (and therefore the paper would be rated by two teachers).
A hallmark of high-intensity agri-business is its dependence on pesticides and chemical fertilizers, especially those containing nitrogen. Inputs from humans are said to equal all natural inputs to the nitrogen cycle and are seriously affecting terrestrial, freshwater and marine ecosystems (Vitousek, P.M. et al. Ecol. Appl. 1997). But nitrogen is only one of the human inputs that enter and affect non-agricultural ecosystems. According to Diamond (Guns, Germs, and Steel: The Fates of Human Societies, 1997), no other activity has transformed humanity, and the Earth, as much as agriculture.

Students need to begin to understand the effects and consequences of human decisions and the interrelatedness of resulting actions among the man-made and natural systems. The hydrologic system is used because of its universal importance.
ASSESSMENT RUBRICS:  Samples

PRODUCT OUTCOMES:

Written Report

<table>
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<tbody>
<tr>
<td>CONCEPTS: Important concepts are identified and explained.</td>
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<tr>
<td>CONNECTIONS: Relationships among actions and systems are recognized.</td>
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<tr>
<td>CONSEQUENCES: Examples of immediate and long-term consequences are provided.</td>
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<tr>
<td>CONSTRUCT: Positions and recommendations are supported by facts/evidence.</td>
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Content Knowledge:

- **Student explains the potential and actual adverse effects of pesticides on our water system.**
  
  4  Demonstrates a thorough understanding of the potential and actual unintended adverse effects of certain agricultural inputs. Explains how these inputs such as pesticides contaminate the Earth’s hydrologic system.

  3  Displays a complete and accurate understanding of the effects of certain agricultural inputs on the natural water systems.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the natural water systems and the effects of agricultural inputs.
PROCESS OUTCOMES:
Observation rating:

- **Student accurately qualifies or restricts the claim.**
  
  4  Provides careful and reasoned qualifications or restrictions for the claim in such a way that the argument provides a unique perspective on the claim.
  
  3  Provides accurate qualifications or restrictions for the claim, with the result being a well-defended claim.
  
  2  Qualifies or restricts the claim, but leaves out important aspects of the qualifications or restrictions.
  
  1  Does not address qualifications or restrictions for the claim.

- **Student identifies viable and important alternatives for overcoming constraints or obstacles.**
  
  4  Identifies creative but plausible solutions to the problem under consideration. The solutions address the central difficulties posed by the constraint or obstacle.
  
  3  Proposes alternative solutions that appear plausible and that address the most important constraints or obstacles.
  
  2  Presents alternative solutions for dealing with the obstacles or constraints, but the solutions do not all address the important difficulties.
  
  1  Presents solutions that fail to address critical parts of the problem.
Self Assessment:

- **I provide enough information to support the statement.**

  4 I clearly and accurately present all the available information that strongly supports the statement. I describe how important each piece of information is to the support of the statement. I also explain what information is not available and what problems the missing information might cause.

  3 I clearly and accurately present all the important information that strongly supports the statement.

  2 I present some important information that supports the statement, but I don’t provide enough information or I leave out necessary information.

  1 I don’t present information that supports the statement.

- **I suggest workable and effective solutions for dealing with the obstacles or barriers so the goal can be achieved.**

  4 I suggest a number of interesting and workable solutions. My suggestions show I have thought carefully and the solutions relate directly to all the specific problems caused by the barriers.

  3 I suggest a number of workable solutions. My suggestions will help deal with the problems created by the obstacles or barriers.

  2 I suggest several solutions, but some of them do not help solve the important problems created by the obstacles or barriers.

  1 I suggest solutions, but my suggestions do not relate to the problems created by the obstacles or barriers.
HOW CLEAN IS YOUR WATER?
(excerpt from *Organic Gardening*, April 1998, p. 14)

According to the U.S. Geological Survey (USGS):

- Pesticides currently contaminate almost every stream and half of all wells sampled in urban and agricultural areas of the U.S.
- At any particular time, an average of seven to eight different pesticides have been found in each stream.
- In most agricultural areas, the highest levels of pesticides, often above safe drinking water standards, occur as seasonal pulses lasting from a few days to several months.

These are just some of the startling facts revealed by the USGS' ongoing National Water Quality Assessment. The assessment, which began in 1991, is the most extensive study ever done of pesticides in our water. To obtain fact sheets on the National Quality Water Assessment, or for information on specific test results in your region of the country, contact (703) 648-5716, or visit the USGS Web site at [http://water.wr.usgs.gov/pnsp](http://water.wr.usgs.gov/pnsp).

The greatest potential for unintended adverse effects of pesticides, in many respects, is through contamination of the Earth’s hydrological systems, which supply water for both humans and natural ecosystems.
Among the pesticide apologists there is a cliché that goes as follows: “If properly used, according to instructions on the label, there is absolutely no hazard in the use of pesticides.” Unfortunately, there are major flaws in this cliché. First, the materials are frequently used in ways that deviate from the label, and second, the data that support pesticide registration and labeling are at times inadequate or sloppily obtained and apparently even doctored. Finally, registration and labeling simply do not cover the full spectrum of contingencies, some of which appear only as tragedies in the field.

What else explains the repeated occurrence of unfortunate episodes associated with the use of properly registered and labeled pesticides? Just look at what’s been happening in recent times:

- In the autumn of 1971, in a single incident, leptophos, a U.S. produced insecticide, poisoned a number of Egyptian peasants and killed about twelve hundred water buffalo. Later in the United States this same insecticide caused permanent nerve injury to workers in the chemical plant in which it was being produced.

- In vast forest areas of eastern Canada and the north-eastern United States, nature’s silviculturist, the spruce budworm, which once functioned to prune out over-aged balsam fir trees at approximately quarter-century intervals, is now perennially epidemic, because chemical control practices designed to save every tree have thrown the forest into a continuously vulnerable condition. The spruce budworm problem is taking on nightmarish dimensions as each year’s caterpillars produce masses of moths that spread out over new areas of forest to produce additional destructive populations. Today, 120 million acres of Canadian forest and immense areas of Maine’s woodlands are economically threatened by budworms generated out of pesticide use.

- In Central America each year thousands of peasants are poisoned by insecticides used for cotton insect control, and those who survive run the deadly course again and again. Certain culpable chemicals are properly registered and labeled, U.S.-produced materials.
• In Mexico in 1973, in an incident in the state of Coahuila, a number of farm workers were killed and hundreds more sickened by several properly registered and labeled insecticides of U.S. manufacture.

• In 1975 in California more than thirteen hundred persons were sufficiently poisoned by pesticides to require medical attention. Since strict laws pertain to the use of pesticides, it is assumed that the victims were poisoned by properly registered and labeled materials. As disturbing as the official poisoning figures are, there is reason to believe that they are conservative, for it appears that many affected persons do not seek medical attention. Dr. Ephraim Kahn, chief of the Epidemiological Studies Laboratory of the California Department of Public Health, estimates that the reported pesticide injuries represent only about 1 per cent of the total poisonings. In other words, if Dr. Kahn’s estimate is correct, the actual poisonings in 1975 exceeded one hundred thousand, a shocking state of affairs indeed!

• Today in California the encephalitis mosquito is widely resistant to virtually all conventional larvicides. Resistance in this dangerous species is the result of intensive exposure to insecticides both through direct treatment and indirectly from agricultural applications. Whatever the cause, because of resistance induced by excessive use of properly labeled and registered insecticides, residents of California’s Central Valley are today living with a dangerous disease transmitter that is difficult to control.

• In Asia, Africa, and Latin America, malaria, once felt to be on the verge of eradication by DDT, is making a cruel resurgence. Increasing mosquito resistance to DDT, substantially engendered by excessive agricultural use of the material, is a major cause. Another important factor is that DDT never did eradicate malaria in its areas of strong endemicity. The disease was always there, and when the poor Third World countries reduced their spraying programs to divert badly needed funds to other socioeconomic programs, malaria returned with a vengeance among populations that had lost much of their conditioned resistance to the disease.

• In the southwestern United States in the late 1960s a properly registered and labeled organophosphate insecticide caused massive unanticipated bird kills. Then, after a series of “tests” and corrective steps, assurances were
given that the material could be safety used. But in 1972 it was again involved in a major bird kill, this time in Florida.

- During one night in the spring of 1974 at Hemet, California, 2,450 ducks resting near a reservoir were killed by still another properly registered and labeled insecticide that apparently drifted over them during the spraying of nearby alfalfa field.

- Each year in the U.S. Southwest, tens of thousands of honeybee colonies are destroyed by properly registered and labeled insecticides.

- Globally, spider mites, once relatively minor crop pests have been boosted to the top of the pest heap by the properly registered and labeled insecticides that were supposed to solve our insect problems. This has come about largely because the pesticides suppress the spider mite's natural enemies. The materials also have at times physiological effects that stimulate spider mite reproduction. Today in California the once relatively unimportant spider mites cost the agri-economy more than $116 million annually, double the losses caused by any other “insect” pest group.

The above listing is just a sample of the economic, social, and ecological problems associated with prevailing pest-control practice. And since virtually all of these incidents have involved properly registered and labeled insecticides, their consequences make a hollow mockery of the “follow the label” cliché.
**WORKER PROTECTION STANDARDS**

Summary

- **WPS Compliance Checklists**
  - Requirements for agricultural workers
    - Information at a central location
    - Pesticide safety training
    - Decontamination sites
    - Emergency assistance
    - Restrictions during application
    - Special application restrictions in nurseries and greenhouses
    - Restrictions during REIs (restricted-entry interval)
    - Posted and oral application warnings.
  - Requirements for Employed or Commercial Pesticide Handlers
    - Information at a central location
    - Pesticide safety training
    - Decontamination sites
    - Emergency assistance
    - Restrictions during applications (do not allow pesticide to contact anyone directly or through drift)
    - Monitoring handlers
    - Specific instructions for handlers
    - Equipment safety
    - Personal protective equipment (PPE)
    - Exceptions to PPE (closed systems, enclosed cabs, open and enclosed cockpits)
- **Pesticide Manufacturers Labeling Requirements**
  - Standardized Personal Protective Equipment (PPE) requirements for handlers.
  - Statement permitting only protected handlers to be in the area during the application.
  - Statement requiring that the product be applied in a manner that will not result in contact to workers or others.
  - An Agricultural Use Requirements box that includes
    - Restrictions on entering areas after pesticides have been applied
    - Statement requiring employers to provide their agricultural employees with all WPS protections.
- **Toxicity Categories**
  - I - “Danger”
  - II - “Warning”
  - III - “Caution”
  - IV - “Caution”
ACTIVITY NAME:  **OG - WHAT?**

**Subject Area(s):** AGRICULTURE, WORKPLACE READINESS

**Duration:** Two class periods

**PROJECT SUMMARY:**
Students look into what it takes to be certified as an organic farmer.

**CONTENT STANDARDS:**

**Science: Historical Perspectives**
- *Malama i ka ‘Aina:* Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
  - Sustaining Food Supply: Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology.*

**Health Education:**
- *Students advocate for personal, family, and community health.*
  - Apply accurate health information to persuade others to make health enhancing choices as appropriate.

**Life Skills: Habits of Mind**
- *Controls own behavior and thought processes.*
  - Is open-minded.

**Life Skills: Information Processing**
- *The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.*
  - Effectively interprets and synthesizes information.
DRIVING QUESTION(S):

- What is organic farming?
- What are the differences between conventional farming and organic farming?

MATERIALS:

- Pairs of vegetables and/or fruits (one organically grown and one conventionally grown); place a colored sticker on the organic product

ACTIVITY PROCESS:

- Have students compare the pairs of vegetables and fruits. How are they alike? Different? At the market, which ones would you buy?
- Explain that the sticker indicate that the fruit/vegetable was organically grown. Also, inform the students that you needed to be certified in order to label your products “organically grown.” Would that information change your mind about which ones to buy? How?
- Have students discuss the preparation of the fruits and vegetables for consumption. Would you prepare the conventionally grown product differently from the organically prepared? How? Why?
- Divide students into small groups.
- Have each small group identify questions they have about organic growing, such as:
  - What is organic growing?
  - Is there a formal organization? How come?
  - What are the principles or goals of organic growing organizations? How do they differ from conventional farming?
  - Why does a farmer need an Organic Certification to market products that are organically grown?
  - What are the standards and processes for certification?
  - Are there a lot of people interested in buying organically grown products?
  - Do organically grown products cost more than conventionally grown products?
- Invite a representative of the Hawaii Organic Farming Association (HOFA) or the Organic Crop Improvement Association (OCIA) to make an informational presentation addressing the questions the students have about organic growing.
• Have the students develop a class checklist for Organic Certification based on what the speakers share.
• Each student is to complete a report on the answers to the questions about organic growing that each learned. Additional research may also be done before submittal of the report.

**CONTENT:**

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<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
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</thead>
<tbody>
<tr>
<td>• Organic farming is a form of agriculture that does not use synthetic inputs such as pesticides and fertilizers.</td>
<td>• Questioning</td>
<td>• Habits of Mind</td>
</tr>
<tr>
<td>• Organic farming seeks to maintain the ecological balance considered essential to maintain a sustainable system indefinitely.</td>
<td></td>
<td>• Information Processing</td>
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**STRATEGIES:**

• **Grouping:** This is primarily an individual activity, although it may be accomplished with groups. If groups are used, be sure that each member has an assigned role with respective responsibilities.

• **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review. The representative of HOFA or OCIA will be invaluable to the students.

**COMPONENTS:**

• **Product:** This activity calls for a class-developed check list for certification and individual reports on the topic.

• **Student Learning Tasks:** The students seek answers about the topic by, first, formulating questions and, secondly, taking full advantage of the primary source of
information. Ability to listen and synthesize the information provided will be supported by the ability to communicate in writing.

- **Instructional Support**: The activity can be supported by providing students with prompts or guide questions and assisting students in locating information sources. Guidance in the development of the checklist should be provided with the potential use in mind. Since a major activity for this program is the development of a mini-organic growing project, the checklist will become a basic tool for planning and monitoring.

**ASSESSMENT**: Samples are attached.

- **Process Outcomes**: Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes**: The individual reports will probably be rated by the teacher. It may also be interesting to have some reports made to the entire class.

**NOTES**:

Organic farming is a form of agriculture that does not use synthetic inputs such as pesticides and fertilizers. It seeks to maintain the ecological balance considered essential to maintain a sustainable system indefinitely.

However, organic farming is not just farming without chemicals. Organic farmers focus on using techniques such as crop rotation, proper spacing between plants, incorporation of organic matter into the soil and use of biological controls to promote optimum plant growth and minimize pest problems. Application of organic pesticides are considered a last resort and used sparingly.

The principles of organic farming found in *Organic Farming* 1990 were stated by the International Federation of Organic Agriculture Movements (IFOAM):

- To produce food of high nutritional quality in sufficient quantity;
- To work with natural systems rather than seeking to dominate them;
- To encourage and enhance biological cycles within the farming system; involving microorganisms, soil flora and fauna, plants and animals;
- To increase and maintain the long-term fertility of soils;
• To use as far as possible renewable resources in locally organized agricultural systems;
• To work as much as possible within a closed system with regard to organic matter and nutrient elements;
• To give all livestock conditions of life that allow them to perform all aspects of their innate behavior;
• To avoid all forms of pollution that may result from agricultural operations;
• To maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plants and wildlife habitats;
• To allow agricultural producers an adequate return and satisfaction from their work including a safe working environment;
• To consider the wider social and ecological impact of the farming system.

Certification is an assurance to consumers, retailers and brokers of organic produce that the produce marketed as “certified organic” has been grown under pre-approved standards set by the certifying agency. In Hawaii, the Department of Agriculture does not have an organic program, allowing the industry here to regulate itself. The Hawaii Organic Farming Association (HOFA) and the Organic Crop Improvement Association (OCIA) are two organizations that certify organic farmers.

The Organic Standards for Certification identifies:

• Prohibited substances:
  • Any chemically synthesized material such as pesticides, fertilizers, growth regulators, etc.
  • Natural poisons that are extremely toxic and/or take a long time to degrade in the environment, such as arsenic, lead, rotenone, and nicotine.
  • Uncomposted manure when applied less than four months before harvest, or prior to planting of crops that accumulate nitrates.
  • Uncomposted agricultural residues and by-products from off-farm sources that are not documented to be free of residues of restricted materials.

• Record-keeping:
  • Clear records must be kept of all materials added to the soil or crop, including date, location and amount of the substance applied.
  • The source of all materials brought from off-farm should be recorded as well as the chemical treatments of any seeds and seedlings used that were not produced on the farm.
• Management plan
  • Enriching the soil, based on belief that a healthy, living soil is necessary for healthy plants.
  • Enhancing the natural biological cycles of the farm (adding organic compost, crop rotation, use of green manures and cover crops, reduced tillage, use of trap crops, biological control agents, and other habitat manipulations to enhance natural biocontrol mechanisms.

RESOURCES:
## ASSESSMENT RUBRICS: Samples

### PRODUCT OUTCOMES:

**Report:**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<td></td>
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</tr>
<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
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</tr>
</tbody>
</table>

**Content Knowledge:**

- Student explains organic farming and the standards used for certification.
  - **4** Demonstrates a thorough understanding of organic farming and its certification.
  - **3** Displays a complete and accurate understanding specific to the activity.
  - **2** Displays an incomplete understanding and has some notable misconceptions.
  - **1** Demonstrates severe misconceptions about organic farming and its certification.
PROCES OUTCOMES:

Observation rating:

- **Student is open-minded.**

  4  Seeks out different and opposing points of view. Considers alternative views impartially and rationally.

  3  Is aware of points of view that differ from own. Makes a concerted effort to consider alternative views.

  2  Is aware that his/her perspective is not completely shared by all. Pays mild attention to alternative viewpoints.

  1  Assumes his/her own perspective is universally accepted. Deliberately avoids other perspectives.

- **Student effectively interprets and synthesizes information.**

  4  Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- **I am open-minded.**
  
  4 I try to find ideas that are different from mine and evaluate them to decide if they make sense—even when the ideas are unusual.

  3 When I come across ideas that are different from mine, I try to understand them.

  2 I understand that other people have ideas different from mine, but I don’t pay attention to these different ideas.

  1 I believe my ideas are the only ideas worth listening to and I don’t listen to people who have different ideas.

- **I find meaning in information and then combine and organize information to make it useful for my project.**
  
  4 I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

  3 I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

  2 I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

  1 I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
ACTIVITY NAME: **PEOPLE'S PERCEPTIONS**

Subject Area(s): AGRICULTURE, SCIENCE, SOCIAL STUDIES, MATHEMATICS

Duration: Four class periods

PROJECT SUMMARY:
Students collect information on people's perceptions about organically grown food. The activity involves students in developing a questionnaire, provides them practice in conducting a survey, and has them collecting and summarizing data.

CONTENT STANDARDS:

Science: Understanding Ourselves and the World Around Us
- **Learning and Human Behavior:** Students explain what influences learning and human behavior.
- **Learning:** Give examples of how the expectations, moods, beliefs, and prior experiences of humans can affect how they interpret new perceptions or ideas.

Social Studies: Cultural Anthropology
- **Cultural Inquiry:** Students use the tools and methodology of social scientists to explain and interpret ideas and events.
- Use tools, theories, and methods of anthropologists to examine persistent current issues and social problems and use the data to analyze personal and collective decisions.

Mathematics: Data Analysis, Statistics and Probability
- **Students pose questions and collect, organize, and represent data to answer those questions.**
- Systematically collect and organize data (e.g., using tables, line graphs, or pie charts).

Health Education
- **Students advocate for personal, family, and community health.**
- Develop a plan for persuading others to make healthful choices.
Life Skills: Collaboration/Cooperation
- General Learner Outcome: Students understand that it is essential for human beings to work together.
  - Demonstrates effective interpersonal skills.

Life Skills: Analyzing Perspectives
- Analyzing Perspectives: Considers one perspective on an issue and the reasoning behind it as well as an opposing perspective and the reasoning behind it.
  - Identifies one position on the issue and the reasoning behind it.

DRIVING QUESTION(S):
- What perceptions do people have about organically grown food?
- How do you change perceptions?

MATERIALS:
- Suggested Questions (attached)

ACTIVITY PROCESS:
- Have students discuss perceptions and how perceptions influence decisions and behaviors.
- Have students brainstorm a list of perceptions other people may have about organically grown foods: What is organic growing? How does an organically grown food taste? How do organically grown foods differ from conventionally grown food?
- Discuss the possible ways that people developed these perceptions and the effects (positive or negative) that these perceptions may have on the growing and buying of food.
- Task 1: Questions to Ask
  - Review the brainstormed list of perceptions that the class developed. How would we verify that these are indeed what people in general think? If some of
the perceptions are inaccurate or slanted, how could we help to correct the misconceptions?

- If this is a social studies class, a mini-lesson could be conducted on pertinent parts of the Tools and Methods of Cultural Anthropologists (Face to face interviews, primary sources, artifacts, data retrieval, etc.).
- Ask students to think of questions that will help to elicit what the real perceptions are of the people.
- Remind students that there may be brochures they could have available, but the survey is a questionnaire seeking answers from people, not “giving answers” to people.
- Have the students then complete the questionnaire with demographic questions. (See Suggested Questions.)

**Task 2: How and Who to Ask**

- Divide class into teams
- Each team is to determine where they will conduct their survey and who they will survey. (For this activity, we are not too concerned about sampling strategies.)
- If a team is planning to conduct the survey at a shopping mall, it may be necessary to check if permission is needed.
- Each team should interview approximately the same number of people (e.g., 24 for each team, or 6 persons per student) and the people being interviewed should represent the range (e.g., one interviewee per age category).
- Provide time in class for students to practice interviewing:
  - Introduction - stating their names, the purpose of the survey, the amount of time it will take, the use of the data (no names).
  - Question - reading the question and interpreting if asked, following up if the response is not clear, using a tape recorder only if permission given, taking notes.
  - Ending - expressing appreciation, offering to share the final results if the interviewee is interested (need name and address if this will be done).
- Teams should schedule their survey within a common period of time.

**Task 3: What Did We Find?**

- Have the survey questions or their codes listed on large tally sheets (2 sets) and post one set on the day of compilation.
- Teams are to record their compiled numbers on the posted tally sheets. Anecdotes may be taped on the tally sheets.
• Divide the responsibilities for compiling and summarizing among the teams (e.g., Team A compiles the demographics, Team B compiles the knowledge section, Team C compiles the consumption section, Team D develops graphs, etc.).
• Compiling will involve finding totals and subtotals (frequency), determining percentages, and writing out summary statements.
• The second set of the questions on tally sheets now serves as the summary, where teams record the compilation and the outcome statements.
• Have each team present its part. How close were we when we brainstormed people’s perceptions?
• Have the class identify two major “problems” or concerns relating to organic growing that surfaced from the survey. (Use consensus or majority to decide.)
• Have students discuss possible actions they can take as individuals or as a class to address these problems or concerns.
• Each student, then, will be responsible for submitting a brief action plan for addressing one of the selected problems or concerns.
• Team leaders will be asked to finalize the survey results in a formal report to be shared with various audiences (e.g., HOFA, OCIA, UH Extension, the interviewees who requested the information, etc.).

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Perceptions influence decisions and behavior.</td>
<td>• Interviewing</td>
<td>• Working in groups</td>
</tr>
<tr>
<td>• Awareness about organic growing is increasing among people in general.</td>
<td></td>
<td>• Analyzing Perspectives</td>
</tr>
</tbody>
</table>

STRATEGIES:

• Grouping: Students work in teams. Skills in interpersonal relating and leadership become important as the group becomes involved in shared decision-making. Even in the large group discussions, students should see that “WE are smarter than me.”

COMPONENTS:

• Product: This activity has two products:
The total group report on the organic farming survey.

Written action plan submitted by each individual describing what might be done to address one of the major problems/concerns that arose in the survey results.

**Student Learning Tasks:** Learning tasks are many in this activity. They include formulating questions, developing a questionnaire, conducting an interview, compiling data, and developing a summary report. In addition to these more proceduralized learning tasks, students delve into intellectual constructs such as predicting perceptions based on trends or extant data on the topic, inferring from the information received, and extrapolating personal experience into a more generalized context.

**Instructional Support:** The activity can be supported by observing students, identifying where they may need more specific skills/information, and providing for these needs in ways that entail more coaching, modeling or mentoring. For example, formulating questions is not an easy task (even adults/teachers have difficulty doing this). Students may benefit from prodding questions such as, “Do you really want a simple yes or no response? Will the response provide you with new information that you can use? How about something like …?”

**ASSESSMENT:** Samples are attached.

**Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

**Product Outcomes:** The individual action plans may be assessed using rubrics or criteria established by the teacher/class. The finalized survey results report should be assessed and the assessment returned to the group leaders for revisions in order that the report be reflective of the highest standards of quality and content.

**NOTES:**

There were (are?) strong perceptions about organic farming from certain corners of the community. Some of these may still persist. For example, the objection to
organic farming stems from the belief that it practiced by hippies, eco-freaks, and organic-food fanatics. Or even farther back in history, raw vegetables raised by certain groups were shunned because of the belief that “honey buckets” were used as fertilizer.

Are there similar one-sided perceptions about conventional farming? This may be another facet of the issue that students could pursue. What is becoming evident is the strengthening of a united front in terms of protecting the fragile environment. This commitment appears to be bringing people together, increasing the importance of research, and making available more information to the public.

However, decisions and behaviors are still personal, as a consumer or producer. Is the commitment to protect the environment as strong as the commitment to economic gains? The students will, soon enough, be the citizenry that decides.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Action Plan:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The plan addresses one of the major concerns.</td>
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<tr>
<td>2. Steps proposed are viable and appear to have the potential to reach some of the target audience.</td>
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<tr>
<td>3. The choices and rationale reflect high standards of reasoning and decision making.</td>
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<tr>
<td>4. The planner understands the needs and has a good grasp of the cause(s).</td>
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</tbody>
</table>

Content Knowledge:

• Student explains perceptions of people regarding organic growing and identifies where there are misconceptions.

  4 Demonstrates a thorough understanding of how people’s perceptions may differ and the effect they have on decisions and behavior. Explains the reasons for the different perceptions.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about how perceptions are formed and their effect on behavior or decisions.
PROCESS OUTCOMES:

Observation rating:

- **Student demonstrates effective interpersonal skills.**
  
  **4** Actively promotes effective group interaction and the expression of ideas and opinions in a way that is sensitive to the feelings and knowledge base of others.

  **3** Participates in a group interaction without prompting. Expresses ideas and opinions in a way that is sensitive to the feelings and knowledge base of others.

  **2** Participates in group interaction with prompting or expresses ideas and opinions without considering the feelings and knowledge base of others.

  **1** Does not participate in group interaction, even with prompting, or expresses ideas and opinions in a way that is insensitive to the feelings or knowledge base of others.

- **Student identifies one position on the issue and the reasoning behind it.**

  **4** Articulates detailed position and the reasoning behind it and, if a strong line of reasoning does not underlie the position, articulates the errors or holes in the reasoning.

  **3** Articulates a position and the basic reasoning underlying the position. Does not address or incompletely addresses the errors or holes in the reasoning.

  **2** Articulates a position but does not present a clear line of reasoning behind it.

  **1** Does not articulate a clear position.
Self Assessment:

• I communicate well with the other group members.

  4 I encourage good communication among the group members and try to make sure everyone shares their ideas. When I share my ideas, I show that I care about other people's feelings and ideas, and I encourage everyone in the group to do the same.

  3 I participate in group discussions without being asked to. When I share my ideas, I show that I care about other people's feelings and ideas.

  2 I participate in group discussions when I am asked to. When I share my ideas, I don't clearly show that I care about the feelings and ideas of others.

  1 I do not participate in group discussions, even when asked to. I share ideas in a way that shows I don't really care about the feelings and ideas of others.

• I state an opinion on the topic and explain the reasons for that opinion.

  4 I clearly state an opinion on the topic and explain the reasons for that opinion. I also describe the thinking that might lead to the opinion, and I explain the strengths, weaknesses, and errors in that thinking.

  3 I clearly state an opinion on the topic and explain some of the important reasons for that opinion. I do not explain the thinking that might lead to the opinion.

  2 I clearly state an opinion on the topic, but I do not clearly explain the reasons for that opinion.

  1 I do not state a clear opinion.
**ORGANIC FARMING SURVEY (sample)**

To the interviewer: Use a separate form for each person you interview.

### Demographics:

<table>
<thead>
<tr>
<th>Age Category:</th>
<th>Gender:</th>
<th>Food Shopping:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teenager</td>
<td>___ M</td>
<td></td>
</tr>
<tr>
<td>18 - 29 yr. Old</td>
<td>___ F</td>
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<tr>
<td>30 - 39</td>
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<td>40 - 49</td>
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<tr>
<td>50 - 59</td>
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<tr>
<td>60+</td>
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</tbody>
</table>

- How many people live with you?

### Food Shopping:

- How many times a week do you go to the store/market to buy food?

### Where do you do most of your food shopping?

### Do you have a garden?

### What do you grow?

### Pest control?

- What do you use for fertilizer?

### Awareness about Organic Farming:

- Do you know what organic or sustainable farming is? *(Circle responses.)*
  - Yes
  - No

- If yes, how did you learn about it? *(Check all that apply.)*
  - Reading
  - Word of mouth
  - TV
  - Schooling
  - Other (Specify) ______

- Do you know how farmers control pests? Using: *(Circle all responses that apply.)*
  - Chemicals? Yes No
  - Biocontrol (e.g., bugs) Yes No
  - Integrated approaches Yes No

- How much effect does chemical controls have on food products? *(Check one.)*
  - No idea
  - No effect
  - Little effect
  - Much effect
• How much effect does the use of chemical in agriculture have on our environment? (Check one.)
  ______ No idea
  ______ No effect (disappears)
  ______ Little effect (limited to specific pests)
  ______ Much effect (water, soil, etc.)

Consumer Choices:

• If you had a choice, would you buy organically grown food? (Check one.)
  ______ No idea
  ______ Never
  ______ Sometimes
  ______ Most of the time

• Where are organically grown food available on this island? (Check as many as apply.)
  ______ No idea
  ______ Supermarket
  ______ Health food store
  ______ Open market
  ______ Direct from farmer
  ______ Other (Specify) __________________________

What concerns do you have about food products today?
ACTIVITY NAME: THE GREAT DEBATE

Subject Area(s): AGRICULTURE, SCIENCE, LANGUAGE ARTS

Duration: Two weeks

PROJECT SUMMARY:
Students pool all the information they have and do additional research as members of in-class debate teams. Teams present their positions on pre-assigned issues relating to organic growing and high-intensity agri-business and conduct appropriate rebuttals, and deliver their concluding statements. Decision on the outcomes of the debates is made by two panels (students and professionals).

CONTENT STANDARDS:

Science: Historical Perspectives
• Malama i ka Aina: Sustainability - Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
• Sustaining Food Supply: Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology.

Health Education:
• Students use interpersonal communication skills to enhance health.
• Evaluate effective verbal and nonverbal communication.

Language Arts: Oral Communication
• Range: Communicate orally using various forms—interpersonal, group, and public—for a variety of purposes and situations.
• Take and defend a position in a debate to consider an issue from differing perspectives.

Life Skills: Habits of Mind
• Controls own behavior and thought processes.
• Is aware of and uses necessary resources.
Life Skills: Collaboration/Cooperation

- General Learner Outcome: The understanding that it is essential for human beings to work together.
- Works toward the achievement of group goals.

**Driving Question(s):**

- What are some key issues related to organic growing versus conventional or high-intensity agri-business?
- What are the differing perspectives on these issues?

**Activity Process:**

- **Pre-Task Presentation:** Have a debate teacher conduct a mini-lesson on note taking and organizing, the process of debating, the protocol, and presentation strategies. The debate format may be simplified, including the time allocations, to:
  - Establishing pro/con positions
  - Rebuttal
  - Concluding statements
- **Task 1:** Taking Sides
  - Divide students into Debate Teams. (In heterogeneous classes, be sure the students are distributed equally in terms of ability/capability.)
  - There should be an even number of teams (half will be pros for the topics and the other half will be the cons.)
  - Review the research and data organization strategies. (For example: use of note cards; cross referencing by key words; inclusion of facts with figures; etc.)
  - Have each team meet to organize itself: roles for each member, research responsibilities, data organization and recording, etc. Every member of the team need not be a “debater,” but each person must have a clear role/responsibility. Assignments may be:
    - Team leader
    - Opening debater
    - Reference librarian
    - Rebuttal debater
    - Conclusion presenter
• Note taker
• Demonstrator or Illustrator (assistant to debater)
• Have team leaders draw lots from a box for their team debate topic and side. Some suggested topics are: (May be converted to a statement or question form.)
  • Genetically engineered potatoes (or other vegetable/fruit)
  • Integrated Pest Management
  • Introduction of New Bugs to Control Pests
  • High-Intensity Agriculture to Meet Growing Population
  • Government Control of Chemical Use Through Labeling and Monitoring

• **Task 2: Building Your Case**
  • Teams should plan their information gathering; dividing the task by assigning each person a concept/key word/topic or assigning people to different sources of information.
  • Remind teams that there are sources outside of school as well (many of the resource people the students met will have information).
  • Provide time in class for teams to meet and organize their data and presentations.
  • Have the teams also discuss “decorum,” including how to dress on the day of the debate.
  • Share the criteria to be used by the two panels of observers (Content, Supporting Information, Communication Skills, Teamwork, Presentation, etc.).

• **Task 3: The Great Debates**
  • Teams will be scheduled for the debates. Each debate should be video-taped.
  • The student panels can be comprised of the students who are not scheduled to debate at that time. The professional panel would have to include people who are willing to give their time over whatever number of days it takes for all the debates to be held.
  • When all the debates are concluded, results should be shared primarily in the form of commendations and recommendations for improvement.
  • If it is appropriate, an overall award could be made to the team that did the most outstanding presentation.
**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural technology (and methodology) has resulted in scientific, environmental, and social issues.</td>
<td>Communication</td>
<td>Planning and Managing Resources, Working together</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

- **Grouping:** Each member's diligence in completing his/her responsibility, as well as in taking ownership of the project will be important.

- **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review. Lists of community resources with phone numbers and addresses will also be helpful.

**COMPONENTS:**

- **Product:** This activity calls for individuals to work in teams over a period of time. The team's plans, assignment of responsibilities, and supportive interaction (especially during the debate) will be critical to its success.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Debating: Taking a position and mobilizing the best possible information and means of presenting it in support of that position.
  - Conducting research: Locating and collecting information, synthesizing information.
  
  Part of the learning will be in contributing to the group goal — making a logical, sound, and effective presentation at the debate. Decision making and leadership skills will come into play as the team will need to use the strengths of each member in completing the tasks.

- **Instructional Support:** The activity can be supported by a team approach from the social studies, agriculture, language arts, and science teachers. Collaboration
among these teachers will make a range of information and expertise available to the students. It will also be an excellent modeling of integration.

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes:** The team’s performance at the debate will be the project’s product. Peer and community expert panels serve as the assessors. Criteria such as content, supporting information, communication skills, logical presentation, etc., should be shared with the students before the project starts.

**NOTES:**
The debate format brings many things together: declarative and scientific concepts and topics, perceptions, interpersonal skills, communication, complex thinking skills, information processing, and collaboration/cooperation, to name a few. Too often only the “top” students are given the opportunity to participate in a debate or be on the debate team. Now that the communication strategy of debate, taking a position and supporting it in a logical fashion with acceptable information, is part of the language arts content standards for all students, teachers of various subject areas or disciplines need to provide opportunities for their students within those contexts.

The issues relating to organic farming may largely be perceptions and economics, but to understand the issues one must be able to step into the shoes of the producer, consumer, scientist, environmentalist, and politician. What better way than through participating in debates!

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES: (Judging criteria should be added.)

Debate Presentation:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The position was clearly established and supported.</td>
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<tr>
<td>2. The information presented showed that many sources of information were used.</td>
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<tr>
<td>3. The data used were accurate and appropriate.</td>
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<tr>
<td>4. The presentation showed that each team member was a valuable contributor.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains the position and provides supporting information.
  
  4 Demonstrates a thorough understanding of the issue and the position taken on it. Provides accurate and appropriate information in support of the position.
  
  3 Displays a complete and accurate understanding specific to the activity.
  
  2 Displays an incomplete understanding and has some notable misconceptions.
  
  1 Demonstrates severe misconceptions about the issue and the position taken.
PROCESS OUTCOMES:
Observation rating:

- Student demonstrates effective interpersonal skills.

  4  Actively promotes effective group interaction and the expression of ideas and opinions in a way that is sensitive to the feelings and knowledge base of others.

  3  Participates in a group interaction without prompting. Expresses ideas and opinions in a way that is sensitive to the feelings and knowledge base of others.

  2  Participates in group interaction with prompting or expresses ideas and opinions without considering the feelings and knowledge base of others.

  1  Does not participate in group interaction, even with prompting, or expresses ideas and opinions in a way that is insensitive to the feelings or knowledge base of others.

- Student is aware of and uses necessary resources.

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.

Self Assessment:
• I communicate well with the other group members.

4  I encourage good communication among the group members and try to make sure everyone shares their ideas. When I share my ideas, I show that I care about other people's feelings and ideas, and I encourage everyone in the group to do the same.

3  I participate in group discussions without being asked to. When I share my ideas, I show that I care about other people's feelings and ideas.

2  I participate in group discussions when I am asked to. When I share my ideas, I don't clearly show that I care about the feelings and ideas of others.

1  I do not participate in group discussions, even when asked to. I share ideas in a way that shows I don't really care about the feelings and ideas of others.

• I am aware of available resources that could help me complete a task.

4  I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.

3  I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.

2  I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.

1  As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
ACTIVITY NAME:  WOG IT! (Watch Organic Growth)

Subject Area(s):  AGRICULTURE, SCIENCE, FOOD SCIENCE

Duration:  One quarter or longer

PROJECT SUMMARY:
Students grow a minimum of seven vegetables or herbs from the FJGI list. They have hands-on experience with alternatives to traditional pesticides and fertilizers. The plants are grown using organic farming or sustainable agricultural methods. The students evaluate their efforts in terms of the products of their garden and, using their own Organic Certification checklist, assess their effort.

CONTENT STANDARDS:

Science:  Organisms and Development
•  Unity and Diversity:  Students examine the unity and diversity of organisms and how they can be compared scientifically.
  •  Explain how different organisms need specific environmental conditions in order to survive.*
•  Interdependence:  Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
  •  Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*

Career and Life Skills:  Skills for Life and Work
•  Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  •  Managing Resources:  Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Health Education:
•  Students use goal-setting and decision-making skills to enhance health.
  •  Demonstrate the ability to apply decision-making processes to health issues and problems individually and collaboratively.
Life Skills: Habits of Mind
• Controls own behavior and thought processes.
  • Makes effective plans.
  • Is aware of and uses necessary resources.

Life Skills: Collaboration/Cooperation
• General Learner Outcome: The understanding that it is essential for human beings to work together.
  • Works toward the achievement of group goals.

DRIVING QUESTION(S):
• What does it take to grow food using organic or sustainable agricultural methods?
• What is the quality of the food products?

MATERIALS:
• FJGI List (provided)
• Farming supplies and tools
• Adequate location

ACTIVITY PROCESS:
• Pre-Task Presentation: Have students review prior exploratory activities and related lessons on soil, pests, safety, and organic farming.
• Task 1: Preparation
  • Students will study designing and planning a sustainable garden. They will directly and vicariously observe methods and processes for:
    • Design and types of irrigation systems.
    • Evaluation of site (soil, wind, water, infrastructure inventory, and layout).
    • Crop production methods.
    • Specific application to the school site.
• Students will have hands-on experience in various methods of plant propagation and understand the biological processes of:
  • Germination
  • Root development
  • Shoot development

• Task 2: Plot Development
  • Students will prepare the plot.
  • Composting processes will be applied and the benefits of soil amendment reviewed.
  • Students will plant the 7 or more varieties in the plot.

• Task 3: Garden Maintenance
  • Plant nutrition and physiology will be studied and applied to the site.
  • Fertilizers will be applied.
  • Nutritional disorders will be monitored and remedied.
  • Insect and disease problems will be identified and control measures implemented.

• Task 4: Reaping
  • Students will develop a harvesting plan and study post-harvest handling.
  • Decisions will be made in the plan as to the use and/or distribution of grown products.
  • If selling is one of the activities, the basic concepts of marketing will be studied. The plan will also address the use of funds accruing from sales.
  • Each student will complete a “What I Learned and Experienced” reflection.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic or sustainable methods can produce nutritious and high quality food products.</td>
<td>Planning and Managing Resources</td>
<td>Problem solving and decision making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working together</td>
</tr>
</tbody>
</table>

STRATEGIES:

• Grouping: The grouping strategies will depend on the teacher. Students may work independently if there is sufficient space to assign each person his/her plot. In this situation, the individual will be totally responsible for seeing every step of the process through from beginning to end. Group work may be the choice of some
teachers, where teams are provided with plots or rows. Students within each team work on individual assignments which may be rotated as the project goes on. This also enables designated roles among the students (e.g., weeder, waterer, fertilizer, etc.).

- **Hands-on, Authentic Tasks:** The development of a functioning garden that yields consumable and/or marketable products is an authentic task. This task provides relevant learning opportunities dealing with abstract concepts (e.g., scientific nomenclature), real-world solutions to environmental issues/problems, and tangible rewards.

**COMPONENTS:**

- **Product:** The primary product of this activity is the vegetables/fruits/herbs grown by the students.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Producing: Preparing, planting, maintaining, and harvesting.
  Part of the learning will be in contributing to the group goal — producing high quality products, using the most environmentally safe methods.

- **Instructional Support:** The activity will be supported by continuous “leading from behind” and modeling. As the plants begin growing, questions can help students to focus in on potential problems and to identify alternatives for dealing with the problems.

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes:** The criteria such as time, cost, collaboration, production process, and quality of product should be shared with the students before the
project starts. The assessment of success in this activity is the product of the harvest.

NOTES:
The possible extensions of this activity are embedded in the concepts of health advocacy, career exploration, and service learning. It is hoped that teachers will work together toward elaborating on each.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Harvest:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The products meet quality and quantity expectations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The growing process met criteria for organic certification.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The products were distributed and used according to plan.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The success of the effort was dependent on the contributions of each student.</td>
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</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains the preparation, plot development, plant maintenance, and harvesting processes.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Demonstrates a thorough understanding of the processes involved in organic or sustainable agriculture. Is able to explain problems encountered and solutions.</td>
</tr>
<tr>
<td>3</td>
<td>Displays a complete and accurate understanding specific to the activity.</td>
</tr>
<tr>
<td>2</td>
<td>Displays an incomplete understanding and has some notable misconceptions.</td>
</tr>
<tr>
<td>1</td>
<td>Demonstrates severe misconceptions about the growing process.</td>
</tr>
</tbody>
</table>

Food: Just Grow It! WOG
PROCESS OUTCOMES:
Observation rating:

• **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

• **Student is aware of and uses necessary resources.**

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.
Self Assessment:

- I plan carefully before I begin my project.
  
  4. I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.
  
  3. I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.
  
  2. I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.
  
  1. I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I am aware of available resources that could help me complete a task.
  
  4. I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.
  
  3. I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.
  
  2. I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.
  
  1. As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
“Know Your Pests”

INTRODUCTION:

Unity and diversity are the “big ideas” under which science has had our students examine organisms and compare them scientifically. This component uses these big ideas as the theme for further studying the organisms and their characteristics in relation to the function or role they play in a plant propagating environment. The “big ideas” have interesting twists and turns in this small, but boundless setting.

CONTENT STANDARDS:

Across the activities in this unit, several content standards provide the thrust for the student learning tasks. Specific references are made to directly related standards and their respective benchmarks. At the same time, there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

Health Education
• Students use interpersonal communication skills to enhance health.
• Students advocate for personal, family, and community health.

Science
• Malama i ka ʻAina: Sustainability. Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
• Interdependence: Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
• Unity and Diversity: Students examine the unity and diversity of organisms and how they can be compared scientifically.

Social Studies
• Economics: Understand how the government influences the well being of people and institutions.

Career and Life Skills
• Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work and at home: thinking and reasoning skills, personal qualities, skills for managing resources, interpersonal skills, skills for managing information, and skills and knowledge related to systems.
LIFE SKILLS:

Although a range of life skills is reflected among the activities in this unit, particular focus should be on developing the skills for **Working Together** and **Communication**. The selected standards and the performance indicators for these areas include:

**Achievement of Group Goals**
- Students actively help identify group goals and work hard to meet them.

**Communication for a Variety of Purposes**
- Students clearly communicate a purpose in a highly creative and insightful manner.

**Communication with Diverse Audiences**
- Students present information in a style and tone that effectively capitalizes on the audience’s level of interest and level of knowledge or understanding.

CONCEPTS:

Understanding of the theme of unity and diversity is developed in the activities through concepts such as:

- Organisms become pests when their interaction with the specific setting/system becomes disruptive and invasive.
- Identification of pests and beneficials is systematized by the scientific classification system.
- Human actions and decisions can destroy the balances of unity and diversity in the environment.
- Selection of controls must be considered within the context of the total environment.
- Beneficials add to the diversity of the garden.
ACTIVITY NAME: PEST-INESS

Subject Area(s): SCIENCE, AGRICULTURE,

Duration: Three class periods

PROJECT SUMMARY:
Students collect data on garden pests. By asking questions and doing some research, the students sort the identified pests into groups and document the bases for their classification.

CONTENT STANDARDS:

Science: Organisms and Development
• Unity and Diversity: Students examine the unity and diversity of organisms and how they can be compared scientifically.
  • Identify the different structures and functions of organisms that allow them to survive in the environment.*

Mathematics: Patterns, Functions, and Algebra
• Students understand various types of patterns and functional relationships.
  • Use generalizations to make predictions to check that the generalization fits the given pattern.

Life Skills: Complex Thinking
• Comparison: Describes the similarities and differences between two or more items.
  • Selects appropriate characteristics on which to base the comparison.
• Classification: Organizes items into categories based on specific characteristics.
  • Specifies accurate and comprehensive rules for category membership.

Life Skills: Collaboration/Cooperation
• General Learner Outcome: Understands that it is essential for human beings to work together.
  • Works toward the achievement of group goals.
DRIVING QUESTION(S):

- What is considered a pest in the garden?
- How are pests similar and how do they differ?

ACTIVITY PROCESS:

- Have students share their ideas of what a pest is. Ask them to name as many pests as they can that are found in a garden. Start a list with their contributions.
- Divide class into teams to collect information on garden pests.
- Have the teams plan their data collection and sorting tasks, addressing questions such as:
  - What information must we get about each pest?
  - Where will the information be available?
  - Who will do what task?
- Each team will produce a static display of the pest groups. The display should provide information (pictures would help) about the pests in each group.
- Teams will present their displays, answering questions from the audience. The audience’s task is to try to determine the bases (criteria/rules) used by each team to classify the pests.
- Every student will submit an individual report containing the information on the pests, the groups into which they were sorted, and the rules/criteria used to classify the pests. Reports should also indicate the sources of information.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are many similarities and differences among pests that enable them to survive in the garden.</td>
<td>Comparison and Classification</td>
<td>Working in groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information Gathering</td>
</tr>
</tbody>
</table>
STRATEGIES:

• **Grouping:** Students work in small teams (3 to 4). Each team member should have an “assignment” in completing the project. For example, the team members could be assigned roles such as researcher, presenter, writer. The teams should write an outline of the tasks, responsibilities, and time line for completing the group project. The time line should also allow time for members to complete the individual reports.

• **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

• **Product:** The activity yields two products: Group display and individual reports elaborating on the display. The individual report requirement seeks to have every team member become engaged in the process.

• **Student Learning Tasks:** In order to complete the products, the students should be guided through tasks that will enhance their products and their learning.
  
  • **Planning:** Developing questions to address, steps to be taken, responsibilities, and time lines.
  
  • **Conducting research:** Locating and collecting information, synthesizing information.

  • **Comparing and classifying:** Delineating characteristics and functions of each pest studied, comparing and searching for strong relationships (rules), classifying the pests in groups according to the rules developed.

  • **Reporting:** Developing static display of information as a group, and writing an individual report.

• **Instructional Support:** The activity is one requiring complex thinking. Students may need some prodding to identify characteristics, besides the most obvious. Because there is a tinge of “competition” or a challenge in the audience guessing part of the activity, the groups that do a thorough study of each pest may be able to establish rules for classification that are quite complex. Concurrently, they will be taking an in-depth look at each pest.

Further learning can be supported as each group shares its display. A guest speaker may be invited to support this activity or any of the following.
ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The static display and its presentation may be assessed using rubrics or criteria established by the teacher/class. The teacher and peer groups may do the rating. For the individual reports, it is recommended that the teacher do the rating.

NOTES:

Gardening is a reflection of life. You do everything right, including anticipating problems/pests (a few can always be expected). Then WHAM-O.

Feed your soil, put each plant where it belongs, provide good drainage and air circulation, mix your plantings and pest *shouldn’t* be a problem...right? Not necessarily so. Sometimes it goes too long without raining; sometimes the rain goes too long without stopping; sometimes the sun "thinks" it should heat things up to 100 degrees F everyday; and sometimes you never see the sun behind the volcanic VOG! So, despite our best efforts, pests appear in the garden.

Aside from just listing and rotely studying pests, students are asked to "hunt" them down, find out about them, and classify them. The complex thinking activity should lead the students to broaden their inquiry parameters (i.e., not all pests are bugs); deepen their understanding (e.g., phases of development are as important in some pests as the damage they cause); and find subtle commonalties that may provide unique controls. Mastering thinking processes such as this will indeed contribute to students making good decisions in their lives.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Display:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The visual display is comprehensive and clear.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The display and its contents reflect high standards of quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Optimum use of team members' strengths were evident in the products.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains characteristics of the pests studied and the bases for their classification.**
  
  4    Demonstrates a thorough understanding of the pests studied. Explains the damage caused in the garden and relates some interesting, seldom known, information about them.

  3    Displays a complete and accurate understanding specific to the project.

  2    Displays an incomplete understanding and has some notable misconceptions.

  1    Demonstrates severe misconceptions about the pests and their relationships.
PROCESS OUTCOMES:
Observation rating:

- **Student selects appropriate characteristics on which to base comparisons.**
  
  4  Selects characteristics that encompass the most essential aspects of the items and presents a unique challenge or provides an unusual insight.
  
  3  Selects characteristics that provide a vehicle for meaningful comparison of the items and address the basic objective of the comparison.
  
  2  Selects characteristics that provide for a partial comparison of the items and may include some extraneous characteristics.
  
  1  Selects characteristics that are trivial or do not address the basic objective of the comparison. Selects characteristics on which the items cannot be compared.

- **Student specifies accurate and comprehensive rules for category membership.**
  
  4  Provides a clear and complete specification of the defining characteristics of each category. Describes the defining characteristics in such a way as to provide a unique or unusual way of looking at the items.
  
  3  Clearly specifies the defining characteristics of the categories and addresses any questions of overlap in characteristics.
  
  2  Describes the defining characteristics of categories in a way that results in some overlap or confusion between categories, or describes characteristics that are unrelated to the rules for category membership.
  
  1  Identifies characteristics that do not accurately describe the categories.
Self Assessment:

- I select useful and important characteristics on which to compare the selected items.

  4 I select characteristics that focus on the most useful and important information about the items being compared. The characteristics will help me see the items in new and unusual ways.

  3 I select characteristics that are useful and important and will help me think about items in interesting ways.

  2 I select some characteristics that will help me do some comparing of items, but a few of the characteristics are not very useful in the comparison.

  1 I select unimportant characteristics that are not at all useful in the comparison; or I select items that I cannot even compare.

- I describe accurate and complete rules for deciding which items go in each category.

  4 I clearly and completely describe the rules for deciding which items go in each category; I describe these rules in a way that forces me to think about the items in interesting and unusual ways.

  3 I clearly describe rules for deciding which items go in each category, working my descriptions in ways that eliminate any confusion about where to place the items.

  2 I describe the rules for deciding, but I leave things out and create confusion, or I include information that does not really help classify the items.

  1 I list rules, but they do not describe the categories.
ACTIVITY NAME:  
**LEAST "WANTED"**

Subject Area(s):  
SCIENCE, AGRICULTURE, LANGUAGE ARTS

Duration:  
Three- five class periods

PROJECT SUMMARY:

Students select and study a pest/disease that is among the biggest problems faced by local farmers. Through interviews, research, and on-site visits, the students find out more about the pest, the infecting process, the damage or invasive effects of the organism, attempts to control the pest, and short- and long-term consequences of the pest or control.

CONTENT STANDARDS:

Science:  
**Earth Systems and the Universe**

- Interdependence:  
  Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
- Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*
- Identify and describe the biotic and abiotic factors that affect the carrying capacity of a specific niche.

Language Arts:  
**Reading and Literature**

- Comprehension Processes:  
  Use strategies within the reading processes to construct meaning.
  Generate questions, identify issues or problems, and investigate answers or solutions using general and specialized information sources.

Life Skills:  
**Habits of Mind**

- Controls own behavior and thought processes.
- Makes effective plans.
- Is aware of and uses necessary resources.

Life Skills:  
**Information Processing**

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including
interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.

- Effectively interprets and synthesizes information.

**Life Skills: Collaboration/Cooperation**

- **General Learner Outcome:** Understands that it is essential for human beings to work together.
  - Works toward the achievement of group goals.

**DRIVING QUESTION(S):**

- What is the primary “Pest” to local farmers?
- What are the negative effects caused by the pest?
- How is the pest controlled?
- What are the immediate and long-range effects?

**MATERIALS:**

- Starter List of Garden Pests (optional)

**ACTIVITY PROCESS:**

- Review what students know about garden pests. (Question: Which of these pests are farmers on our island most concerned about?)
- **Task 1:** Interview Planning
  - Divide the students into work groups.
  - Review the interviewing process: etiquette, presenting the purpose and use of information, selecting the interviewee(s), making appointments, asking clear and non-intrusive questions, expressing appreciation.
  - Have students discuss questions to include in the interview, such as:
    - What is the pest that causes the farmer the most problems?
    - What are the characteristics of the organism?
    - How does it get to the plants?
    - What kinds of damage does it do?
    - When is the problem most prevalent?
    - How do you control the pest?
  - List the suggested questions and probe for additional ones as needed.
• Groups are then to select their questions, plan their interviews, select who they would like to interview, and responsibilities of each team member.
• The interview would preferably be face-to-face. However, a phone interview may be conducted if there are problems.

**Task 2: Collecting Information**

• The teams are to conduct the interview according to their time schedule.
• Students may tape the interview, if permission is granted by the interviewee. The recording should be transcribed and summarized for the report.
• On-site visitations may be part of the teams' plans. Encourage them to take photographs for inclusion in the report.
• Additional information will probably need to be gathered on detailed characteristics of the identified pest, range of infestation (other islands, countries, etc.), other damaging effects, different control methods used, and other pertinent information (e.g., origin of the pest, means of arrival in the islands, other functions of the pest in the ecosystem, etc.).

**Task 3: Reporting**

• The selected pest to report on will be picked earlier as the teams interview a farmer.
• Teams should study all the information collected from the different sources: interview, research, consultation with experts, etc.
• Each team is to prepare a static display with appropriate graphics (pictures, sketches) and information about the particular pest and key points such as:
  • Characteristics of the organism
  • Location on the island
  • Types of damage caused – to plants, animals, people, forests, etc.
  • Origin of the organism
  • Controls
• Individual written reports are to be submitted by each student from the information collected.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are certain organisms that are more damaging in certain areas and to certain crops.</td>
<td>Research</td>
<td>Planning</td>
</tr>
<tr>
<td>Control methods vary among farmers.</td>
<td>Interviewing</td>
<td>Reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

- **Grouping:** The activity is structured as group tasks, except that each individual student must submit his/her own written report. In a highly rural area, the activity may be structured as an individual assignment since there may be more farming sources of information.

- **Information Sources:** In addition to people resources, reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

- **Product:** The project is largely one of information collection. The specific topic is decided upon in the process of interviewing a farmer (practitioner). The students work on collecting as much information as possible on the selected pests in order to complete static displays (as teams) and individual written reports.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - **Interviewing:** Formulating questions; selecting interviewees; arranging for interview; conducting, recording, and transcribing information.
  - **Planning:** Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
• **Conducting research:** Locating and collecting information, synthesizing information.

• **Reporting:** Developing an informational static display; writing individual report, seeking feedback, assessing own work.

• **Instructional Support:** Support should be provided along the way as students plan their interview. Encourage students to ask for clarification if they are not sure what the interviewee is saying or if they are not familiar with what is mentioned. Once the "Least Wanted" is selected by the teams, students will benefit from knowing other sources of information. For example, there may be resource people at the University Extension Offices, University scientists/entomologists, Agricultural Cooperatives, or large commercial growers (if available).

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

• **Product Outcomes:** The informational static displays should be exhibited with peers/resource people given the opportunity to “evaluate” the displays. This can be done by having small slips of "Happy Grams" available near each display and a decorated box for depositing the completed grams. The "Happy Gram” would have a space for TITLE, and a short lead to be completed by the evaluator such as: I like the display because…….; The display can be improved by ........ . The individual reports will be rated by the teacher. If an English teacher is collaborating with the science/agriculture teacher(s), the rating could be done by the different teachers (each rating a different aspect of the report).

**NOTES:**

The activity is an opportunity for the students to learn about what is happening in agricultural or horticultural sites around them. As they have opportunities to interact with “real life” growers, it is hoped that the students see that farmers are also scientists. This concept is captured quite vividly in the video, THE SCIENCE AND TECHNOLOGY OF CROP PRODUCTION…OLD AND NEW, produced by the Department of Education as part of the series SCIENCE IN HAWAII, 1984.
The static displays developed by the students may be very useful in disseminating information to others. Those that are well done should be exhibited in the school library or on the administration bulletin board. Also, feeder schools may be willing to exhibit the displays. Another good place is in the airports of the neighbor islands.

An extension of this activity is for students to look into the pest(s) that were prevalent in the large plantations (sugar or pineapple) and the controls that were used. This extension yields much information on the driving question of long-range effects.

**RESOURCES:**

---

Food: Just Grow It! PESTS
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report/Display:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
<td></td>
<td></td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains the negative effects of a specified pest on the local farm/growing scene.**

  4  Demonstrates a thorough understanding of the pest and the damaging effects it has. Is able to elaborate on the organism and the controls being used on it.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the pest and the controls used.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**

  4  Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
• **Student works toward the achievement of group goals.**

4  Actively helps identify group goals and works hard to meet them.

3  Communicates commitment to the group goals and effectively carries out assigned roles.

2  Communicates a commitment to the group goals but does not carry out assigned roles.

1  Does not work toward group goals or actively works against them.

**Self Assessment:**

• **I plan carefully before I begin my project.**

4  I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

3  I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

2  I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

1  I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.
• **I find meaning in information and then combine and organize information to make it useful for my project.**

4  I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

3  I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

2  I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

1  I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.

• **I work to help achieve the goals of the group.**

4  I participate actively and even help lead the group in setting goals. I do the jobs assigned to me better than anyone expects.

3  I participate in group discussions and show that I care about the group goals. I complete the jobs assigned to me.

2  I participate in group discussions and show that I care about the group goals but I do not do the jobs assigned to me.

1  I don’t participate in group discussions or show that I care about the group goals; or I actually work against the goals.
### Some Least Wanted: Garden Pests

<table>
<thead>
<tr>
<th>Organism</th>
<th>Selected By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn Earworm</td>
<td></td>
</tr>
<tr>
<td>Cucumber Beetles</td>
<td></td>
</tr>
<tr>
<td>Colorado Potato Beetle</td>
<td></td>
</tr>
<tr>
<td>Bean Beetles</td>
<td></td>
</tr>
<tr>
<td>Flea Beetles</td>
<td></td>
</tr>
<tr>
<td>Root Maggots</td>
<td></td>
</tr>
<tr>
<td>Cabbageworms</td>
<td></td>
</tr>
<tr>
<td>Stink Bugs</td>
<td></td>
</tr>
<tr>
<td>Aphids</td>
<td></td>
</tr>
<tr>
<td>Grasshopper</td>
<td></td>
</tr>
<tr>
<td>Cutworms</td>
<td></td>
</tr>
<tr>
<td>Whiteflies</td>
<td></td>
</tr>
<tr>
<td>Squash Vine Borer</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td></td>
</tr>
<tr>
<td>Molds</td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td></td>
</tr>
<tr>
<td>Deer</td>
<td></td>
</tr>
<tr>
<td>Rats</td>
<td></td>
</tr>
<tr>
<td>Weeds</td>
<td></td>
</tr>
<tr>
<td>Fruit Flies</td>
<td></td>
</tr>
<tr>
<td>Slugs and Snails</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
ACTIVITY NAME: MOST "WANTED"

Subject Area(s): SCIENCE, AGRICULTURE,

Duration: One - two class periods

PROJECT SUMMARY:

There are many beneficial organisms in the garden. Students start identifying them and their contributions.

CONTENT STANDARDS:

Science: Earth Systems and the Universe

- Interdependence: Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
  - Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*
  - Identify and describe the biotic and abiotic factors that affect the carrying capacity of a specific niche.
- Unity and Diversity: Students examine the unity and diversity of organisms and how they can be compared scientifically.
  - Explain how different organisms need specific environmental conditions in order to survive.

Educational Technology: Technology as a Tool for Productivity

- Students use technology tools to enhance learning, increase productivity, and promote creativity. Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.
  - Identify and use advanced features of software programs used in previous grade levels.

Life Skills: Information Processing

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
• Effectively interprets and synthesizes information.

Life Skills: Collaboration/Cooperation
• General Learner Outcome: Understands that it is essential for human beings to work together.
  • Works toward the achievement of group goals.

DRIVING QUESTION

• What organisms help keep the garden healthy?
• How can these organisms be attracted to the garden?
• What are the advantages of using beneficials? Disadvantages?

MATERIALS:

✓ Starter Lists:
  • (1) Beneficials
  • (2) Descriptions
  • (3) Targets
  • (4) Attraction, attached to end of this activity.

ACTIVITY PROCESS:

• Have students discuss BENEFICIALS, those organisms that farmers want in their gardens. As students give suggestions (or guess), prod them with the lead questions:
  • Why is it beneficial to the garden/farmer?
  • What does it do?
  • What attracts it to the garden?
• Divide students into small work groups (about 3). The activity may also be done by individuals, although additional time may be required to gather information if only one person is working.
• Each group is to develop a reference guide of Beneficials.
• They will begin by using the lists provided, trying to match the organism with the description, target, and attraction. There may be overlaps.
• Students are to find information that supports their matches, as well as information that may add more beneficials to their reference guide. References should be cited.
• Each student will then individually organize and compile the information into his/her own reference guidebook, adding pictures or graphics, table of contents, index, etc.
• The guidebooks are to be submitted to the teacher.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are organisms that contribute to the health of a garden.</td>
<td>Research</td>
<td>Working Together</td>
</tr>
<tr>
<td>The growing environment can be made more attractive to beneficials.</td>
<td></td>
<td>Information Processing</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

• **Grouping:** The activity is structured as group tasks, except that each individual student must develop his/her own reference book. Planning how to lay out the information may still be a group activity. Students may need to refer to the format of a dictionary or atlas to identify helpful ways of organizing their reference book. They may need examples of displays such as cross-references, index, primary/secondary organizers, etc.

• **Information Sources:** In addition to people resources, reference books or Internet addresses may be made available in the classroom for students to consult.
COMPONENTS:

- **Product:** The project requires information collection. The outcome will be a reference guidebook of beneficials.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Conducting research: Locating and collecting information, synthesizing information.
  - Assessing and validating information: Identifying other sources of information to corroborate matchings.
  - Reporting: Developing a useful reference guide.

- **Instructional Support:** There may be resource people at the University Extension Offices, University scientists/entomologists, Agricultural Cooperatives, or large commercial growers (if available) available as sources of information or as corroborators.

  A teacher (English teacher or Librarian) who is skilled in bookmaking may be invited to demonstrate to the students the various creative ways of making a book.

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The reference guidebooks may be evaluated by the teacher or an outside resource person. If an English teacher is collaborating with the science/agriculture teacher(s), the rating could be done by the different teachers (each rating a different aspect of the report).

NOTES:

There are positive relationships between organisms and the garden that the students need to be aware of. These include functions such as pollinating, decaying, and preying. What may be of interest to some students is the fact that an organism is sometimes a pest and sometimes a partner. Ahhhhh...such is a BUG’S LIFE!
Getting to know these relationships is helpful in the garden and in the home as well. The extent to which the students expand their reference guide is a matter of creativity and insight.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Guidebook:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The guidebook is comprehensive and accurate.</td>
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<td></td>
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<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Content Knowledge:

- Student explains the positive relationships among organisms in a healthy garden environment.

  4 Demonstrates a thorough understanding of the beneficials and their contributions. Is able to elaborate on the organism and the role/function it performs.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the beneficials and/or their contributions.
PROCESS OUTCOMES:

• **Student creates quality product.**
  4  Creates a product that exceeds conventional standards.
  3  Creates a product that clearly meets conventional standards.
  2  Creates a product that does not meet one or a few important standards.
  1  Creates a product that does not address the majority of the conventional standards.

• **Student effectively interprets and synthesizes information.**
  4  Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.
  3  Accurately interprets information gathered for the report and concisely synthesizes it.
  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.
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• **Student works toward the achievement of group goals.**
  4  Actively helps identify group goals and works hard to meet them.
  3  Communicates commitment to the group goals and effectively carries out assigned roles.
  2  Communicates a commitment to the group goals but does not carry out assigned roles.
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Self Assessment:

• I plan carefully before I begin my project.

  4  I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

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- **I work to help achieve the goals of the group.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>4</td>
<td>I participate actively and even help lead the group in setting goals. I do the jobs assigned to me better than anyone expects.</td>
</tr>
<tr>
<td>3</td>
<td>I participate in group discussions and show that I care about the group goals. I complete the jobs assigned to me.</td>
</tr>
<tr>
<td>2</td>
<td>I participate in group discussions and show that I care about the group goals but I do not do the jobs assigned to me.</td>
</tr>
<tr>
<td>1</td>
<td>I don’t participate in group discussions or show that I care about the group goals; or I actually work against the goals.</td>
</tr>
</tbody>
</table>
**BENEFICIALS STARTER LIST**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Matching Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aphidioletes aphidimyza</em> (aphid midge)</td>
<td></td>
</tr>
<tr>
<td>Assassin bug</td>
<td></td>
</tr>
<tr>
<td>Big-eyed bug</td>
<td></td>
</tr>
<tr>
<td>Blowfly</td>
<td></td>
</tr>
<tr>
<td>Braconid/aphidiid wasp</td>
<td></td>
</tr>
<tr>
<td>Bumble bee</td>
<td></td>
</tr>
<tr>
<td>Butterfly</td>
<td></td>
</tr>
<tr>
<td>Chalcid wasp</td>
<td></td>
</tr>
<tr>
<td>Damsel bug</td>
<td></td>
</tr>
<tr>
<td>Ground beetle</td>
<td></td>
</tr>
<tr>
<td>Honey bee</td>
<td></td>
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<tr>
<td>Hover fly</td>
<td></td>
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<tr>
<td>Hummingbird</td>
<td></td>
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<tr>
<td>Ichneumonid wasp</td>
<td></td>
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<tr>
<td>Lacewing</td>
<td></td>
</tr>
<tr>
<td>Ladybug</td>
<td></td>
</tr>
<tr>
<td><em>Orius insidiosus</em> (Minute pirate bug)</td>
<td></td>
</tr>
<tr>
<td>Moth</td>
<td></td>
</tr>
<tr>
<td>Paper wasp</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania leatherwing</td>
<td></td>
</tr>
<tr>
<td>Pink-spotted ladybug</td>
<td></td>
</tr>
<tr>
<td>Robber beetle</td>
<td></td>
</tr>
<tr>
<td>Rove beetle</td>
<td></td>
</tr>
<tr>
<td>Solitary bee</td>
<td></td>
</tr>
<tr>
<td><em>Podisus maculiventric</em> (spined soldier bug)</td>
<td></td>
</tr>
<tr>
<td>Squash bee</td>
<td></td>
</tr>
<tr>
<td>Syrphid fly</td>
<td></td>
</tr>
<tr>
<td>Tachinid fly</td>
<td></td>
</tr>
<tr>
<td>Organism</td>
<td>Matching Notes</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>• Trichogramma wasp</td>
<td></td>
</tr>
<tr>
<td>• Two-spotted Stink bug</td>
<td></td>
</tr>
<tr>
<td>• Virginia Tiger beetle</td>
<td></td>
</tr>
<tr>
<td>• <em>Ahidius colmani</em> (parasitic wasp)</td>
<td></td>
</tr>
<tr>
<td>• <em>Aphytis melinus</em> (scale parasite)</td>
<td></td>
</tr>
<tr>
<td>• <em>Cryptolaemus montrouzieri</em></td>
<td></td>
</tr>
<tr>
<td>• <em>Delphastus pusillus</em> (beetle)</td>
<td></td>
</tr>
<tr>
<td>• Fire mite</td>
<td></td>
</tr>
<tr>
<td>• <em>Galndromus occidentalis</em> (mite)</td>
<td></td>
</tr>
<tr>
<td>• <em>Leptomastix dactylopii</em> (wasp)</td>
<td></td>
</tr>
<tr>
<td>• <em>Metaphycus helvolus</em> (black scale parasite)</td>
<td></td>
</tr>
<tr>
<td>• <em>Tenodera aridifolia sinensis</em> (praying mantis)</td>
<td></td>
</tr>
</tbody>
</table>

**PARTIAL DESCRIPTIONS OF BENEFICIALS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adults are about 1” long and slender, have long narrow heads and stout beaks and can be black, yellowish brown or green. Some have elaborate crests or spines on their backs. Nymphs look like small, brightly colored adults. Eggs are laid in clusters and some have distinct white caps.</td>
</tr>
<tr>
<td>2</td>
<td>Large, fast-moving dark colored beetles with long legs. Most are nocturnal, seeking shelter under rocks or debris in the daytime. Larvae are long, tapered, segmented and usually dark colored.</td>
</tr>
<tr>
<td>3</td>
<td>Adults look like tiny, black and yellow yellow-jackets or bees and are usually seen hovering near flowers. Most are less than 1/4” long. Their larvae are slug-like and less than 1/2” long, varying in color from cream to green to brown. Females lay their eggs near aphid colonies.</td>
</tr>
<tr>
<td>4</td>
<td>Big flies with hairy bodies, big thoraxes and long slender abdomens that can measure 1/3” long. Most species are grayish but some are black and yellow and look like big bees or wasps. The larvae live in the soil and are round and segmented.</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>5</td>
<td>Adults have long, flat bodies and short forewings. Some resemble earwigs. Most are dull brown or black and range in size from 1/4” to 1 1/4”. Adults will curl the end of their abdomen up over their back when disturbed. Larvae look like the adults.</td>
</tr>
<tr>
<td>6</td>
<td>A small, shiny black bug with white fuzzy hairs. Larvae look like dark gray, segmented, stubby little worms. Eggs are white and laid singly in spider mite webs.</td>
</tr>
<tr>
<td>7</td>
<td>Large, dark, bristly flies that look a lot like houseflies. Adults lay live maggot-like larvae in pest insects.</td>
</tr>
<tr>
<td>8</td>
<td>Adults have long legs, run rapidly and fly quickly when disturbed. Colors, sizes, and markings vary widely; they can be black, greenish, bluish or reddish, with no markings or white markings. Larvae are S-shaped, segmented and have little hooks to grab their prey.</td>
</tr>
<tr>
<td>9</td>
<td>Adults vary greatly in size and color, ranging from yellow to black, some with vivid patterns. These are some of the “largest” of the tiny parasitic wasps, often measuring 1/2” long.</td>
</tr>
<tr>
<td>10</td>
<td>Fat and fuzzy adults; black and yellow. Noticeable low-pitched bzzzz when flying around. Some species nest in the ground in small colonies and others nest above ground in whatever cavities are available. Largest of the bees, measuring up to 1”.</td>
</tr>
<tr>
<td>11</td>
<td>Live in large colonies. Wander over large area, venturing out only when it’s warm and sunny. Account for 15% of the pollinating done by bees.</td>
</tr>
<tr>
<td>12</td>
<td>Don’t require a hive. Often stick almost exclusively to one crop. Work even when it’s cool, cloudy and damp.</td>
</tr>
<tr>
<td>13</td>
<td>Adults are slender, gray or brown, about 1/2” long, have long beaks and big front legs, move rapidly and can fly long distances.</td>
</tr>
<tr>
<td>14</td>
<td>Most adults are smaller than 1/2” long and vary widely in coloring and markings: red or orange with 12 black spots (<em>Hippodamia convergens</em>); pink with black spots (<em>Coleomegilla maculata</em>), the pink spotted lady beetle; some are all black and some are all gray. Larvae are tiny alligator-like creatures, sometimes with bright orange or red markings.</td>
</tr>
<tr>
<td>15</td>
<td>Adults resemble fireflies but don’t glow, are 1/2” long or smaller, and usually dark with orange, yellow, or red markings. Larvae are usually dark colored, flat, long and segmented with many fine hairs and a velvety appearance.</td>
</tr>
<tr>
<td>16</td>
<td>Adults are about 1/2” long and shield-shaped with long sucking mouth parts. One type is light brown with black specks and has prominent points on its shoulders. Its relative (pest) has a dark line on the tip of each forewing. Nymphs are very brightly marked with red, black and orange. Another type is black with red or</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>17</td>
<td>Small (usually less than 1/2” long) and either brown or black, with thick little bodies. Larvae form cocoons on or near host pests.</td>
</tr>
<tr>
<td>18</td>
<td>Metallic blue-green, 1/2” long flies.</td>
</tr>
<tr>
<td>19</td>
<td>Adults are 1/8 to 1/4” long, gray, brown, black or tan with tiny black spots and have very large eyes. Eggs are laid singly on leaves near potential prey. Adults and nymphs both drop to the ground when disturbed.</td>
</tr>
<tr>
<td>20</td>
<td>Adults have black and white patterned bodies about 1/4” long and beaks for sucking. Nymphs are shiny, wingless and voracious. <em>O. insidiosus</em> is often mistaken for the chinch bug, on which it preys.</td>
</tr>
<tr>
<td>21</td>
<td>Adults are bright green (3/4” long) with golden eyes and four large, lacy wings; eggs are laid at the ends of hair-like stalks. Larvae, also known as aphid lions, look like fierce little dragons with big jaws, are about 3/4” long and pinkish brown and cream in color. Brown adults are smaller and less common. Adults fly at night.</td>
</tr>
<tr>
<td>22</td>
<td>Larvae are bright orange and tiny (less than1/8” long). Adults fly at night and are rarely seen. Females lay their eggs at night among aphids.</td>
</tr>
<tr>
<td>23</td>
<td>Adults are very tiny - 1/32 to 1/100” long, and are often yellow with some dark markings, Larvae are tiny white grubs that develop inside pest hosts.</td>
</tr>
<tr>
<td>24</td>
<td>Adults are very tiny, most less than 1/50” long. They are often yellow or yellow and black colored, with bright red eyes.</td>
</tr>
</tbody>
</table>

## TARGETS

<table>
<thead>
<tr>
<th>No.</th>
<th>Target (Prey/Plant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Adult wasps lay their eggs inside the eggs or larvae of scales, mealybugs, thrips, whiteflies, cabbage butterflies, aphids, moths, flies and beetles.</td>
</tr>
<tr>
<td>B</td>
<td>Adults and larvae eat aphids; some also feed on scale insects, Colorado potato beetle eggs and larvae, mealybugs, spider mites and European corn borer eggs</td>
</tr>
<tr>
<td>C</td>
<td>Adults and larvae eat snails and slugs, caterpillars, cutworms, armyworms, root maggots, tent caterpillars, bollworms and the eggs, larvae and pupae of the Colorado potato beetle.</td>
</tr>
<tr>
<td>D</td>
<td>Adults and nymphs feed on many kinds of insects, especially Colorado potato beetle and Mexican bean beetle larvae, other small, immature insects and insect eggs, and many (almost all) pest caterpillars.</td>
</tr>
<tr>
<td>E</td>
<td>Adults capture all kinds of flying insects on the wing, including horseflies, leafhoppers, grasshoppers, beetles and other flies. Larvae live in the soil and eat white grubs and the pupae of pest insects.</td>
</tr>
<tr>
<td>No.</td>
<td>Target (Prey/Plant)</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>F</td>
<td>Adults eat aphids, leafhoppers, lygus bugs, mites, Mexican bean beetle eggs, corn earworms, thrips, tarnished plant bugs, chinch bugs, greenbugs, sod web-worms and other turfgrass pets.</td>
</tr>
<tr>
<td>G</td>
<td>Adults eat aphids, thrips, plant bugs, treehoppers, leafhoppers, caterpillars, etc.</td>
</tr>
<tr>
<td>H</td>
<td>Adults eat chinch bugs, thrips, European corn borers, corn earworm larvae and eggs, other small insects and their eggs and mites.</td>
</tr>
<tr>
<td>I</td>
<td>Both adults and larvae eat a wide variety of creatures including mites, snails, slugs, and soft-bodied pests such as cabbage root maggots, onion maggots, seed corn maggots, and carrot rust fly maggots.</td>
</tr>
<tr>
<td>J</td>
<td>Both adults and larvae eat all kinds of insects, most pests.</td>
</tr>
<tr>
<td>K</td>
<td>Both the larvae and adults feed on the grasshopper eggs, cucumber beetles, aphids and moth larvae.</td>
</tr>
<tr>
<td>L</td>
<td><em>Cotesia glomerata</em> parasitizes imported cabbageworm; In Hawaii <em>Macrocentrus grandii</em> parasitizes European corn borer; other species parasitize Mediterranean fruit flies and melon flies.</td>
</tr>
<tr>
<td>M</td>
<td>Females pick up whole caterpillars and bite them into little pieces to feed their young. May sometimes inflict painful stings on people.</td>
</tr>
<tr>
<td>N</td>
<td>Larvae are parasites of squash bugs, cutworms, Japanese beetles and many pest caterpillars, including gypsy moth.</td>
</tr>
<tr>
<td>O</td>
<td>Larvae eat aphids, scale insects, mealybugs, thrips, mites, leafhopper, moth, and Mexican bean beetle eggs.</td>
</tr>
<tr>
<td>P</td>
<td>Larvae eat over 60 species of aphids. Some also eat mites, mealybugs and scale insects.</td>
</tr>
<tr>
<td>Q</td>
<td>Larvae feed on aphids, whiteflies and small caterpillars, including European corn borers and corn earworms.</td>
</tr>
<tr>
<td>R</td>
<td>Mainly caterpillars of moths, including gypsy moths; parasitizes moths and corn borers.</td>
</tr>
<tr>
<td>S</td>
<td>Nymphs and adults prey on aphids, other small pest insects and their eggs and larvae. One type attacks large caterpillars, sucking them dry. Another eats the larvae of many pest insects and all stages of the Mexican bean beetle.</td>
</tr>
<tr>
<td>T</td>
<td>Pollinates melons, blueberries, cantaloupes, and fruit trees.</td>
</tr>
<tr>
<td>U</td>
<td>Pollinates plants that require pollination to seed, such as carrots, onions, brussels sprouts, kale, cabbage.</td>
</tr>
<tr>
<td>V</td>
<td>Pollinates raspberries, strawberries. Results in larger fruits and better yields.</td>
</tr>
<tr>
<td>W</td>
<td>Pollinates tomato, pepper, eggplant flowers. Results in earlier and better looking fruits.</td>
</tr>
<tr>
<td>X</td>
<td>These parasitize more than 200 species of moth eggs, including cotton bollworm, cabbage pests, corn pests, and codling moths.</td>
</tr>
<tr>
<td>No.</td>
<td>Conditions</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
</tr>
<tr>
<td>1</td>
<td>Allow some areas to go wild, undisturbed. Naturally diverse in plants.</td>
</tr>
<tr>
<td>2</td>
<td>Collect from alfalfa, cotton and soybean fields with a butterfly net and release them in garden.</td>
</tr>
<tr>
<td>3</td>
<td>Don’t use pesticides—even botanical ones! An exception may be Bacillus thuringiensis (Bt).</td>
</tr>
<tr>
<td>4</td>
<td>Grow “umbels” and other small flowered plants like sweet alyssum and spearmint.</td>
</tr>
<tr>
<td>5</td>
<td>Grow cover crops, and maintain permanent plantings to provide shelter for adults. Provide shelter under rocks, in compost piles or other decaying materials.</td>
</tr>
<tr>
<td>6</td>
<td>Grow dill, caraway, angelica, sunflowers, cosmos, sweet alyssum, dandelion and goldenrod flowers. Spray sugar water on non-crop plants to attract and feed adults. Provide water in pan filled with gravel—especially during dry spells.</td>
</tr>
<tr>
<td>7</td>
<td>Grow flowering plants for nectar for adults.</td>
</tr>
<tr>
<td>8</td>
<td>Grow nectar and pollen plants; adults often congregate in large numbers on the flowers of goldenrod, milkweed and hydrangeas. Maintain undisturbed areas near garden.</td>
</tr>
<tr>
<td>9</td>
<td>Grow perennials to provide permanent shelter plantings.</td>
</tr>
<tr>
<td>10</td>
<td>Grow pollen and nectar plants, especially “umbels,” mints and herbs. Provide shelter with tall plants like sunflowers. Let some broccoli and radishes flower.</td>
</tr>
<tr>
<td>11</td>
<td>Grow pollen and nectar plants (especially sweet alyssum, alfalfa and goldenrod); provide weedy areas for shelter.</td>
</tr>
<tr>
<td>12</td>
<td>Grow pollen and nectar plants in the carrot and mustard family (Queen Anne’s lace, parsley, parsnips, radishes, etc.)</td>
</tr>
<tr>
<td>13</td>
<td>Grow pollen and nectar plants, especially dill, dandelion, wild carrot, angelica, cosmos, goldenrod, yarrow and sunflowers. Grow native grasses and perennials. Stagger corn plantings so pollen is always available.</td>
</tr>
<tr>
<td>14</td>
<td>Grow pollen and nectar plants, especially sweet alyssum, “umbels,” buckwheat and wild mustard. Allow some broccoli to flower. Landscape with tall plants like sunflowers that break the wind to allow hovering.</td>
</tr>
<tr>
<td>15</td>
<td>Grow pollen and nectar plants. Shelter a garden area from strong winds and sun with a windbreak or hedges. Provide water in a pan filled with gravel.</td>
</tr>
<tr>
<td>16</td>
<td>Grow pollen-providing plants. Provide moist shelter with dense cover crops, weedy areas with goldenrod and wild amaranth and permanent, perennial plantings. Maintain grass or stone walkways between permanent garden beds.</td>
</tr>
<tr>
<td>17</td>
<td>Grow some grass.</td>
</tr>
<tr>
<td>18</td>
<td>Grow sweet alyssum, daisies, goldenrod, yarrow, clover, cosmos, vetch and shrubs. Maintain permanent plantings; collect with a net in alfalfa fields.</td>
</tr>
<tr>
<td>19</td>
<td>Keep down the dust.</td>
</tr>
<tr>
<td>No.</td>
<td>Conditions</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
</tr>
<tr>
<td>20</td>
<td>Maintain permanent plantings and trees to provide shelter for adults. Grow pollen and nectar flowers.</td>
</tr>
<tr>
<td>21</td>
<td>Maintain permanent plantings and undisturbed areas. These beetles prefer sunny, dry, light, sandy soils for burrowing and egg laying. Don't use bug zappers.</td>
</tr>
<tr>
<td>22</td>
<td>Plant lots of flowers.</td>
</tr>
<tr>
<td>23</td>
<td>Provide water.</td>
</tr>
</tbody>
</table>
ACTIVITY NAME: “...CIDES”

Subject Area(s): SCIENCE, AGRICULTURE

Duration: Two Weeks

PROJECT SUMMARY:
Students look into chemical “killers” and draw their own tentative conclusions. They explore questions that address the why, what uses, how effective, what effects.

CONTENT STANDARDS:

Science: Malama I Ka ‘Aina
- Sustainability: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- Conservation of Resources: Analyze, evaluate and propose possible solutions in sustaining life on Earth, considering the limited resources and fragile environmental conditions.
- Sustaining Food Supply: Explore how agricultural technology affects humans and the environment.*

Health Education: Decision Making
- Students use goal-setting and decision-making skills to enhance health.
- Analyze immediate and long term consequences, including personal, family, and community consequences.

Social Studies: Political Science
- Citizenship/Participation: Students understand roles, rights (personal, economic, political) and responsibilities of American citizens and exercise them in civic action.
- Debate positions on issues regarding rights and responsibilities, come to consensus on the issues, and take action to gain larger community involvement on the issues.

Life Skills: Habits of Mind
- Controls own behavior and thought processes.
- Makes effective plans.
• Is aware of and uses necessary resources.

**Life Skills: Information Processing**

• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.

• Effectively interprets and synthesizes information.

**DRIVING QUESTION(S):**

- What is the common purpose of “...cides?”
- What are the advantages of using chemical controls? Disadvantages?

**MATERIALS:**

Starter List of commercial “...cides.” (Provide labels of commercial products, if possible.)

**ACTIVITY PROCESS:**

• Have students share the words they know that have “...cide” as a suffix. (Among the initial words will probably be “suicide,” “homicide.”) Some students may have collected information on some insecticides used by the farmers in the prior activity. Start with those on the list. Question: What does the suffix signify across all the words?

• Explain the cooperative learning assignment: The list is divided among the students so everyone doesn't have to do research on all, but will learn from each other’s research.

• Students may be assigned individually or in pairs/groups, depending on how many “...cides” they will learn about.

• Students are to collect information and prepare a report on their assigned “...cide” to be presented to the whole class. Each report is to address at least the following questions:
  - What is the commercial product made of?
• What is the primary use of the product? What does it do? (Who developed it? Why?)
• What side effects does the product cause?
• Who uses the product locally? How much? How often? On what?
• What are the cautions given by the manufacturer?
• Are there legal regulations relating to the product? Why?
• Reports will be made to the whole class on the days specified. If the reports are to be spread out over several days, have students draw lots.
• After all the reports are given, student is to write a learning log (reflection) on “…cides,” summarizing what he/she learned, what thoughts he/she has about the need for “…cides,” governmental controls on their uses, and the immediate and possible long-term effects.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There are different kinds of pest controls.</td>
<td>• Synthesizing</td>
<td>• Planning</td>
</tr>
<tr>
<td>• Chemical controls have been developed for efficiency.</td>
<td></td>
<td>• Reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** Each member’s diligence in completing his/her responsibility, as well as in taking pride in the quality of information gathered, contribute to what the class as a whole gains from the activity. This is one of the strengths of cooperative learning. (It is also one of the weaknesses, when individuals fail to do their part.)

• **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review. After the students present their oral reports, you may want to invite two speakers to do a mini-debate (pro-con) on the use of chemical controls or have a panel of practitioners to discuss wise-use.

COMPONENTS:

• **Product:** This activity calls for a report to be presented orally to the class, and a reflective written log by each student for the teacher.
• **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.

  - **Planning:** Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - **Conducting research:** Locating and collecting information, synthesizing information.
  - **Evaluating:** Developing a set of criteria for the effectiveness of the controls.
  - **Communicating:** Developing an oral presentation that will keep the attention of the class and provide them with the important information.
  - **Reflecting:** Reviewing all the information gathered and received from presentations, synthesizing the information, evaluating or making some judgments as to the use/effectiveness of the controls, and determining one’s own position or value with respect to methods.

• **Instructional Support:** The activity can be supported by providing students with prompts or guide questions such as the following:

  - Why do you think it was developed?
  - What effects were anticipated? Unanticipated?
  - Why are there some legal requirements? How did these requirements come about?
  - Who developed the “cautions?” On what basis?
  - Are there alternatives?

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

• **Product Outcomes:** The oral reports may be rated by the peers, teacher, or UH specialist. The individual reflections should be read by the teacher.

**NOTES:**

The use of chemical controls is often the center of debate among growers. More recently, concerns on disposal, long-term contamination, and resistance-build-up have been receiving serious attention. Students should be aware of the range of
perspectives on these issues and the controls that are being developed. They need to also recognize the importance of humans' values and decision-making skills.

Students start relating anatomical structures with functions: parasitic, predatory, pollinating.

RESOURCES:
**ASSESSMENT RUBRICS: Samples**

**PRODUCT OUTCOMES:**

**Report:**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The information provided shows careful documentation.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. The report reflects high standards of quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Content Knowledge:**

- Student provides valuable information on the specified chemical control.

  4  Demonstrates a thorough understanding of the chemical control and its use. Is able to explain the effects and cautions.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about chemical control. Lacks complete information.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**

  4  Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- I plan carefully before I begin my project.
  
  4  I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.
  
  3  I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.
  
  2  I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.
  
  1  I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I find meaning in information and then combine and organize information to make it useful for my project.
  
  4  I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.
  
  3  I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.
  
  2  I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.
  
  1  I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
### “CIDE” GENERAL LIST

<table>
<thead>
<tr>
<th>Cide Groups</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INSECTICIDE</strong>&lt;br&gt;(killer of insects)</td>
<td>• DDT&lt;br&gt;• Aldrin&lt;br&gt;• Dieldrin&lt;br&gt;• Lindane&lt;br&gt;• Heptachlor&lt;br&gt;• Endrin&lt;br&gt;• Chlordane&lt;br&gt;• Taxaphene&lt;br&gt;• Dichtorvos (resin strips)</td>
</tr>
<tr>
<td><strong>HERBICIDE</strong>&lt;br&gt;(killer of herbs and weeds)</td>
<td>• 2-4-D&lt;br&gt;• 2-4-5-T&lt;br&gt;• Compound containing lead&lt;br&gt;• Compound containing mercury&lt;br&gt;• Compound containing arsenic</td>
</tr>
<tr>
<td><strong>FUNGICIDE</strong>&lt;br&gt;(killer of molds and fungi)</td>
<td>• Dinitro cresol&lt;br&gt;• Captan&lt;br&gt;• Folpet</td>
</tr>
<tr>
<td><strong>RODENTICIDE</strong>&lt;br&gt;(killer of rodents)</td>
<td>• Antu</td>
</tr>
</tbody>
</table>
ACTIVITY NAME: "LOW TECH" CONTROL

Subject Area(s): SCIENCE, AGRICULTURE, LANGUAGE ARTS

Duration: Three - five class periods

PROJECT SUMMARY:
Students study low-tech and organic control methods for pests. Peer teaching is the strategy recommended.

CONTENT STANDARDS:

Science: Historical Perspectives
- Malama I Ka 'Aina: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology.*

Health Education: Information
- Students access valid health information and health-promoting products and services.
- Evaluate the validity of different sources of health information.

Career and Life Skills: Skills for Life and Work
- Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work and at home.
- Interpersonal Skills: Teach others a process, strategy, or skill.

Life Skills: Communication
- Almost all of us are at one time or another involved in communicating what we have learned, both at work and in our private lives.
- Effectively communicates in a variety of ways.

Life Skills: Collaboration/Cooperation
- General Learner Outcome: Understands that it is essential for human beings to work together.
- Effectively performs a variety of roles within a group.
DRIVING QUESTION(S):

- What can be done to control pests, with minimum damage to the environment?
- How do controls of a hobby garden differ from controls for a commercial farm?

MATERIALS:

- List of Organic Control Methods

ACTIVITY PROCESS:

- Have students share their ideas of what they have learned or their experiences with garden pests and controls, including the use of pesticides. Some of the students may have collected valuable information from farmers and other experts on what control means they use.
- Divide class into “expert” teams. Each team will study an organic control method or a low-tech process and, therefore, become “experts” on that specific method.
- Assign (or have team captains choose) a method for each team. It is possible that a low-tech process may be developed, besides the sample provided.
- Provide a time line and a schedule for each team’s lesson presentation. Teaching time may be limited to 20 or 30 minutes, unless the teams ask for more time. (Note: Once the students get started, many will have difficulty keeping within the allotted time!)
- Have the teams plan and conduct their data collection and learning tasks, addressing questions such as:
  - Do we need clarification on the information we received?
  - What additional information do we need?
  - Where will the information be available?
  - Who will do what in collecting the information?
  - How will we make sure each of us “knows” everything that we need to know in order to be the “experts?”
- Provide time in class for teams to plan and prepare the lesson they will be teaching. (Note: Insist that each team member have a role in the teaching.)
- Team captains are to submit 3 questions for inclusion in the test to be given after all lessons are presented by the teams.
- Each team will produce whatever learning materials or props or displays to help the class learn the information.
• Teams will present their lessons.
• Every student will submit an individual report containing the information on the method taught and an evaluation of how well the lesson went. Reports should also indicate the sources of information.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There are day-to-day actions that may be taken to control pests.</td>
<td>• Transmitting information (teaching)</td>
<td>• Work in groups</td>
</tr>
<tr>
<td>• Organic pest controls may have less intrusive effects on the environment.</td>
<td></td>
<td>• Oral communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Information Gathering</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** Students work in small teams (3 to 4). Each team member should have an “assignment” in completing the project. The group work expands beyond simply working together—now the students must insure “learning together.”

• **Information Dissemination:** The students are put in a position where they must learn the information (become experts), and must figure out ways to teach it to others. Debriefing after the lessons might be worthwhile to highlight learning strategies such as paraphrasing, asking questions for clarification, providing hands-on experiences, using visuals or models or real examples, etc.

COMPONENTS:

• **Product:** The primary “product” is the lesson taught by each team. The individual report requirement seeks to have every team member become engaged in the process. Besides repeating the information taught, the individual student is asked to give his/her evaluation of how the lesson went.

• **Student Learning Tasks:** The activity capitalizes on the truism, “You don’t really know something until you have to teach it to someone else.”
• **Instructional Support**: As the groups review the materials and seek additional information, check to see that everyone in the group is developing understanding, and formulating ideas about the topic. The students may be guided in developing an understanding about the learning process, including being able to monitor their own.

**ASSESSMENT**: Samples are attached.

• **Process Outcomes**: Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

• **Product Outcomes**: The lesson presentation may be assessed using rubrics or criteria established by the teacher/class. The teacher and peer groups may do the rating. For the individual reports, it is recommended that the teacher do the rating. The culminating test (after all teams present their lessons) will be comprised of questions from each team. A passing score may be agreed upon with the involvement of all the students. This is not a sorting test; it is a mastery test. Students may have ideas on: How many of the items should everyone get correct, at the minimum? Should we have sub-scores (by team-questions)? What will the results tell us?

**NOTES**:

Control of unwanted organisms and conditions in the garden environment is ongoing. Decisions on what to do and what to use are made based on various reasons. Students need to discuss some of these reasons, but the discussion cannot be pedantic. Why do some people spray herbicides between their rows of vegetables and others choose to rid the weeds with good old-fashioned hoes? Why does one organic control method work for a small garden, but may not work for a large commercial farm?

The number of biocontrol organisms has increased. Growers have choices, including predatory insects, a wide range of Bt insecticides, fungi, beneficial nematodes, and viruses. As choices on controls increase, decision-making skills become more critical, together with consideration of primary, secondary, and tertiary consequences.

**RESOURCES**:

---

Food: Just Grow It! PESTS
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Lesson:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The lesson was comprehensive and clear.</td>
<td></td>
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<td></td>
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<tr>
<td>2. The information was provided using multiple media strategies.</td>
<td></td>
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<tr>
<td>3. The illustrations and activities reflect high standards of quality.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Optimum use of team members' strengths were evident in the presentation of the lesson.</td>
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</tr>
</tbody>
</table>

Content Knowledge:

- Student explains the organic control method thoroughly and gives appropriate examples.

  4 Demonstrates a thorough understanding of the organic control method studied. Explains the process, organisms or ingredients involved, and the effectiveness of the method.

  3 Displays a complete and accurate understanding specific to the project.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the organic control method and its application.
PROCESS OUTCOMES:

Observation rating:

- **Student effectively communicates in a variety of ways.**
  
  4 Uses multiple methods of communication, applying the conventions and rules of those methods in highly creative and imaginative ways.

  3 Uses two different methods of communication, applying the conventions and rules of those methods in customary ways.

  2 Attempts to use two methods of communication but does not apply the conventions and rules of those methods.

  1 Uses only one method of communication when more than one method is clearly needed or requested and does not correctly apply the conventions and rules of that method.

- **Student effectively performs a variety of roles within a group.**
  
  4 Effectively performs multiple roles within the group.

  3 Effectively performs two roles within the group.

  2 Makes an attempt to perform more than one role within the group but has little success with secondary roles.

  1 Rejects opportunities or requests to perform more than one role in the group.
Self Assessment:

- I communicate well using a variety of media.

  4  I use many methods of communication and I follow the correct processes and use the accepted standards of those mediums. I also use the mediums in new and different ways.

  3  I communicate using two mediums and follow the correct process and use the accepted standards for both of those mediums.

  2  I try to communicate using two mediums, but I make errors in the processes and misunderstand the accepted standards of the mediums I use.

  1  I do not even try to communicate in more than one medium.

- I perform a variety of jobs in my group.

  4  I perform many jobs in my group and do them all well.

  3  I perform two jobs in my group and do both well.

  2  I try to perform two jobs in my group but don't perform both well.

  1  I don't even try to perform any more than one job in my group.
SAMPLE LOW-TECH WAYS TO CONTROL PESTS
(abstracted from article by Jill Jesiolowski Cebenko)

- **Plant resistant varieties.** Many resistant varieties are recognizable by the initials after their names. For instance, tomatoes that are disease resistant have “V” or “F” after their names, which stand for the disease the variety can resist. There are also a few varieties that are resistant to certain pests. “N” following a tomato name indicates that the variety has proven its roots are less attractive to root knot nematodes. FLY AWAY carrot has been bred to be less attractive to carrot rust fly and “Non-bitter” cucumbers are less attractive to cucumber beetles.

- **Keep a clean garden!** Many pests seek protection in crop debris. Clean up spent plants as soon as they finish producing, and always pull out any badly infested plants during the growing season.

- **Turn, turn, turn...** Turning the soil with a tiller, garden fork, hoe or other implement can help destroy the soil-dwelling stage of many pests.

- **Get in the handpicking habit!** Get out into the garden every day and do a walk through, looking for trouble—and when you find it, just pinch the offending pest between thumb and forefinger. Look at undersides of leaves for egg masses and squish them, too.

- **Use water as a pesticide!** A strong spray of water from a garden hose can be effective in controlling small caterpillars, aphids, mites, scale, spittlebugs, etc.

- **Ring your seedlings.** Simple barriers such as cardboard (paper cylinders cut from toilet paper or hand towel tubes) or aluminum foil collars will keep pests from chewing tender stems.

- **Plant a trap.** Bugs have preferences in some foods. Plant some of these as a sacrificial “trap” to lure the pests away from the real crop.

- **Mix things up.** In diversified plantings, pests can’t easily gain a stronghold the way they can in a big single crop.

- **Mulch pests away.** Mulches help control pests by repelling and/or confusing them.

- **Invite beneficials in.** Get good bugs to work for you.

- **Don’t forget to rotate!** Crop rotation can be very important in fighting disease, and it also works against corn rootworm and root knot nematodes.
MAJOR ORGANIC PEST CONTROL PRODUCTS

- **Floating Row Cover** - translucent, white, porous polyester fabric

- **Diatomaceous Earth** - mined, fossilized remains of tiny prehistoric algae-like creatures called diatoms.

- **Pheromone Traps** - duplicated smells that resemble the smells (pheromones) produced by insects to lure the opposite sex.

- **Sticky Traps** - rigid material of a specific color, coated with a sticky substance.

- **Insecticidal Soap** - soap containing unsaturated long-chain fatty acids.

- **Oil Sprays** - horticultural oils (light weight and refined)

- **Bacillus Thuringiensis (Bt)** - naturally occurring bacterium found in soil.

- **Parasitic Nematodes** - beneficial nematodes (nonsegmented worm).

- **Nosema locustae** - naturally occurring protozoa
ACTIVITY NAME: TRANSPORT/IMPORT

Subject Area(s): SCIENCE, AGRICULTURE, LANGUAGE ARTS

Duration: Three-five class periods

PROJECT SUMMARY:
Students are asked to think about how organisms (plants and animals) come to Hawaii. They look into the means of transportation and the regulations on importation. There are some natural means and accidental causes, but there also are purposeful human actions. The results are what we are concerned about.

CONTENT STANDARDS:

Science: Organisms and Development
- Unity and Diversity: Students examine the unity and diversity of organisms and how they can be compared scientifically.
  - Explain how different organisms need specific environmental conditions in order to survive.

Social Studies: Geography
- Physical Systems: Students understand how physical processes shape Earth’s surface, and create, sustain, and modify the ecosystem.
  - Explain how physical processes affect formation and distribution of climates, natural resources, and ecosystems.

Life Skills: Complex Thinking
- Investigation: Students apply the process involving close examination and systematic inquiry.
  - Develops and defends a logical and plausible resolution to the confusions, uncertainties, or contradictions about the past event.

Life Skills: Information Processing
- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
  - Effectively interprets and synthesizes information.
Life Skills: Collaboration/Cooperation

- General Learner Outcome: Understands that it is essential for human beings to work together.
  - Works toward the achievement of group goals.

**DRIVING QUESTION(S):**

- How did plants and animals come to Hawaii?
- How are they coming to Hawaii today?
- What effects (positive and negative) have these introduced organisms had on our environment?
- For those that were purposefully introduced, what were the primary reasons?

**MATERIALS:**

- Map of the Hawaiian Islands.

**ACTIVITY PROCESS:**

- Distribute the map of the Hawaiian Islands. Have students imagine what the islands looked like hundreds of years ago.
- Develop a list of the suggested means of transport/import means for plants and animals. If possible, add a second column for the names of plants/animals that were introduced by each suggested means.
- **Task 1:** Select a Pest
  - Divide the students into work groups.
  - Have students select one or two notorious pests to study. They will be doing a historical investigation as to how the pest came to the islands.
  - Have students discuss questions to address in their study, such as:
    - What is the natural habitat of the pest? Food? Life cycle?
    - Is it found only in Hawaii?
    - Where else is it found in the world?
    - How did it (or might it have) come to the islands?
    - Where is it found in Hawaii?
    - What positive and negative effects has it had on the environment and the living things in that environment?
• List the suggested questions and probe for additional ones as needed.
• Groups are then to select their questions, plan their data collection sources, and schedule their tasks within the time provided.

**Task 2: Collecting Information**
• Teams are to do preliminary research on the pests they selected, addressing as many of the questions as possible.
• Invite a panel of consultants to generally talk to students about the introduction of plants/animals to Hawaii. (Agricultural Inspectors, Entomologists, Botanists, Forest Rangers, Environmentalists, etc.). Prepare them for the questions to be posed by the students about their selected pests.
• Students may then pose questions to these experts relating to their specific pest. They may also ask for additional resource references.

**Task 3: Reporting**
• Teams should study all the information collected from the different sources: research, consultation with experts, interview, etc.
• Each team is to prepare a static display with appropriate graphics (pictures, sketches) and transportation/importation information about the particular pest and key points such as:
  • Characteristics of the organism
  • Location on the island(s)
  • Types of damage caused – to plants, animals, people, forests, etc.
  • Origin of the organism
  • Means of coming to Hawaii
  • Controls
• Each team will present their report to the class.
• Individual written reports are to be submitted by each student from the information collected.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plants and animals came to Hawaii by means of the wind, water, carriers (e.g., birds, planes, boats), and human beings.</td>
<td>• Research • Investigation</td>
<td>• Working Together • Information Processing</td>
</tr>
<tr>
<td>• There are evidences of positive and negative effects on the environment.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** The activity is structured as group tasks, except that each individual student must submit his/her own written report.

• **Information Sources:** In addition to people resources, reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

• **Product:** The project is largely one of information collection. The students work on collecting as much information as possible on the selected pests in order to complete static displays (as teams) and individual written reports. There are many possible extensions to this activity, involving concepts appropriate in the disciplines of the teachers (e.g., evolution, indigenous, endemic, natural selection, human behavior, cultural practices, regional similarities, immigration, migration, etc.).

• **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Conducting research: Locating and collecting information, synthesizing information.
• Reporting: Developing an informational static display; writing individual report, seeking feedback, assessing own work.

• Instructional Support: Support should be provided along the way as students plan their interview. Encourage students to ask for clarification if they are not sure what the expert is saying or if they are not familiar with what is mentioned. Students also will benefit from knowing other sources of information. For example, there may be other resource people at the University Extension Offices, University scientists, or ethnobotanist at the Bishop Museum.

ASSESSMENT: Samples are attached.

• Process Outcomes: Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

• Product Outcomes: The informational static displays should be exhibited as part of the team presentation. Individual written reports may need to refer to the display in the event that some of the pictures or graphics cannot be included in the individual report.

NOTES:

Located more than 3,200 km (2,000 miles) from the nearest large land mass, the Hawaiian Islands are the most isolated group of high islands in the world. Due to this extreme isolation, very few plants and animals reached and colonized Hawaii before the arrival of people. Native plants arrived by floating, rafting, drifting on air currents and by attaching to birds’ feathers or in birds’ digestive tracts. Today, of course, human beings are also carriers of plants and seeds. Often they bring in unwanted plants or animals.

High elevation winds transported some plants to the islands. The Pacific portion of the northern hemisphere jet stream speeds up over Asia and slows down over the Hawaiian Islands. This fast-moving wind flows between 9,100 and 12,133 meters (30,000 and 40,000 feet) above the Earth’s surface where air temperatures are quite cold. Tiny grass or sedge seeds, such as those of the native sawgrass (‘uki), may have traveled to the Hawaiian Islands in the jet stream. Other organisms with larger seeds, such as the native makai sedge, probably hitched a ride to the islands in the belly of a migratory waterbird.
This hitch-hiking means exists today with people coming from all parts of the world on planes and boats. In some cases, the people make a conscious decision to bring an unwanted animal to Hawaii (e.g., snakes as pets). There are regulations that must be adhered to in bringing animals and plants into the State. How effective are these regulations?

Follow-up study may be appropriate as part of service learning activities such as working with Hawaii Nature Conservancy on pest such as ginger and banana poka, or with the DLNR on miconia or fire ants.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report/Display:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<td></td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<td></td>
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<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
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</tbody>
</table>

Content Knowledge:

- **Student explains the possible means of transport or import of the selected pest and describes the positive/negative effects.**

  4  Demonstrates a thorough understanding of how the pest came to Hawaii and the damaging effects it has had. Is able to elaborate on the organism and the controls being used on it.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the pest and how it got to Hawaii.
PROCESS OUTCOMES:
Observation rating:

- **Student develops and defends a logical and plausible resolution to the uncertainties about how the selected organism came to Hawaii and the effects it has had.**
  
  4 Provides a logical and well-developed resolution to the uncertainties. The resolution reflects creative thinking as well as thoughtful attention to the details of the problem and information collected.
  
  3 Presents a clear resolution to the problem associated with the concept. The resolution is logical and plausible as a result of the investigation.
  
  2 Develops and presents a resolution to the uncertainties. The resolution is satisfactory, but lacks thorough treatment and accuracy.
  
  1 Presents an unsubstantiated and implausible resolution to the uncertainties.

- **Student effectively interprets and synthesizes information.**
  
  4 Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.
  
  3 Accurately interprets information gathered for the report and concisely synthesizes it.
  
  2 Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.
  
  1 Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
• **Student works toward the achievement of group goals.**

4  Actively helps identify group goals and works hard to meet them.

3  Communicates commitment to the group goals and effectively carries out assigned roles.

2  Communicates a commitment to the group goals but does not carry out assigned roles.

1  Does not work toward group goals or actively works against them.

**Self Assessment:**

• **I suggest and defend a way of settling the uncertainties about the origin of the pest and means of arrival.**

4  I suggest and defend a detailed explanation. My explanation makes sense and shows that I understand the problem, thought about it carefully, and used all the information I could get.

3  I suggest and defend an explanation. My explanation uses information accurately and makes sense.

2  I suggest an explanation that tries to clear up uncertainties, but I do not defend it very well or I use some inaccurate information.

1  I suggest an explanation that does not clear anything up, that I cannot defend, or that does not make sense.
- **I find meaning in information and then combine and organize information to make it useful for my project.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.</td>
</tr>
<tr>
<td>3</td>
<td>I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.</td>
</tr>
<tr>
<td>2</td>
<td>I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.</td>
</tr>
<tr>
<td>1</td>
<td>I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.</td>
</tr>
</tbody>
</table>

- **I work to help achieve the goals of the group.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I participate actively and even help lead the group in setting goals. I do the jobs assigned to me better than anyone expects.</td>
</tr>
<tr>
<td>3</td>
<td>I participate in group discussions and show that I care about the group goals. I complete the jobs assigned to me.</td>
</tr>
<tr>
<td>2</td>
<td>I participate in group discussions and show that I care about the group goals but I do not do the jobs assigned to me.</td>
</tr>
<tr>
<td>1</td>
<td>I don’t participate in group discussions or show that I care about the group goals; or I actually work against the goals.</td>
</tr>
</tbody>
</table>
ACTIVITY NAME: THE BATTLE

Subject Area(s): SCIENCE, AGRICULTURE, SOCIAL STUDIES

Duration: Five class periods

PROJECT SUMMARY:
Students take on roles in simulating a process to get organisms imported to help wage the “battle” with unwanted pests on a farm. By learning their roles, the students become familiar with the Regulating Board, the philosophies of different farmers, and the phases of biological control.

CONTENT STANDARDS:

Science: Organisms and Development
- Unity and Diversity: Students examine the unity and diversity of organisms and how they can be compared scientifically.
- Identify the different structures and functions of organisms that allow them to survive in the environment.

Social Studies: Political Science
- Citizenship/Participation.
- Explain the significance of citizenship and participate responsibly for the common good, e.g., select and study an issue or problem and plan and implement a civic action.

Life Skills: Complex Thinking
- Investigation: Students apply the process involving close examination and systematic inquiry.
- Develops and defends a logical and plausible resolution to the confusions, uncertainties, or contradictions about the past event.

Life Skills: Information Processing
- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
- Effectively interprets and synthesizes information.
Life Skills: Collaboration/Cooperation

- **General Learner Outcome:** Understands that it is essential for human beings to work together.
  - Works toward the achievement of group goals.

**DRIVING QUESTION(S):**

- What are the procedures for importing and introducing new species of organisms into the State of Hawaii as biological controls?
- What are the arguments for and against biological controls? Chemical controls?

**MATERIALS:**

- News Article (modified for the lesson)

**ACTIVITY PROCESS:**

- Distribute the article and have students read it to themselves.
- Explain that the project is one of role playing the meeting of the Agricultural Board.
- The class will be divided into the following role groups: (or students choose which group they want to be in)
  - Agricultural Board members (AB)
  - Advisory Council members (AC)
  - Organic Orange Growers Association members (OOG)
  - Chemical Control Combine (CCC)
  - Community Action Group (CAG)
  - TV News Reporters (optional)
  - Retired Farmers Hui (RFH, optional)
  - University Extension Service staff (optional)

**Task 1:** Role Group Planning

- Have students select one or two leaders. Each student is to have a part.
- Have students discuss the upcoming meeting (agenda attached) of the Agricultural Board: Consider questions such as -
  - What is the request being made of the Board?
  - What evidence supports the request?
• What evidence is there against the request?
• How will the Board vote, for or against the request?
• What is our position?
• What positive and negative effects might it have on the environment and the living things in that environment?
• How will we present our position? (not AB)
• What questions should we be prepared to raise?
• Groups are then to plan their “performance” at the Board meeting. Will they be using their real names?

• **Task 2: Collecting Information**
  • Role groups are to do preliminary research to support their roles and the position(s) they decided on.
  • Information they collected and/or reported in other activities may be very helpful.
  • For students who feel uncomfortable to ad lib in their role playing, perhaps they need to write out what they want to say at the meeting on little note cards.

• **Task 3: Board Meeting**
  • The Agricultural Board and its Chairperson will be responsible for convening and conducting the scheduled meeting.
  • Each role group should participate actively in support of its respective position.
  • After all the testimony has been heard and questions asked, the Agricultural Board should take a short recess to decide on the request.
  • The meeting will end with the Board announcing its decision and whatever else it will deem necessary (e.g., requiring reports, etc.).
  • Individual written reports are to be submitted by each student reflecting on the Board’s action. This is a short report wherein the student states whether or not he/she supports the Board’s decision and why.

• **Task 4: Follow-up**
  • There are several options as a follow-up, the purpose of which is to have the students see what really happens (ed).
  • One option is to take the students to a meeting of the Agricultural Board.
  • Another is to get minutes or the results of the Board’s meeting on Morton Bassan’s request to import thousands of insects. Share the results or invite a Board member/representative to share the results.
  • Another option is to invite farmers who can share their actual experiences in getting approval, importing insects, and conducting “the battle.”
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Procedures have been developed by the government to regulate the introduction of biological controls.</td>
<td>• Research</td>
<td>• Working Together</td>
</tr>
<tr>
<td>• Citizens have a responsibility to participate in the process and ensure that decisions are beneficial to the community, present and future.</td>
<td>• Investigation</td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping**: The groups each have a common goal by virtue of the part each plays. Planning will be critical, not only to make sure they have the right information, but also to be sure that everyone participates and the information is presented clearly (and maybe with a little flair).

• **Information Sources**: In addition to people resources, reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

• **Product**: The project is one of role playing. In this activity, as with a debate, the groups have a position and must do research in support of the position. The Agricultural Board must likewise do research on the major positions, the scientific or extant evidence, and the secondary and tertiary consequences.

• **Student Learning Tasks**: The students have been accumulating a lot of knowledge about pests and controls. This activity is an attempt to place them into a situation that simulates the real world. What they will learn from this activity may primarily be the civic nature of our relating to each other in the community and how important the knowledge they have about pests and controls is.
• **Instructional Support:** Support should be provided along the way as students plan their role playing. Encourage students to ask for clarification if they are not sure what some of the technical information means. Students also will benefit from knowing other sources of information such as the University Extension staff.

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

• **Product Outcomes:** The Board meeting is the final outcome. Guests may be invited to help “evaluate” the performance. Individual written reports will be read by the teacher, primarily in terms of the position taken by the student and how he/she supports that position.

**NOTES:**


An extension of this activity may be the introduction of current efforts in Integrated Pest Management (IPM) strategies.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Board Meeting Presentation:

<table>
<thead>
<tr>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The meeting was well conducted and the Board members and testifiers were well prepared.</td>
</tr>
<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
</tr>
<tr>
<td>3. The performance was effective and met high standards of communication.</td>
</tr>
<tr>
<td>4. Every group made efforts to involve all members in the performance.</td>
</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains the procedures for importing of the selected biological organisms for pest control.**

  4  Demonstrates a thorough understanding of how biological controls are regulated and what it takes to import organisms. Is able to elaborate on the criteria for approval and use of these organisms.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the procedures for importing organisms and about the uses of biological controls.
PROCESS OUTCOMES:
Observation rating:

- **Student develops and defends a logical and plausible resolution to the uncertainties about how the selected organism came to Hawaii and the effects it has had.**
  
  4 Provides a logical and well-developed resolution to the uncertainties. The resolution reflects creative thinking as well as thoughtful attention to the details of the problem and information collected.

  3 Presents a clear resolution to the problem associated with the concept. The resolution is logical and plausible as a result of the investigation.

  2 Develops and presents a resolution to the uncertainties. The resolution is satisfactory, but lacks thorough treatment and accuracy.

  1 Presents an unsubstantiated and implausible resolution to the uncertainties.

- **Student effectively interprets and synthesizes information.**

  4 Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3 Accurately interprets information gathered for the report and concisely synthesizes it.

  2 Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1 Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
• **Student works toward the achievement of group goals.**

  4  Actively helps identify group goals and works hard to meet them.

  3  Communicates commitment to the group goals and effectively carries out assigned roles.

  2  Communicates a commitment to the group goals but does not carry out assigned roles.

  1  Does not work toward group goals or actively works against them.

**Self Assessment:**

• **I suggest and defend a way of settling the uncertainties about the origin of the pest and means of arrival.**

  4  I suggest and defend a detailed explanation. My explanation makes sense and shows that I understand the problem, thought about it carefully, and used all the information I could get.

  3  I suggest and defend an explanation. My explanation uses information accurately and makes sense.

  2  I suggest an explanation that tries to clear up uncertainties, but I do not defend it very well or I use some inaccurate information.

  1  I suggest an explanation that does not clear anything up, that I cannot defend, or that does not make sense.
• I find meaning in information and then combine and organize information to make it useful for my project.

4  I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

3  I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

2  I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

1  I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.

• I work to help achieve the goals of the group.

4  I participate actively and even help lead the group in setting goals. I do the jobs assigned to me better than anyone expects.

3  I participate in group discussions and show that I care about the group goals. I complete the jobs assigned to me.

2  I participate in group discussions and show that I care about the group goals but I do not do the jobs assigned to me.

1  I don’t participate in group discussions or show that I care about the group goals; or I actually work against the goals.
Organic Orange Growers Call for Bug Battalion
They want to add to the good insects that fight the bad in their orchards.

Hawaii —In the war on bugs that attack the orchards, Organic Orange Growers Association (OOG) wants more troops.

OOG has asked the state Department of Agriculture to approve importing thousands of helpful insects from six species to attack bad bugs in their orchards.

The new bugs would extend OOG’s “integrated pest management,” in which the growers rely on nature rather than chemicals to protect their crops.

The Advisory Council (AC) of the Department of Agriculture has already recommended approval of the six insects and mites.

The state Board of Agriculture will consider the recommendation at the next meeting.

All of the species are already present on the island. OOG dropped a seventh that was on the list when it could not be found in the orchards. All are small, some the size of a pinhead.

OOG members have several hundred acres of oranges to protect. Their spokesperson said the bad bugs get really bad only under certain conditions of heat and humidity. When that happens, the on-site good bugs attack them, but they need some time to build up their numbers. Meanwhile, the bad bugs wreck the orange trees.

The good bugs can be readily bought from “insectaries” on the mainland. There are about 95 such facilities in the United States and more in Canada and Mexico.

The problem, said Mr. Larry Smith, manager of the state Plant Pest Control Branch, is that the quality of these labs varies. From experience, Mr. Smith knows some labs send just the right bugs, some send good and bad ones mixed, and some occasionally send a completely wrong bug.

The difficulty is that labs send the bugs in the forms of pupae, like cocoons, injected by female bugs into the pupae of bad bugs. Authorities at a quarantine station in Honolulu have to wait until adult bugs pop out of the bad bug pupae before they’re sure what they have.

So OOG members face a two-step process: first get import approval, then write conditions for making the imports. That basically means finding out which labs are reliable, Smith said. It may sound complicated, but OOG members said the alternative is worse.

When the orchards where taken over by OOG members in 1980, insecticides were used, but their effectiveness gradually declined. Meanwhile, the chemicals killed good bugs as well as bad ones.
With careful monitoring, OOG members say that they can use good insects to protect their orchards for a tenth of the cost of insecticides. Monitoring means knowing when to release $4 worth of insects instead of waiting until $4,000 worth would be needed.

After the good bugs kill the bad bugs, they run out of food, die off, and are cleaned up by another set of good bugs, OOG members said.

Another example of biocontrol are the ants and the aphids. Aphids suck the juices of the orange trees. Ants like aphid juices so they protect the aphids. OOG members broke the cycle by putting out bowls of honey mixed with boric acid. The ants took the honey to their queen and unwittingly poisoned her. No queen, no ants, no aphids —and no chemicals on the trees.

Besides attracting pests to poison, OOG members let them munch on decoy plants. Caterpillars can be seen stripping a Chinese lantern plant bare of leaves while ignoring orange trees right next to it.

Rounding out the picture are the geese and ducks used by OOG. These animals eat other bugs and weeks. The orchards also have 50 or more cats, but they are, according to OOG, only for decoration. The OOG members started the transition from standard practices to biocontrol in the 1980's. They have received "transitional" organic certification and expect final certification soon. This certification will enable them to sell their oranges as “organically grown.”

Interviews were held with people who live next to the orchards. Members of the Community Action Group (CAG) reported that the people have been noticing infestations of bugs in their yards and plants. They don't know if the bugs are good or bad bugs, but they are concerned that there be a safe balance in the environment. A member said, "We don't want to come to a point with bugs as we did with tilapia!"

The state Agricultural Board will be meeting next week. Everyone is invited. The agenda follows.
AGRICULTURAL BOARD

Agenda

7:00 p.m. Opening and Welcome Remarks: Chairperson, Agricultural Board

7:05 p.m. Old Business

7:10 p.m. Request for Approval: Organic Orange Growers (OOG)
Presentation of Request and Justification

Questions to OOG by Agricultural Board members

7:20 p.m. Submittal of Recommendation: Advisory Council
Importing Species
Insectaries

Questions to AC by Agricultural Board Members

7:30 p.m. Testimonies by Interested Public

Questions to testifiers by Agricultural Board Members

7:40 p.m. Other Testimonies or Questions

7:45 p.m. RECESS

7:50 p.m. Rendering of Decision by Agricultural Board

8:00 p.m. ADJOURNMENT
“Five A Day”

INTRODUCTION:

The activities in this thematic unit use the context of food and diet to address eating practices that may or may not contribute to good health and overall wellness.

CONTENT STANDARDS:

Across the activities in this unit, several content standards provide the thrust for the student learning tasks. Specific references are made to directly related standards and their respective benchmarks. At the same time there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

Health Education
• Students comprehend concepts related to health promotion and disease prevention in nutrition.
• Students practice health-enhancing behaviors and reduce health risks.

Science
• Understanding Ourselves and the World Around Us: Wellness. Students appraise the relationships between their bodily functions and their physical and mental well being.

Social Studies
• Cultural Anthropology: Cultural Systems. Students understand culture as a system of beliefs, knowledge, and practices shared by a group.

Career and Life Skills
• Individual, Family and Community Development: Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.

LIFE SKILLS:

Although a range of life skills is reflected among the activities in this unit, particular focus should be on developing the skills for Analyzing Perspectives. The standards and the performance indicators for analyzing perspectives include:
Identification of an issue on which there is disagreement.
• Students identify and articulate explicit points of disagreement that cause conflict.

Identification of one position on the issue and the reasoning behind it.
• Students articulate a position and the basic reasoning underlying the position, and, if a strong line of reasoning does not underlie the position, students articulate the errors or holes in the reasoning.

Identification of an opposing position and the reasoning behind it.
• Students articulate a detailed opposing position and the reasoning behind it. If a strong line of reasoning does not underlie the position, students articulate the errors or holes in the reasoning.

CONCEPTS:

Understanding of the theme of nutrition and wellness is developed in the activities through concepts such as:

• Eating preferences may be influenced by internal and external factors.
• Cultural dietary practices have differences and similarities.
• Healthy eating follows the “Five A Day” recommendations.
ACTIVITY NAME: WE ARE WHAT WE EAT!

Subject Area(s): FOOD SCIENCE, MATHEMATICS, SCIENCE

Duration: Five class periods

PROJECT SUMMARY:
Students use the recommended food pyramid as the guide to analyze their food intake. The students individually make a commitment to improve their intake in one area. Their success (or failure) is recorded over a one-week period.

CONTENT STANDARDS:

Science: Understanding Ourselves and the World Around Us
• Wellness. Students appraise the relationships between their bodily functions and their physical and mental well being.
• Identify elements that will lead to maintaining a healthy body (e.g., personal hygiene, balanced diet).*
• Explain the need for proper diet to maintain a healthy body over time.*
• Identify certain behaviors and practices that increase and decrease longevity (e.g., regular exercise, eating disorder, high fiber and vegetarian diet).*

Mathematics: Data Analysis, Statistics and Probability
• Students pose questions and collect, organize, and represent data to answer those questions.
• Systematically collect and organize data (e.g., using tables, line graphs, or pie charts).*

Health Education:
• Students comprehend concepts related to health promotion and disease prevention.
• Evaluate the short and long term benefits and consequences of nutrition.

Life Skills: Complex Thinking
• Analyzing Perspectives. Considering one perspective on an issue and the reasoning behind it as well as an opposing perspective and the reasoning behind it.
• Identifies one position on the issue of eating patterns and the reasoning behind it.

Life Skills: Complex Thinking
• Problem Solving. Developing and testing a method or product for overcoming obstacles or constraints to reach a desired outcome.
• Selects and adequately tries out alternatives.

DRIVING QUESTION(S):
• What should we eat? (Who said? Why?)
• What are we eating?

MATERIALS:
• Food Guide Pyramid and Servings Explanation
• Graphing charts
• Record keeping log

ACTIVITY PROCESS:
• Have students share what they think is a healthy meal. Then have them discuss food intake for a day (including snacks).
• Explain the Food Guide Pyramid in relation to what the students shared. Discuss “servings.” Extend the Servings Explanation by arriving at agreements for unique foods that the students may mention—for example, li hing mui, arare popcorn, etc.
• Each student records what he/she ate the day before. Use the Pyramid and the extended Servings Explanation.
• Then each student lists the food intake by group and computes the totals on the Recording Worksheet. The totals are plotted on the Daily Intake Graph (bar graphs).
• Have students study their own graphs and select one of the food groups as the area for improvement (e.g., eat more of; eat less of).
• Divide the class into groups based on their improvement area. That is, all the students who choose to reduce fat/oil/sweets intake will be in one group. All
students who choose to eat more fruits and vegetables will be in another group. (If the groups are too large, subdivide the students.)

- Groups are to discuss what foods they will be targeting to improve their eating patterns. This discussion should build better understanding of the Food Guide Pyramid and the possible consequences of not making changes to one’s diet. The teacher or guest speakers (e.g., nutritionist, doctor) may talk to the students about long term effects of certain dietary imbalances.

- Individual students record the number of servings they intake each day for a week.
- The class period after the 7th day should have the students graphing their week's intake on the Week's Intake Graph (line graph).
- In the work groups, the students share their individual Week's Intake Graph. Students should be encouraged to share anecdotes such as what difficulties they faced; what new foods they tried; what they found they liked/disliked. Celebrations are in order. Then the group's data are compiled and a group graph is made, using averages for each day.
- Before the entire class, each group shares their group graph and anecdotes of the students. Individual graphs are submitted to the teacher.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
</table>
| Food Guide Pyramid. | Data Collection and Graphing | • Working in groups  
|                   |                | • Analyzing Perspectives |
|                   |                | • Problem Solving |

**STRATEGIES:**

- **Grouping:** Students will be working individually on key parts of the activity. The assessment of oneself and making a commitment to try to change are individual actions. The formation of groups later in the activity is based on common areas of change. In the group setting, there should be some discussion about “cheating” on the information to be collected. Some groups may want to pair members up to record (and monitor) the intake from each previous day so that there will be less fictitious data. Anecdotes should also be recorded.
• **Information Sources:** The use of a nutritionist, dietician, doctor, etc., will provide the students with information, as well as the opportunity to find out about other sources of information. With “live” experts, the students may be able to ask questions to determine what the experts’ perspectives are and how they came about.

**COMPONENTS:**

• **Product:** This activity has several required products.
  - Graphic display of individual’s one day intake
  - Graphic display of individual’s intake of target food group over one week
  - Graphic display of group’s average intake of target food group over one week
  - Oral presentation of group results

• **Student Learning Tasks:** In this activity, the products are means through which students learn about the Food Guide Pyramid and about their individual status with respect to the recommended levels of intake. In the process, they are applying their graphing skills (or developing these skills if they have not mastered them). Perhaps the most difficult part of the activity is when the student has to select an improvement area. The difficulty rests in students being able to analyze their perspectives about what is good food and what is good for them.

• **Instructional Support:** Instructional support should be provided along the way as students discuss the Food Guide Pyramid. They may be interested in knowing about the different kinds of occupations/professions involved in the developing of such a guide. Also, how these recommendations came about—the data or information collected, the studies conducted. Inviting speakers will be a good support when the students have to make a commitment to change.

Students may end the activity on a “question.” That is, it is possible that the students may indicate in their group presentations or on their individual worksheets/ graphs that making changes in their perspectives or in their eating habits or their level of physical activity is very difficult. The “question” of how to affect change for one’s own health is a good stepping stone into follow up activities or discussions.
ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The graphing products may be assessed using rubrics or criteria established by the teacher/class. For the oral presentation, the teacher and peer groups may do the rating. For the individual graphs, it is recommended that the teacher do the rating.

NOTES:

*The following messages about nutrition and physical activity are combined because they are closely related aspects of a healthy lifestyle and, if heeded, together can help to reduce the increasing number of overweight youth in the United States. (CDC, 1997)*

**Key Messages**
- Small changes can make a big difference. You don't have to totally give up your favorite foods or run marathons to become healthier.
- There are many different kinds of physical activities that result in health benefits, from sports to housework to yardwork. Pick activities that you enjoy and that fit into your daily schedule. Vary activities to avoid getting bored.
- It is recommended that everyone be physically active for at least 30 minutes on most days of the week. You don't have to be active for 30 minutes all at once. You could bike for 15 minutes in the morning and walk the dog for 15 minutes at night (ACS, 1996).
- Everyone over the age of two should
  - Eat a diet low in fat (eat mostly plant foods, choose lowfat dairy products, lean meats and use very little added fat);
  - Eat at least five servings of fruits and vegetables every day;
  - Eat more fiber (whole grain breads and cereals, beans, fruits and vegetables). (USDA, 1995)
Benefits

- Cancer deaths in the US might be reduced as much as 35% through simple changes such as eating more fruits, vegetables, and grains, limiting high-fat foods especially from animal sources, being more physically active, and limiting consumption of alcohol (ACS, 1997).

- Benefits of regular physical activity include:
  - Higher levels of self-esteem or "feeling better"
  - Less stress
  - Increased strength, endurance, and flexibility (CDC, 1996)
  - Improved appearance and staying in shape (Calfas KJ, Taylor WC. 1994)

- There is some evidence that good nutrition is linked to:
  - Improved school performance and test scores
  - Increased school attendance
  - Increased energy levels
  - Improved attitude toward school (Wolford et al, 1997; USDOE 1992).

RESOURCES:

*American Cancer Society Guidelines for Nutrition, and Cancer Prevention.*


**ASSESSMENT RUBRICS:  Samples**

**PRODUCT OUTCOMES:**

**Projects:  Group Report**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The graph and oral presentations were comprehensive and informative.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The information provided shows that members seriously addressed their commitment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The graph and oral presentations reflect high standards of quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Optimum use of team members' strengths were evident in presentation.</td>
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</tr>
</tbody>
</table>

**Content Knowledge:**

- **Student explains the food pyramid and analyzes the importance of balanced eating.**

  4  **Demonstrates a thorough understanding of the food pyramid groups and the relationship among the groups as they relate to good health and nutrition.**

  3  **Displays a complete and accurate understanding specific to the project.**

  2  **Displays an incomplete understanding and has some notable misconceptions.**

  1  **Demonstrates severe misconceptions about the interrelationships among the food groups as they relate to good health and nutrition.**
PROCESS OUTCOMES:
Observation rating:

- **Student identifies a position on the issue of eating patterns and the reasoning behind it.**

  4  Articulates a detailed position and the reasoning behind it and, if a strong line of reasoning does not underlie the position, articulates the errors or holes in reasoning.

  3  Articulates a position and the basic reasoning underlying the position. Does not address or incompletely addresses the errors or holes in the reasoning.

  2  Articulates a position but does not present a clear line of reasoning behind it.

  1  Does not articulate a clear position.

- **Student selects and adequately tries out alternatives.**

  4  Engages in effective, valid, and exhaustive trials of the selected alternatives. Trials go beyond those required to solve the problem and show a commitment to an in-depth understanding of the problem.

  3  Puts the selected alternatives to trials adequate to determine their utility.

  2  Tries out the alternatives, but the trials are incomplete and important elements are omitted or ignored.

  1  Does not satisfactorily test the selected solutions.
Self Assessment:

- I state an opinion on the topic and explain the reasons for that opinion.

  4  I clearly state an opinion on the topic of good eating and explain the reasons for that opinion. I also describe the thinking that might lead to the opinion, and I explain the strengths, weaknesses, and errors in that thinking.

  3  I clearly state an opinion on the topic and explain some of the important reasons for that opinion. I do not explain the thinking that might lead to the opinion.

  2  I clearly state an opinion on the topic, but I do not clearly explain the reasons for that opinion.

  1  I do not state a clear opinion.

- I select and try out the best solution for improving my eating patterns.

  4  I decide which of my ideas is probably going to be the best solution and set up a way of trying it out to see if it works. I use a method of testing the solution that I know will give me a good idea of how well it helps me deal with the problems created by my eating habits. I also see if the solution has other unexpected effects that help me achieve my goal of improving my eating patterns.

  3  I select what seems to be the best solution and try it out in a way that will tell me if it works. The test I use helps me decide if the solution is a good one for dealing with the problems in my eating.

  2  I select what seems to be the best solution and try it out, but the way I try it doesn't really tell me how it will work over time. I still won't know if the solution is a good one for changing my eating patterns.

  1  I select what seems to be the best solution, but I do not try it out in a situation that gives me any usable information about how well it works.
Use the Food Guide Pyramid to help you eat better every day. Start with plenty of breads, cereals, rice, and pasta; vegetables; and fruits. Add two to three servings from the milk group and two to three servings from the meat group. Each of these food groups provides some, but not all, of the nutrients you need. No one food group is more important than another—for good health you need them all. Go easy on fats, oils, and sweets, the foods in the tip of the pyramid.

(Source: US Department of Agriculture/US Department of Health & Human Services)
THE DAILY FOOD GUIDE

What Counts as One Serving?

<table>
<thead>
<tr>
<th>Breads, Cereals, Rice, and Pasta</th>
<th>Milk, Yogurt and Cheese</th>
<th>Fats, Oils and Sweets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 slice of bread</td>
<td>1 cup of milk or yogurt</td>
<td>LIMIT CALORIES!</td>
</tr>
<tr>
<td>1/2 cup of cooked cereal, rice, or pasta</td>
<td>1.5 to 2 ounces of cheese</td>
<td>Especially if you need to lose weight.</td>
</tr>
<tr>
<td>1 ounce of ready-to-eat cereal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vegetables

<table>
<thead>
<tr>
<th>3/4 cup 100% juice</th>
<th>1/2 cup of other raw, chopped, or cooked vegetables</th>
<th>1/2 cup of cooked beans</th>
<th>1 cup of leafy raw vegetables</th>
</tr>
</thead>
</table>

Fruits

<table>
<thead>
<tr>
<th>1 medium piece of fruit</th>
<th>3/4 cup of 100% juice</th>
<th>1/2 cup of chopped, canned, or frozen fruit</th>
<th>1/4 cup of dried fruit</th>
</tr>
</thead>
</table>

Meat, Poultry, Fish, Eggs, and Nuts

<table>
<thead>
<tr>
<th>2-3 ounces of cooked lean meat, poultry, or fish</th>
<th>1 egg, 2 Tbsp. peanut butter, or 1/3 cup of nuts count as 1 ounce of lean meat</th>
</tr>
</thead>
</table>

How Many Servings Do You Need Each Day?

<table>
<thead>
<tr>
<th>Calorie Level*</th>
<th>Women and Some Older Adults</th>
<th>Children, Teen Girls, Active Women, Most Men</th>
<th>Teen Boys and Active Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread Group</td>
<td>6</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Vegetable Group</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Fruit Group</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Milk Group</td>
<td>2-3**</td>
<td>2-3**</td>
<td>2-3**</td>
</tr>
<tr>
<td>Meat Group</td>
<td>2, for a total of 5 ounces</td>
<td>2, for a total of 6 ounces</td>
<td>3, for a total of 7 ounces</td>
</tr>
</tbody>
</table>

*These are calorie levels if you choose low-fat, lean foods from the five major food groups and use food from the fats, oils, and sweets group sparingly.
**Women who are pregnant or breastfeeding, teenagers, and young adults to age 24 need three servings.

Note on Fat and Added Sugars: The small tip of the Pyramid shows fats, oils, and sweets. These are foods such as salad dressings, cream, butter, margarine, sugar, soft drinks, candies, and sweet desserts. LIMIT how much you eat of these. Some fat and sugar are in the other food groups, like cheese, ice cream, french fries.
### Daily Intake Recording Worksheet

Name: __________________ Date: ________________

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Intake (List)</th>
<th>No. Servings</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fats/Sweets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable Group</td>
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<td></td>
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<tr>
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</tr>
<tr>
<td>Milk Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat Group</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DAILY INTAKE GRAPH
(Plot Your Intake on the Recommended Bars and Shade Them)
Recommended Bars - Teen Boys and Girls (…….)

WEEK INTAKE OF TARGET FOOD GROUP:

Name: ___________________________

Dates: ___________________________

Food: Just Grow It! 5ADAY

232
(Plot number of servings for each day. Connect points to form a line graph.)
ACTIVITY NAME: **FIGHT FAT!**

Subject Area(s): FOOD SCIENCE, LANGUAGE ARTS, SCIENCE

Duration: 7 – 9 class periods

**PROJECT SUMMARY:**

Students can make a concerted effort to control their fat intake by being aware of the fat contents of the foods they eat. They recognize that healthful food choices can enhance body composition and self-concept, as well as the health of their body. By reading labels, students account for their fat intake.

**CONTENT STANDARDS:**

**Science:** Understanding Ourselves and the World Around Us

- **Wellness.** *Students appraise the relationships between their bodily functions and their physical and mental well being.*
- Identify elements that will lead to maintaining a healthy body (e.g., personal hygiene, balanced diet).*
- Explain the need for proper diet to maintain a healthy body over time.*
- Identify certain behaviors and practices that increase and decrease longevity (e.g., regular exercise, eating disorder, high fiber and vegetarian diet).*

**Career and Life Skills:** Skills for Life and Work

- *Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.*
- **Personal Qualities:** Assess self accurately, set personal goals, monitor progress, and exhibit self-control.

**Health Education:**

- *Students comprehend concepts related to health promotion and disease prevention.*
- Evaluate the short and long term benefits and consequences of nutrition and healthy diets.

**Language Arts:** Writing

- *Write using various forms to communicate for a variety of purposes and audiences.*
• Write to report information from research using appropriate forms (e.g., term paper, position paper, I-search, interviews).

**Life Skills: Complex Thinking**
• **Analyzing Perspectives.** Considering one perspective on an issue and the reasoning behind it as well as an opposing perspective and the reasoning behind it.
  • Identifies a position on the issue of eating patterns and the reasoning behind it.

**Life Skills: Complex Thinking**
• **Problem Solving.** Developing and testing a method or product for overcoming obstacles or constraints to reach a desired outcome.
  • Selects and adequately tries out alternatives.

**DRIVING QUESTION(S):**
• Why is a low-fat diet healthier than a high-fat diet?
• Why is it important for young people to limit high-fat foods in their diets?
• Which foods might you choose to eat more often? Which foods might you choose to eat less often?

**MATERIALS:**
• Heavy brown wrapping paper
• Favorite foods
• Food labels

**ACTIVITY PROCESS:**

**Task 1: Evidence of Fat**
• Have students bring their favorite snack or food with them to class on a specified day. (Be prepared with some foods like french fries, potato chips, Reeses candy, in the event that the students forget.)
• In the work groups of two or three, students are to see if their favorite foods contain fat.
• Each group works with sheets of brown paper (approximately 3" x 4").
• The paper should be labeled with the name of the food being tested. Then a piece or small amount of the food is placed on the paper. The piece of food may be rubbed on or tightly folded in the paper.
• Then remove the food. Foods with fat in them will leave a translucent grease spot.
• Each group should log the foods tested, and describe the results.
• **Task 2: Fat’s Not Where It’s At**
  • Each work group is to prepare a report on the effects of a high fat diet.
  • Information should be collected from various sources (e.g., print materials, interview with doctor/nutritionist, guest speaker from American Heart Association, Internet, Cafeteria Manager, etc.).
• **Task 3: Cut the Fat**
  • As a large group, the students are presented with information on low-fat diets and why they are healthier in general. Concepts such as cholesterol, saturated and unsaturated fats are presented. A guest speaker from the American Heart Association or University Extension Service may be stimulating for the students.
  • Have students bring in food labels (Nutrition Facts) from their favorite snacks or foods. Review the format of the labels with them.
  • Individually, have the students total their fat intake each day for three or four days. Then the total should be divided by the number of days to give the average grams of fat intake.
  • An individual report should be submitted, describing the importance of low-fat diets, the individual data collected, and the changes they are considering making to their normal food intake.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high-fat diet can increase the risk of heart disease and some cancers in adults.</td>
<td>Research and Report Writing</td>
<td>Working in groups</td>
</tr>
<tr>
<td>It is important to form healthy eating habits at a young age.</td>
<td></td>
<td>Analyzing Perspectives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem Solving</td>
</tr>
</tbody>
</table>
STRATEGIES:

• **Grouping:** Students work together on the exploratory task. This is fun, but it can also be quite revealing. Have the groups share their results. A group that has good documentation may be asked to do a bulletin board display, describing the process and findings. For the research task, division of work should be clear. Specific requirements for the report are left to the teacher, but there should be a “credit page” where each student’s contributions are acknowledged (e.g., illustrations, interviews, Internet materials, introduction, findings, etc.).

• **Feedback:** Because this activity has three major tasks, feedback along the way will be important. Encourage students to be as orderly as possible on the blotting test. Provide probing questions when they report their findings, such as “What about ....?”. Ask for clarity when they plan their report for Task 2, “Who will be doing what?” Putting feedback in the form of a question will be helpful to the students and may be received in a more positive light.

COMPONENTS:

• **Tasks:** The activity is divided into three major task sets. The first task is more exploratory. Some foods are rich in fats; so much so, that a simple blotting test will demonstrate the fattiness. (A related follow-up question may be, “What has no fat or oil?”) The second task is one of gathering information on high- or low-fat diet effects. Among the various sources should be “experts.” The third task relates to the individual’s diet and identification of possible changes in practices.

• **Student Learning Tasks:** The students are provided the opportunity to learn through exploring, with hands-on fat blotting. Some may find this evidence sufficient to make some serious connections to their health. The learning progresses through the collection of information, written and/or oral. This provides the students with “expert” opinions or evidence, as well as the opportunity to get other perspectives, if they see the need. The learning tasks then become personal—applicable to oneself. The extent of integration by the student will become evident in the final report on what he/she learned about himself/herself and is willing to change.

• **Instructional Support:** Instructional support should be provided along the way as students discuss fat in the diet. They may be interested in knowing about the
different kinds of occupations/professions in the food industry (Nutrition Facts), in the treatment of diseases, and in the prevention of diseases. Inviting speakers will be a good support when the students have to make a commitment to change.

There are many possible extensions to this activity, should the students express interest. For example, there are many articles that decry the growing numbers of fat people in America. Or the students may relate to bulimia or anorexia among teens. Encourage individual research projects.

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. Or an arrangement with an English teacher could be made where the students would also submit the paper for English credit (and therefore the paper would be rated by two teachers).

NOTES:

It is important that our body gets a certain amount of fat from the food we eat. Fat is a fuel that is burned in the body and supplies us with a good deal of the energy that we use when we work and play. It is one of the nutrients that our body needs in order to stay healthy. Too much fat, however, at the expense of other nutrients is harmful.

Foods, such as milk, butter, cream, fatty meats, fish, and nuts are rich in fats. Carrots, potatoes, apples, oranges, sugar, and cereals contain no fats. Students may be too eager to conclude that plants have no fats and oils. It should be noted that fats and oils are related substances—in fact, fat is a solid or half-solid form of oil. Also, all plants contain oil, but some have much more than others. Nuts would show a lot of oil on the blotting test. Orange or lemon peels when squeezed on the paper will leave small oil spots. Or these peels when squeezed near a flame will produce fiery dots in the flame as the oil drops catch fire. The students may be interested in finding out how perfumes are made—using the essential oils in flowers.
The students record the number of fat grams in the food they eat. Keeping a record over several days and finding the average will show how consistent they are. The students should compare their average daily fat intake with some standard such as 83 grams for boys and 73 grams for girls.

In deciding what they might do to change their eating habits, the students may express distaste for low-fat versions of their favorite food. A “blind” taste test could be conducted for each food, with ratings recorded. They may be surprised.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT: All essential, relevant information included.</td>
<td></td>
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<tr>
<td>ORGANIZATION: At least three main ideas with elaborate supporting details provided. Transitions are smooth.</td>
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<tr>
<td>MECHANICS: Word usage, sentence structure, punctuation, spelling, capitalization</td>
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<tr>
<td>VOCABULARY: Word choice, accuracy, appropriate selection</td>
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</tbody>
</table>

Content Knowledge:

- Student explains why a low-fat diet is healthier than a high-fat diet.

  4  Demonstrates a thorough understanding of fats in the diet and their positive and negative effects on the health of individuals, both short-term and long-term.

  3  Displays a complete and accurate understanding of fats in the diet.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about diets and the relationships to an individual’s health.
PROCESS OUTCOMES:
Observation rating:

- Student identifies a position on the issue of eating patterns and the reasoning behind it.
  
  4     Articulates a detailed position and the reasoning behind it and, if a strong line of reasoning does not underlie the position, articulates the errors or holes in reasoning.

  3     Articulates a position and the basic reasoning underlying the position. Does not address or incompletely addresses the errors or holes in the reasoning.

  2     Articulates a position but does not present a clear line of reasoning behind it.

  1     Does not articulate a clear position.

- Student identifies viable and important alternatives for lowering one’s fat intake.
  
  4     Identifies creative but plausible solutions to lowering fat intake. The alternatives address the personal difficulties posed by the change in diet.

  3     Proposes alternatives that appear plausible and that address the most important obstacles to changing one’s diet.

  2     Presents alternatives for dealing with the eating obstacles, but the solutions do not address the important personal difficulties.

  1     Presents alternatives that fail to address the need for change in diet.

Self Assessment:
• **I state an opinion on the topic and explain the reasons for that opinion.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I clearly state an opinion on the topic of good eating and explain the reasons for that opinion. I also describe the thinking that might lead to the opinion, and I explain the strengths, weaknesses, and errors in that thinking.</td>
</tr>
<tr>
<td>3</td>
<td>I clearly state an opinion on the topic and explain some of the important reasons for that opinion. I do not explain the thinking that might lead to the opinion.</td>
</tr>
<tr>
<td>2</td>
<td>I clearly state an opinion on the topic, but I do not clearly explain the reasons for that opinion.</td>
</tr>
<tr>
<td>1</td>
<td>I do not state a clear opinion.</td>
</tr>
</tbody>
</table>

• **I suggest workable and effective solutions for dealing with the barriers to changing my fat intake.**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I suggest a number of interesting and workable solutions for dealing with the barriers to changing my fat intake. My suggestions show I have thought carefully and have attempted to directly address personal difficulties.</td>
</tr>
<tr>
<td>3</td>
<td>I suggest a number of workable solutions for dealing with the barriers to changing my fat intake. My suggestions will help me deal with the personal difficulties in the process.</td>
</tr>
<tr>
<td>2</td>
<td>I suggest several solutions for dealing with the change in fat intake, but some of them do not solve important personal difficulties.</td>
</tr>
<tr>
<td>1</td>
<td>I suggest solutions, but my suggestions do not relate to what needs to be done and the personal difficulties anticipated.</td>
</tr>
</tbody>
</table>
**ACTIVITY NAME:**  
*CULTURAL FIVES*

**Subject Area(s):**  
FOOD SCIENCE, AGRICULTURE, SCIENCE, SOCIAL STUDIES

**Duration:**  
Three - five class periods

**PROJECT SUMMARY:**  
Students learn about eating patterns in various cultures and compare the foods with the Food Guide Pyramid. They also explore the impact or influence of American Fast Foods on the original diets of cultures that have assimilated in Hawaii.

**CONTENT STANDARDS:**

**Science:** Understanding Ourselves and the World Around Us
- *Learning and Human Behavior:* Students explain what influences learning and human behavior.
- *Behavior:* Give examples of how each culture has distinctive patterns of behavior and within a large society, there may be many distinctly different subcultures.

**Social Studies:** Cultural Anthropology
- *Cultural Dynamics/Change and Continuity:* Students understand culture as dynamic, selective, adaptive, and ever changing.
- *Evaluate the impact of culture,* particularly changing culture on individuals, groups, and issues in America and demonstrate an understanding of the relationships between culture, cultural change, and social conditions.
- *Cultural Inquiry:* Students use the tools and methodology of social scientists to explain and interpret ideas and events.
  - Use tools and methods of anthropologists to compare, analyze, and interpret patterns of behavior to make informed decisions and solutions.

**Health Education:**
- *Students comprehend concepts related to health promotion and disease prevention.*
- *Evaluate the short and long term benefits and consequences of nutrition and healthy diets.*
Life Skills: Complex Thinking

- **Analyzing Perspectives.** Considering one perspective on an issue and the reasoning behind it as well as an opposing perspective and the reasoning behind it.
  - Identifies a position on the issue of eating patterns and the reasoning behind it.

Life Skills: Effective Communication

- **Effective communicators are clear, can communicate with diverse audiences, use a variety of methods for various purposes.**
  - Effectively communicates for a variety of purposes.

**DRIVING QUESTION(S):**

- What kinds of food are eaten in different cultures?
- How are eating patterns developed?
- What influenced changes in eating patterns?

**MATERIALS:**

- Food Guide Pyramid and Servings Explanation
- Record keeping log
- Graphing chart

**ACTIVITY PROCESS:**

**Task 1:** Interview Planning

- Present a mini-lesson on interviewing: etiquette, presenting purpose and use of information to the interviewee, selecting interviewee(s), making appointments, asking clear and non-intrusive questions, expressing appreciation.
- Have students discuss possible questions to include in an interview for determining eating patterns of a national origin (non-American) culture.
  - The questions should enable students to get an idea of:
    - The native or original eating patterns as found in the home country
    - The changes resulting from assimilation in this country
    - The factors influencing the changes in eating patterns
- List the suggested questions and probe for additional ones, as needed.
- Have students decide on the questions they will use and the sequence in which they will be asked.
With the help of the students, identify the cultures (or subcultures) to be represented in the study (e.g., Ilocano, Tagalog, Visayan, Szechwan, Cantonese, Vietnamese, Thai, Portuguese, Japanese, Okinawan, French, Sri Lankan, East Indian, Greek, Italian, Hawaiian, etc.). Have students think about possible persons to interview from each of the cultures.

The assignment may be individual or by pairs. Students are to select the culture they will be collecting information about. If one culture is selected by more than one student (or pair), each is to interview a different person and the results are to be averaged.

Remind students that the person they select to interview should be representative of the culture. The interview should be conducted outside of class time, preferably face-to-face. (However, there may be some extenuating situations where phone interviews must be conducted.)

**Task 2: Conducting Interviews**

- The appointments made, students are to conduct the interview within the time frame.
- Students may tape the interview, if permission is granted by the interviewee. The recording will have to be transcribed and summarized for the remaining tasks.
- If students are interviewing in pairs, they may decide to have one person take notes and the other will ask the questions.
- Remind students to allow for the interviewee to also ask questions.

**Task 3: Reporting**

- Students who selected the same culture will have a preliminary analysis step to take. They are to meet and share the information they collected. Then the information must be combined and averages found for amount of intake.
- The kinds of food reported by the interviewees need to be aligned with the Food Guide Pyramid. The record keeping log on page 14 can be used.
- Results may be graphed on the Recommended Bar Graph (Adult version attached. Youth version found on page 15.)
- Culture Reports are to be submitted. These should include interview methods, persons, results of original and changed patterns, aligned with the Pyramid Five in table and graph format, and narrative on influences that changed the original eating patterns.
- Students reports may be orally shared with the whole class.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating patterns of different cultures are influenced by regional and local factors.</td>
<td>Interviewing</td>
<td>Analyzing Perspectives</td>
</tr>
<tr>
<td>Patterns change as internal and external factors influence individuals.</td>
<td></td>
<td>Communicating</td>
</tr>
</tbody>
</table>

STRATEGIES:

- **Grouping:** The activity can be done well by individuals. For certain students, pairing up will be more helpful. The additional step of sharing and compiling information for groups that interviewed people from the same culture requires collaboration strategies and leadership on the part of the students.

- **Feedback:** Because this activity has the students communicating with “outsiders” feedback from the teacher will be important in preparing them. Also, have students observe or collect feedback from their interviewees that may help to improve their skills. Discuss effective communication and use of standard English. Are they synonymous in most of these situations?

COMPONENTS:

- **Tasks:** The activity is largely based on social studies. The methodology is from cultural anthropology, using the face to face interview tool. Students try to get information using this tool: first, about folkways—the traditional patterns of life common to a people of the selected culture; and second, about pattern changes and the influences behind those changes.

- **Student Learning Tasks:** The basic learning task is having students become familiar with the interview as a tool for information gathering. The skills introduced relate to posing questions, gathering and processing data, observing and recording interactions. The students are provided the opportunity to learn about eating patterns in various cultures. Respect for these patterns should be nurtured.
as the students find out how these patterns were established: why certain foods are eaten; the methods of preparation; and the way foods are served and eaten. Through the interview process, the students make direct contact with an authentic representative of a culture, which should foster respect and understanding.

- **Instructional Support:** Instructional support should be provided along the way as students plan their interview. Prompts such as, “What questions could you ask a person from another country to get information on the kinds of food and amounts eaten each day?” Help them to anticipate some hurdles, “How would you ask the person to describe a food that you’re not familiar with?” Provide some examples of tact and etiquette like controlling oneself when a personally distasteful food is mentioned—be open minded.

Encourage students to get clarity when they are not familiar with the foods named. This will be important because the students will need to classify the foods according to the Food Pyramid. Ask the students to consider alternative ways for finding out more about certain foods (e.g., call a restaurant/chef, ask a friend or relative).

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. Or an arrangement with a Social Studies teacher could be made where the students would also submit the paper for Social Studies credit (and therefore the paper would be rated by two teachers).

**NOTES:**

Hawaii is unique in the variety of cultures represented. With each culture came many different foods and eating patterns. The students are asked to get information on a culture’s original (native) eating patterns (foods, preparation, meals), because what they are familiar with now may have changed as people settled in Hawaii. What the cultural/ethnic groups ate originally when compared to the Food Guide Pyramid will
probably show high intakes of vegetables and starches, considering where most of Hawaii’s immigrants came from. This activity is an opportunity for students to see relationships and interdependencies among people, locations, environments, etc.

The changes that have been made to cultural eating patterns are interesting reflections of how people and their behaviors are influenced. The students will hopefully see that not all changes are for the better.
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

<table>
<thead>
<tr>
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</table>

Content Knowledge:

- Student explains how another culture’s diet compares with the Food Guide Pyramid, and analyzes the influences that caused the diet to change.

4 Demonstrates a thorough understanding of diets and eating patterns of another culture. Explains how changes to the patterns occurred as a result of internal and external influences.

3 Displays a complete and accurate understanding of eating patterns of another culture and the changes it has undergone.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about eating patterns in other
cultures.

PROCESS OUTCOMES:

Observation rating:

- Student identifies a position on the issue of eating patterns and the reasoning behind changes.

  4  Articulates a detailed position and the reasoning behind it and, if a strong line of reasoning does not underlie the position, articulates the errors or holes in reasoning.

  3  Articulates a position and the basic reasoning underlying the position. Does not address or incompletely addresses the errors or holes in the reasoning.

  2  Articulates a position but does not present a clear line of reasoning behind it.

  1  Does not articulate a clear position.

- Student effectively communicates for a variety of purposes.

  4  Clearly communicates a purpose in a highly creative and insightful manner.

  3  Uses effective techniques to communicate a clear purpose.

  2  Demonstrates an attempt to communicate for a specific purpose but makes significant errors or omissions.

  1  Demonstrates no central purpose in the communication or makes no attempt to articulate a purpose.
Self Assessment:

• I state an opinion on the topic and explain the reasons for that opinion.

  4  I clearly state an opinion on the topic of good eating and explain the reasons for that opinion. I also describe the thinking that might lead to the opinion, and I explain the strengths, weaknesses, and errors in that thinking.

  3  I clearly state an opinion on the topic and explain some of the important reasons for that opinion. I do not explain the thinking that might lead to the opinion.

  2  I clearly state an opinion on the topic, but I do not clearly explain the reasons for that opinion.

  1  I do not state a clear opinion.

• I communicate well for different purposes.

  4  I clearly explain the purpose of my communication by selecting and using very effective and original methods. My explanation goes beyond just stating the purpose; it adds meaning to the information I am communicating.

  3  I clearly explain the purpose of my communication by selecting and using effective methods.

  2  I try to explain the purpose of my communication, but I make errors in the explanation or leave out information that would make it clear.

  1  I do not try to explain the purpose of my communication or I don’t really have a clear purpose.
DAILY INTAKE GRAPH
(Plot the Cultural Intake on the Recommended Bars and Shade the Them)
Recommended Bars - Men and Women (.....)
ACTIVITY NAME:  SCAVENGER HUNT FOR GREENS

Subject Area(s):  AGRICULTURE, FOOD SCIENCE

Duration:  Three class periods over a couple of weeks

PROJECT SUMMARY:

Students look into one or more plants considered to be a weed by some and a food by others.

CONTENT STANDARDS:

Science:  Earth Systems and the Universe

- Interdependence:  Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.
- Illustrate and explain the relationships among producers, consumers, and decomposers in a food web.*

Language Arts:  Reading and Literature

- Comprehension Processes:  Use strategies within the reading processes to construct meaning.
- Generate questions, identify issues or problems, and investigate answers or solutions using general and specialized information sources.

Life Skills:  Habits of Mind

- Controls own behavior and thought processes.
- Makes effective plans.
- Is aware of and uses necessary resources.

Life Skills:  Information Processing

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation.  They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
- Effectively interprets and synthesizes information.
DRIVING QUESTION(S):

- What weeds are edible?
- Where did people get vegetables before they started farming?

MATERIALS:

- List of Greens (attached)

ACTIVITY PROCESS:

- Have students imagine they are “survivors” on a remote part of the island, without food or cell phones. Focus their attention on what greens may be in the wild that they would eat. (They will spend some time on the exotic things like bugs and lizards, but remind them that we’re starting with greens.)
- Students may work in groups or individually, as appropriate.
- Explain that many vegetables came from the wild before they were raised as crops. Today, many of the greens still growing in the wild are considered delicacies. Distribute the list.
- Students are to look into edible plants in the wild (e.g., research, interview, consultation, etc.).
- They are to select one (or more) for in depth study, one that they can gather to show. Their selections should be approved by the teacher.
- Reports by the individuals (or groups) are to be submitted with information addressing questions about each green, including:
  - What is it (common and scientific names)?
  - What does it look like?
  - Where does it grow on the island?
  - How does it propagate itself?
  - Who gathers and eats it?
  - How is it prepared?
  - How does it taste? (Include a good recipe.)
  - What relatives of this plant are found in the market?
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pesty weeds can often brighten a salad or a meal.</td>
<td>Research</td>
<td>Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reporting</td>
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<tr>
<td></td>
<td></td>
<td>Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

- **Grouping:** This is primarily an individual activity, although it may be accomplished with groups. If groups are used, be sure that each member has an assigned role with respective responsibilities.

- **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review. A salad chef may be invited to share some information with the students, including a possible taste test. Or a person from an ethnic group such as Filipino may be invited to share some of their vegetable dishes made from gathered greens (e.g., shoots of wild bitter melon). These authentic experiences enhance the learning.

COMPONENTS:

- **Product:** This activity calls for individual (or group) research and investigation.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Observing: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Conducting research: Locating and collecting information, synthesizing information.
  - Composing: Developing written report, seeking feedback, assessing own work.
**Instructional Support:** The activity can be supported by providing students with prompts or guide questions such as the following:

- How would you find out about a particular plant?
- How would you know what it looks like when growing?
- What cultural foods do you know of that are gathered from the wild?
- Where might you look for information?
- Who might you interview or ask?
- How can you make your report interesting enough for others to want to try to taste the greens?

**ASSESSMENT:** Samples are attached.

**Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

**Product Outcomes:** The individual reports will probably be rated by the teacher. It may also be interesting to have some reports (and food preparation demonstrations) made to the entire class.

**NOTES:**

Students should be aware that gatherers preceded farmers just as many of these wild plants preceded domesticated cultivars. In many cultures wild plants are sought for their nutritional or medicinal value.

The attached list may be changed or augmented. Reference to the listed plants is made in the FJGI: Partial Reference.

A number of the wild greens can be found in backyards. In some cases, the plants may have a local name (e.g., pig weed). Encourage students to include these names in their report.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report:

<table>
<thead>
<tr>
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<th>Developing</th>
<th>Deficient</th>
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</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
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</tbody>
</table>

Content Knowledge:

- **Student explains the value of wild greens and their relationship to domesticated varieties.**
  
  4 Demonstrates a thorough understanding of greens studied and cites uses of the plant as a food.
  
  3 Displays a complete and accurate understanding specific to the activity.
  
  2 Displays an incomplete understanding and has some notable misconceptions.
  
  1 Demonstrates severe misconceptions about the interrelationships in the food cycle.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**
  
  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**
  
  4  Interprets the information gathered for the report in accurate and highly insightful ways. Proves a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- I plan carefully before I begin my project.
  
  4  I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

  3  I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

  2  I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

  1  I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I find meaning in information and then combine and organize information to make it useful for my project.
  
  4  I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

  3  I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

  2  I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

  1  I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
## WILD WEEDS TO EAT

(Common and Scientific Names; Names in Bold are Domesticated Varieties)

Asterisk indicates that the weed can become “pesty.”

<table>
<thead>
<tr>
<th>Organism</th>
<th>Assigned To</th>
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</thead>
<tbody>
<tr>
<td>Common Arugula or Italian cress (Eruca vesicaria)</td>
<td></td>
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<tr>
<td>Wild Arugula (Diplotxis erucoides, or D. tenuifolia)</td>
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<tr>
<td>Borage (Borago officinalis)</td>
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<tr>
<td>Burnet (Poterium sanguisorba)</td>
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<tr>
<td>Chicories* ‘Dentarella,’ ‘Spadona’ (Chicorium spp.)</td>
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<tr>
<td>Chickweed* (Stellaria media)</td>
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<tr>
<td>Dryland Cress or Land cress* (Barbarea verna)</td>
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<tr>
<td>Water Cress* (Nasturtium officinale)</td>
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<tr>
<td>Dandelion* ‘Pissenlit,’ ‘Ameliore’ (Taraxacum officinale)</td>
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<tr>
<td>Fennel* (Foeniculum vulgare)</td>
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<tr>
<td>Lamb’s-Quarters* (Chenopodium album)</td>
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<tr>
<td>Mache or Corn Salad (Valerianella locusta)</td>
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<tr>
<td>Miner's Lettuce* (Claytonia perfoliata)</td>
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<tr>
<td>Mustards 'Southern Curled' (Brassica spp.)</td>
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<tr>
<td>Nasturtium (Tropaeolum majus)</td>
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<tr>
<td>Stinging Nettle* (Urtica dioica)</td>
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<tr>
<td>Plantain* 'Minutina' (Plantago lanceolata)</td>
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<tr>
<td>Purslane* 'Goldgeler' (Portulaca oleracea)</td>
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<tr>
<td>Garden Sorrel (Rumex acetosa)</td>
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<tr>
<td>Violet Leaves* (Viola odorata)</td>
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ACTIVITY NAME: DECISIONS, DECISIONS

Subject Area(s): FOOD SCIENCE, SCIENCE, MATHEMATICS

Duration: Three class periods

PROJECT SUMMARY:
Students address consumer issues that are in the headlines today. The information they collect are used to make consumer decisions. However, the students are asked to share what other factors influenced their decisions.

CONTENT STANDARDS:

Science: Understanding Ourselves and the World Around Us
- **Learning and Human Behavior:** Students explain what influences learning and human behavior.
  - **Learning:** Give examples of how the expectations, moods, beliefs, and prior experiences of humans can affect how they interpret new perceptions or ideas.
  - **Behavior:** Identify situations where affiliation with a group can increase the power of members through pooled resources and concerted action.

Mathematics: Number and Operations
- **Students use computational tools and strategies fluently and when appropriate, use estimation.**
- **Choose appropriate computational procedures and tools to solve problems.**

Health Education
- **Students comprehend concepts related to health promotion and disease prevention.**
  - Analyze choices individuals can make that promote and protect or that harm their health.

- **Students practice health-enhancing behaviors and reduce health risks.**
  - Identify barriers to and supports for making health-enhancing decisions.

Life Skills: Complex Thinking
- **Decision Making:** Selecting among apparently equal alternatives.
• Makes a selection that adequately meets the decision criteria and answers the initial decision question.

Life Skills: Analyzing Perspectives

• **Analyzing Perspectives**: Considers one perspective on an issue and the reasoning behind it as well as an opposing perspective and the reasoning behind it.
  • Identifies one position on the issue and the reasoning behind it.

DRIVING QUESTION(S):

• What do you do when there are conflicting information?
• How do you make wise decisions?

MATERIALS:

• News articles

ACTIVITY PROCESS:

• Ask the students to complete the attached survey. This may be done in an earlier class period, before implementing this activity.
• Have students read and discuss the issues. Questions: How do these issues affect you? Do reports on what is good or bad for your diet influence what you eat? Do you consider the content and packaging of food before you buy?
• **Task 1**: Attitudes
  • Share the results of the attitudinal survey.
  • Compare the survey results with the areas of eating that students had earlier identified as needing improvement.
  • Have students share their insights and feelings about what they eat and how they make their decisions.
  • Have students discuss immediate and long-ranged effects or consequences.
  • The discussion could expand to other issues such as mandatory use of seat belts.

Have students submit a personal reflection on the discussion. The reflection may be written in an informal form (journal) addressing questions such as:
What did you learn about yourself and how you make decisions? What steps do you think you need to take to improve your health? Your decision making?

- **Task 2: “Forced” Decision**
  - Divide class into teams.
  - The challenge for the teams is to select foods to take on a one-day grueling hike (e.g., parts of Haleakala, Waipio Valley, Pelekunu Valley, Waimea Canyon, Alaka’i Swamp, etc.). Water will be provided. Because the hike is very difficult, everyone is advised to travel and eat light.
  - Have a sample display of foods from which the teams must choose. Be sure that each item has a price label. The items should vary such as: apple, orange, tangerine, banana, other fruits, various candy and health bars, potato/corn chips in different sized bags, bag of baby carrots, dry samin packages (Mee Wah and Ichiban), spam musubi, crackers (wheat thins), snack cheeses, Ding Dongs, etc.
  - Each team is to decide on what foods they will buy and the amount of each.
  - Together as a team, the students are to calculate the total cost and then the average cost per team member. Also, they are to estimate how many servings of food according to the Food Guide Pyramid each person will be consuming on the hike.
  - Each student will submit a report on his/her share of the food:
    - Types of foods
    - Amounts of foods
    - Average cost
    - Reasons for choices
    - Types of foods he/she would have wanted to take and why.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There are barriers and supports for making health-enhancing decisions.</td>
<td>• Decision Making</td>
<td>• Working in groups</td>
</tr>
<tr>
<td>• Consumerism involves preference, attitude, and values as well as cost consideration.</td>
<td></td>
<td>• Analyzing Perspectives</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** Students work in small teams (3 to 4). Skills in interpersonal relating and leadership become important as this larger group becomes involved in shared decision making. An extension or mini-lesson may be on the different kinds of decision making from one person (dictatorial) through voting (majority rules) to total group agreement (consensual).

COMPONENTS:

• **Product:** This activity has two products:
  • Written reflection done by each individual on what was learned.
  • Written report submitted by each individual describing choices, reasons, cost, and other information.

• **Student Learning Tasks:** The students’ learning will come from listening to each other, and hearing oneself. The hands-on experience of deciding what foods to select as a group has both a content and process value. We want the students to start applying the “wisdom” in recommendations for good eating, but they need to be able to sort through some conflicting information. The content aspect, then, is arriving at a general understanding such as “In general, if you focus on minimally processed, fresh foods, go heavy on fruits and vegetables and light on fats and salt, I don’t really think you’re going to go wrong.” (Ruth Patterson, Fred Hutchinson Cancer Research Center)
The process aspect involves understanding personal decision making. Knowing what is good is one thing. Valuing and using it as part of the criteria for decision making is another.

- **Instructional Support:** The activity can be supported by encouraging students to talk about their decisions and values; recognize and respect their values while concurrently challenging them to think about alternatives. Involvement of a counselor or guidance teacher may be helpful in facilitating discussions.

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The individual reports may be assessed using rubrics or criteria established by the teacher/class. For the individual reflective writings, it is recommended that the teacher do the rating without too much attention to mechanics.

**NOTES:**

According to health educators, students value good health for themselves and their families. However, many students do not know how to positively pursue healthy lifestyles without proper education. Therefore it is fundamental for students to receive the proper knowledge and skills that promote health behaviors so they will not develop conflicting beliefs, attitudes, and habits.

"It is the growing belief that any future advances made in improving the nation's health will not result from spectacular biomedical breakthroughs. Rather advances will result from personally initiated actions that are directly influenced by the individual's health-related attitudes, beliefs, and knowledge" (American Medical Association, 1990).

Within the past 15 years, there have been major concerns expressed about students' abilities to do "higher order thinking." For example,
“On an analytic task that asked students to compare food on the frontier (based on information presented) and today’s food (based on their own knowledge), just 16 percent of the students at grade 8 and 27 percent at grade 12 provided an adequate or better response” (Mullis, Owen, and Phillips 1990, p. 16).

Activities such as this one can provide students with opportunity to practice their “thinking” skills and reflect on the choices, decisions, judgments they arrive at. Extensions into developing complex reasoning skills may be worthwhile for the students. Working on developing criteria for reviewing alternatives, seeing both sides of an issue, and identifying the value of information are a few of the skills embedded in reasoning that students can benefit from mastering.

RESOURCES:
## ASSESSMENT RUBRICS: Samples

### PRODUCT OUTCOMES:

#### Written Report: Task 2

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The written report was comprehensive.</td>
<td></td>
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<tr>
<td>2. The information provided shows in depth discussion occurred, relating to knowledge of recommended foods as well as personal preferences.</td>
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<tr>
<td>3. The choices and rationale reflect high standards of reasoning and decision making.</td>
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<tr>
<td>4. Each member had an evident part in the process.</td>
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</tbody>
</table>

#### Content Knowledge:

- **Student explains the relationships among barriers and supports to making health-enhancing decisions.**

  4  Demonstrates a thorough understanding of the health-enhancing recommendations. Explains the critical barriers faced by students in arriving at health-enhancing decisions.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the interrelationships in the food cycle.
PROCESS OUTCOMES:
Observation rating:

- Student makes a selection that adequately meets the decision criteria and answers the initial decision question.
  
  4  Selects an alternative that meets or exceeds the criteria and that represents a well-supported answer to the initial decision question. Provides a useful discussion of issues and insights that arose during the selection process.

  3  Successfully answers the decision question by selecting an alternative that meets or exceeds established criteria.

  2  Selects an alternative that does not entirely conform to the student’s assessment of the alternatives.

  1  Makes a selection that does not appear reasonable or cannot be justified by the student’s evaluation of the alternatives.

- Student identifies one position on the issue and the reasoning behind it.
  
  4  Articulates detailed position and the reasoning behind it and, if a strong line of reasoning does not underlie the position, articulates the errors or holes in the reasoning.

  3  Articulates a position and the basic reasoning underlying the position. Does not address or incompletely addresses the errors or holes in the reasoning.

  2  Articulates a position but does not present a clear line of reasoning behind it.

  1  Does not articulate a clear position.
Self Assessment:

- I select the choice that meets my criteria and answers the question that created the need for a decision.

  4  I select a choice after carefully considering how the choices match the criteria. I can explain why my choice effectively answers the question that originally created the need for a decision. I also explain any important and interesting ideas that occurred to me or other things I learned during the process of making this decision.

  3  I select the choice that best matches my criteria. The choice provides a satisfactory answer to the question that originally created the need for a decision.

  2  I select a choice that matches some criteria, but it may not be the best choice because I ignored or did not see a better match.

  1  I select a choice without giving much thought to how it matches the criteria, or I cannot explain how my choice matches the criteria.

- I state an opinion on the topic and explain the reasons for that opinion.

  4  I clearly state an opinion on the topic and explain the reasons for that opinion. I also describe the thinking that might lead to the opinion, and I explain the strengths, weaknesses, and errors in that thinking.

  3  I clearly state an opinion on the topic and explain some of the important reasons for that opinion. I do not explain the thinking that might lead to the opinion.

  2  I clearly state an opinion on the topic, but I do not clearly explain the reasons for that opinion.

  1  I do not state a clear opinion.
## FOOD SURVEY

Place a check in the box that best completes the sentence for you.

<table>
<thead>
<tr>
<th></th>
<th>A lot</th>
<th>Some</th>
<th>Little</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I pay attention to what the news states about what foods we should eat and what we shouldn’t.</td>
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<tr>
<td>2. Recommended foods and amounts such as the Food Guide Pyramid should be followed.</td>
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<tr>
<td>3. I follow the Food Guide by eating the recommended servings of the meat, poultry, fish, eggs, and nuts group.</td>
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<tr>
<td>4. I follow the Food Guide by eating the recommended servings of the milk, yogurt, cheese, group.</td>
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<tr>
<td>5. I follow the Food Guide by eating the recommended servings of fruits.</td>
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<tr>
<td>6. I follow the Food Guide by eating the recommended servings of vegetables.</td>
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<tr>
<td>7. I follow the Food Guide by eating the recommended servings of breads, cereals, rice, and pasta.</td>
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<tr>
<td>8. I follow the Food Guide by limiting my intake of fats, oils, and sweets.</td>
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<tr>
<td>9. When I want a snack, I eat from the fruits or vegetables group.</td>
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<tr>
<td>10. When I want a snack, I eat from the milk/cheese or meat/fish/nuts group.</td>
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<tr>
<td>11. When I want a snack, I eat from the fats, oils, and sweets group.</td>
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<tr>
<td>12. I eat at fast foods outlets.</td>
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<tr>
<td>13. I eat at restaurants.</td>
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<tr>
<td>15. At home, I cook what I want to eat.</td>
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<tr>
<td>16. At home, I eat what someone else cooks.</td>
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<tr>
<td>17. I select foods based on what I have learned to eat and enjoy.</td>
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<tr>
<td>18. I choose not to eat foods that I am not familiar with.</td>
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Seattle — Yes, I would like fries with that.

That’s what many Americans are saying in the face of conflicting research advice on just what makes for a healthy diet, researchers found.

“The more negative and confused people feel about dietary recommendations, the more likely they are to eat a fat-laden diet that skimps on fruits and vegetables,” said Ruth Patterson, lead author of the study from the Fred Hutchinson Cancer Research Center.

The study was published yesterday in the Journal of the American Dietetic Association. It follows years of often confusing news reports about findings on some foods.

For example, scientists long have touted margarine as a healthier alternative to butter, but a study recently found that stick margarine can increase the risk of heart disease.

Other research has questioned health claims for oats, eggs and wine.

“I am totally sympathetic to the American consumer’s state of confusion regarding what constitutes appropriate eating behavior,” Linda Van Horn, professor of preventive medicine at Northwestern University Medical School, told The News Tribune of Tacoma.

“It seems as if there are no truths or no clear answers to this question of what should I eat,” said Van Horn, who was not involved in the Fred Hutchinson study.

Patterson and her colleagues, funded by the National Cancer Institute, surveyed 1,751 Washington adults on their eating habits and attitudes toward food and nutrition guidelines.

Some findings:
• More than 40 percent said they were tired of hearing about what foods they should or shouldn’t eat.
• About 40 percent agreed that dietary guidelines should be taken with a “grain of salt.”
• Some 25 percent said a low-fat diet takes the pleasure out of eating.
• 70 percent said the government shouldn’t tell people what to eat.

Patterson said researchers developed a “backlash” scale based on negative or skeptical responses. Those who ranked highest on that scale also had the highest percentage of fat in their diets. The biggest nutrition skeptics were men age 18 - 35 and people over 60 years old.
Patterson said Americans, on the average, get about 34 percent of their calories from fat, while guidelines recommend no more than 30 percent. “When we’re trying to move the entire population toward 30 percent, every percentage point is important.”

Patterson said restaurant dining helps discourage healthy eating habits, since most American restaurants emphasize taste over nutrition. “I was at one of these huge steakhouses recently, and even the asparagus was just covered with blue cheese,” she said. “It was not possible to take a bite of food in that entire restaurant that wasn’t loaded with butter and blue cheese.”

Jon Brandt, heading into a Tacoma-area steakhouse with his wife, Tara, said he finds diet news confusing. “One day something is good for you, then the next day it’s bad for you,” he said, adding that he had his mind set on a steak. “I usually get the big one with fries.”

Patterson said she fears the nutrition backlash could undermine efforts at nutrition education. But 90 percent of those surveyed said they believe nutrition research eventually will help them live longer lives.

“In general, if you focus on minimally processed, fresh foods, go heavy on fruits and vegetables and light on fats and salt, I don’t really think you’re going to go wrong,” Patterson said.
Shoppers Note: You May Be Paying the Same for Less
By Greg Winter, New York Times
(Tuesday, January 2, 2001, Honolulu Star Bulletin)

NEW YORK — Perhaps shoppers did not notice as they scurried through supermarkets filling carts with potato chips and nachos for their holiday party, but their loads may be a little lighter than in the past.

In an effort to offset rising costs, Frito-Lay, the world’s largest maker of snack foods, has begun putting fewer chips in bags of Fritos, Cheetos and other well-known brands, while keeping the price the same.

A supermarket-size sack of Lay’s potato chips has lost an ounce, or about 7.5 percent of its weight, but still costs $2.99. A 99-cent box of Cracker Jacks has shed about 6.7 percent of its weight. And a $3.29 bag of Doritos has dropped almost 7 percent of its weight.

The packages themselves have also shrunk, ever so slightly, so the bag does not seem emptier.

"It's a rip-off," said Jan Buttram, a New York playwright out shopping at the Victoria Supermarket in Manhattan for a holiday party. "If I knew they were putting less in, I wouldn't buy it."

Industry insiders have a name for the practice: the weight out, a subtle way of earning more off everyday products without scaring off price-conscious shoppers. It’s quite legal, as long as the package accurately describes what’s inside.

Makers of candy, coffee and tuna fish have all tried weight outs with varying success. But the practice had been relatively scarce since the mid-1990s, largely because the cost of raw materials was low enough that manufacturers could afford to forgo price increases and still preserve the bottom line.

Now, however, the cost of production is rising — expenses like energy, packaging and ink. So weight outs have slowly begun to resurface as a means of maintaining corporate profits without enraging customers who are often none the wiser.

"We haven’t encountered an environment like this in a long time," said Emanuel Goldman, a food and beverage analyst with ING Barings. "There’s more resistance to raising prices than in the past, so you’re going to get a lot more of these weight outs."

In September, Procter and Gamble reduced the number of disposable diapers in its Luvs and Pampers packages by 13 percent, while cutting prices by only 7 percent. Company officials said the change, which comes out to eight fewer diapers in a jumbo pack that had 56, leaves parents with just enough diapers to get through the week, while providing Procter with a price increase for each diaper sold.
Kimberly-Clark made a similar change to its Huggies diapers almost immediately, prompting makers of many generic diapers to do the same.

“Everyone in the diaper industry is downsizing to the same count,” said Tami Jones, a Procter spokesperson.

As consumers become increasingly resistant to paying more at the supermarket, conditioned by years of low inflation to expect stable prices on everyday items, some industry experts anticipate that other consumer products companies will soon follow suit.

“It’s the most sensible way to deal with the increased cost of production,” said Gene Grabowski, a Grocery Manufacturers of America spokesman. “Consumers have repeatedly shown that they are more accepting of slightly smaller amount in the package than an increase in prices.”

The problem, some consumer product companies argue, lies in their dwindling ability to dictate prices. Fifty percent of manufacturers said that they are unable to pass rising costs on to consumers, compared with 40 percent last year, according to a survey released last week by the National Association of Purchasing Management.

In addition to consumers, giant retailers such as Wal-Mart Stores are increasingly opposed to price increases, and their sheer size has bolstered their influence over what manufacturers can charge in stores.

“The super-size retailers look at their suppliers and say, ‘The consumers are not happy when we raise prices, we’re not raising prices, now you go figure it out,’” said Norbert Ore, who headed the purchasing survey.

For some companies, shrinking portions is preferable to charging more. Prices on Frito-Lay’s chips have risen less than 1 percent annually in recent years, a comparatively low rate for consumer products. Raising them any faster, the company fears, would alienate some consumers.

“In our business there are certain magical price points: 99 cents, $1.29, $2.99,” said Lynn Markely, a Frito-Lay spokesperson. “We’ve learned that we need to stay within them.”

Consumer advocates argue that quietly cutting back on portion sizes is deceptive, especially because consumers often can not tell that the product’s contents have been changed.

“If you want to keep faith with the customers, be honest with them,” said Carol Tucker Foreman, food policy director of the Consumer Federation of America.

Although they are reluctant to advertise it, manufacturers are free to decide how completely they fill a box, carton or bag, as long as the weight is fairly stated on the packaging.
ACTIVITY NAME: THE GREAT SNACK-OFF

Subject Area(s): FOOD SCIENCE, SCIENCE, GRAPHIC ARTS, BUSINESS

Duration: Two weeks

PROJECT SUMMARY:
Students snack a lot. Students learn that snacking is not necessarily bad if done in moderation and if healthy foods are chosen.

CONTENT STANDARDS:

Science: Understanding Ourselves and the World Around Us
- Wellness: Students appraise the relationships between their bodily functions and their physical and mental well being.
- Physical Health: Identify certain behaviors and practices that increase and decrease longevity.

Career and Life Skills: Skills for Life and Work
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
- Managing Resources: Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Life Skills: Habits of Mind
- Controls own behavior and thought processes.
  - Makes effective plans.
  - Is aware of and uses necessary resources.

Life Skills: Collaboration/Cooperation
- General Learner Outcome: The understanding that it is essential for human beings to work together.
  - Works toward the achievement of group goals.
DRIVING QUESTION(S):

- What is a healthy snack?
- What factors affect the acceptance of a “new” food product?

MATERIALS:

- Depends on the recipes and methods to be used by the teams.

ACTIVITY PROCESS:

- **Pre-Task Presentation:** Have students discuss snacks they eat. Use the information from the Decisions, Decisions activity: “Forced” Decision.
- Have students make a list of snacks and indicate the ones that are healthy snacks. Discuss what makes these healthy.
- **Task 1:** Creating Snacks
  - Divide students into Snack Teams. Teams will be working on producing the best snack (taste and nutritional value).
  - Each team works on a Super Snack recipe. The task can be modified by having each member of a team bring in a “home-made” snack. Everyone on the team acts as the judging panel, tasting and studying the nutritional value of each others snack. The members then decide on the best one that will become the team’s Super Snack entry. (*Members may also want to “improve” their choice by changing some parts of the recipe.*)
  - Teams are to submit their recipes to the teacher. (Should funds be available, teacher will try to get ingredients for the Great Snack-Off.)
  - Provide assistance or a mini-lesson on determining nutritional value facts.
- **Task 2:** Planning for Marketing
  - Teams are to develop plans for marketing their snack.
  - In planning, the students should address the following:
    - What will our snack be named?
    - How would we package the snack?
    - How can we advertise the product?
    - Do we have a logo?
    - How will we work together in producing the snack, especially for the Great Snack-Off?
• Teams should, where possible, have an advertisement poster and packages ready for the Great Snack-Off.
• Assignments and responsibilities should be agreed upon by every team member.
• Plans for the preparation, production, and packaging of the snack should be complete. All the steps must be completed in the specified time/period to allow for judging by school and community members.

• **Task 3:** The Great Snack-Off
  • Every team will distribute copies of its snack to the judges before beginning the production.
  • Preparation, production, and packaging will be part of the judging.
  • When all the teams are done, the products will be placed on the presentation table for judging. (If necessary, judging of the taste may have to be conducted at the end of the school day.)
  • Each team will submit a final report, describing the methods, ingredients, amounts, packaging and advertising plans. The report should also identify problems faced and alternatives/solutions implemented.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Healthy snacks are low in fat, salt, and sugar, and high in vitamins and fiber.</td>
<td>• Food preparation</td>
<td>• Planning and Managing Resources</td>
</tr>
<tr>
<td>• Packaging and advertising make an impact on the acceptance of the product.</td>
<td></td>
<td>• Working together</td>
</tr>
</tbody>
</table>

Food: Just Grow It! 5ADAY 277
STRATEGIES:

- **Grouping:** Each member’s diligence in completing his/her responsibility, as well as in taking ownership of the project will be important.

- **Information Sources:** Reference books or Internet addresses may be made available in the classroom for students to review.

COMPONENTS:

- **Product:** This activity calls for individuals to work in teams over a period of time. The team’s plans, schedule, and assignment of responsibilities will be critical to its success.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - **Planning:** Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - **Conducting research:** Locating and collecting information, synthesizing information.
  
  Part of the learning will be in contributing to the group goal — producing a super snack. Decision making and leadership skills will come into play as the team will need to use the strengths of each member in completing the tasks.

- **Instructional Support:** The activity can be supported by providing feedback to students with prompts or guide questions such as the following:
  - How does it taste? How might you modify it?
  - What do you think the nutritional value is?
  - How can the process be simplified?
  - Who will especially like your product? How can you appeal to this target group?
  - What logo describes best what your team or your product stands for?

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.
• **Product Outcomes:** The team reports will be provided to the community experts to be considered as part of the overall judging. Criteria such as time, cost, collaboration, production process, and quality of product should be shared with the students before the project starts.

**NOTES:**

There are two spin-offs to this activity. The first is the actual production of the selected snack for fund-raising purposes. This will be a full activity beginning with students learning about health requirements such as commercial kitchens through setting up a business accounting process.

The second spin-off is the production of a cook book. This spin-off is the next activity.
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES: (Judging criteria should be added.)

Report:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided shows careful documentation.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
<td></td>
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</tr>
<tr>
<td>4. Illustrations and other additions make the report clear and easy to understand.</td>
<td></td>
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</tr>
</tbody>
</table>

Content Knowledge:

- Student explains the ingredients and methods to prepare the snack.

  4 Demonstrates a thorough understanding of the different factors and the process contributing to the product. Is able to explain problems encountered and solutions.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the snack and its production, appeal, and nutritional value.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student is aware of and uses necessary resources.**

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.
Self Assessment:

- **I plan carefully before I begin my project.**

  4 I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

  3 I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

  2 I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

  1 I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- **I am aware of available resources that could help me complete a task.**

  4 I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.

  3 I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.

  2 I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.

  1 As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
ACTIVITY NAME: **BOOK IT!**

Subject Area(s): FOOD SCIENCE, LANGUAGE ARTS, GRAPHIC ARTS, BUSINESS

Duration: Two weeks (may overlap with other activities)

PROJECT SUMMARY:
Students create or select recipes that, from their perspective, will encourage others to eat healthier. Based on assessment of their own and others’ eating patterns, the students work on recipes to increase the consumption of the food group(s) needing improvement. The recipes are compiled into a cookbook.

CONTENT STANDARDS:

Health Education: Health Advocacy
- *Students advocate for personal, family, and community health.*
  - Develop a plan for persuading others to make healthful choices.*
  - Design a health advocacy campaign.
  - Defend a position which encourages a health enhancing behavior.
  - Evaluate effectiveness of strategies in communicating health information and ideas.

Career and Life Skills: Skills for Life and Work
- *Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.*
  - Managing Resources: Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Educational Technology: Technology as a Tool For Productivity
- *Students use technology tools to enhance learning, increase productivity, and promote creativity. Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.*
  - Use technology tools and resources for managing and communicating information in situations individuals encounter in the world of work.
Life Skills: Habits of Mind
- Controls own behavior and thought processes.
  - Makes effective plans.
  - Is aware of and uses necessary resources.

Life Skills: Collaboration/Cooperation
- General Learner Outcome: The understanding that it is essential for human beings to work together.
  - Works toward the achievement of group goals.

**DRIVING QUESTION(S):**

- How do we improve our own, as well as others’, eating patterns?
- What factors affect the acceptance of “new” food product/preparation?

**MATERIALS:**

- Computer access for development of the cookbook
- Ingredients, depending on dressing recipes

**ACTIVITY PROCESS:**

- **Pre- Task Presentation:** Have students review prior assessment activities that identified food group(s) that were not adequately consumed, according to the Food Guide Pyramid. (We're quite confident that the groups will be Fruits and Vegetables, based on other young people's assessments.)
  - Have students share their ideas as well as their efforts to improve food intake for the identified groups.
  - Review the input the students received from studying different cultures, the preparation of wild greens, and creating healthy snacks.
  - Encourage commitment to helping others improve their eating habits as part of a health advocacy campaign.
- **Task 1:** Best “Dressed”
  - Divide students into Dressing Teams. Teams will be working on producing the best dressing (taste and nutritional value) to enhance fruits and/or vegetables.
• Each team works on a Best Dressing recipe. Provide each team with the Cooperative Extension Service, “Sauces, Dips and Dressings,” Hawaii EFNEP-News, v. 7, no 13, Summer 1998. (The worksheet is reproduced at the end of this activity.) The task can be modified by having each member of a team bring in a “home-made” dressing. Everyone on the team acts as the judging panel, tasting and studying the nutritional value of each others dressing. The members then decide on the best one that will become the team’s Best Dressing entry. (Members may also want to “improve” their choice by changing some parts of the recipe.)

• Teams then share their results with other teams. A contest may also be set up with judges, if desired. However, all recipes are accepted by the students.

• Teams are to submit their recipes to the teacher. (Should funds be available, teacher will try to get ingredients for the Best Dressing.)

• Provide assistance on determining nutritional value facts.

**Task 2: Planning to “Book It”**

• Invite an author, publisher, or printer to discuss preparing a “book” for printing. The English teacher, Graphics/Computer teacher or Yearbook Advisor may also be a good resource.

• Have students identify the primary work areas, for example:
  • Contents - getting the recipes, writing and organizing sections.
  • Layout - setting up the pages and selecting the graphics.
  • Master Production - computer input.
  • Business - determining costs, printer, distribution, marketing.
  • Control - monitoring deadlines, public relations, support and facilitation.

• In planning, the students should agree on some major points such as:
  • What is the purpose of our book?
  • What shall the title be?
  • If we “make money,” what shall the profit be used for?
  • Do we have a logo?
  • What follow-up activities might we anticipate?

• Set up work groups according to the primary work areas the students identified. Each group is to select a leader.

• Assignments and responsibilities should be agreed upon by every team member.

• Each work group is to develop work plans including tasks to be done, by when, by whom, meeting and monitoring dates, and resources needed.
• In a total class session, the work groups present their work plans. The facilitator (teacher or lead student) creates a master calendar of tasks and deadlines. Each group insures that its part is completed within the time and quality required for the entire project to progress smoothly.

• **Task 3:** The Sell-Out
  • The published cookbook should meet all the standards required by the school, the Food Science course, the publication committee (if appropriate), and the “author-students.”
  • The business distribution plan should be executed to insure appropriate handling and distribution of monetary receipts.
  • Public relations such as donation of profits, book signing, coordination with related agencies (American Cancer, American Heart, Senior Citizens, etc.) also are implemented.

### CONTENT:

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<tbody>
<tr>
<td>• Food that’s good for you can also taste good.</td>
<td>• Food preparation</td>
<td>• Planning and Managing Resources</td>
</tr>
<tr>
<td>• Ingredients can be low in fat, rich in flavor, and a good source of nutrients.</td>
<td></td>
<td>• Working together</td>
</tr>
</tbody>
</table>

### STRATEGIES:

• **Grouping:** Each member's diligence in completing his/her responsibility, as well as in taking ownership of the project will be important.

• **Information Sources:** Resource persons, reference books, sample cookbooks, or Internet addresses may be made available to the students.

• **Integration:** Integration through teachers working together is one possible level. That is, a business class could do the business tasks; a computer class the inputting; an English class could do the writing and organizing; a graphics arts class could design the logo and artwork, etc. Another level is that of the student. A
student conceivably does reports on these various facets of the project and submits for credit from the respective classes in which he/she is enrolled.

**COMPONENTS:**

- **Product:** The primary product of this activity is a cookbook that supports improvement of eating habits with recipes that enhance the contents of the food groups that were lacking. Contributing products (recipes) have been addressed in earlier activities, as well as in the first task of this activity. In addition, students may bring in other favorite recipes from their family or friends.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Advocacy: Identifying the worthiness of disseminating healthy recipes; determining values to be accrued by different audiences; having a sense of “service” as an outcome of the learning experience.

Part of the learning will be in contributing to the group goal — producing a super snack. Decision making and leadership skills will come into play as the team will need to use the strengths of each member in completing the tasks.

- **Instructional Support:** The activity can be supported by providing feedback to students throughout the process.
  - How can the process be simplified?
  - Who will especially like the product (recipe or book)? How can you appeal to this target group?
  - What logo describes best what your team or your product stands for?
  - Who needs the help or services you are working on?

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.
• **Product Outcomes:** The criteria such as time, cost, collaboration, production process, and quality of product should be shared with the students before the project starts. The assessment of success in this activity is the completion of the cookbook within the given criteria and the extent of distribution/acceptance. (Completion alone should be celebrated. With an eat-in?)

**NOTES:**
The possibilities of this activity are embedded in the concepts of health advocacy, career exploration, and service learning. It is hoped that teachers will work together toward elaborating on each.
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Book:

<table>
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<tr>
<td>1. The book is comprehensive, accurate, and attractive.</td>
<td></td>
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<tr>
<td>2. The information provided shows health consciousness.</td>
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<td>3. The report reflects high standards of quality.</td>
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</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains the recipes and their relationship to improving eating patterns.**

  4  Demonstrates a thorough understanding of the different factors and the process contributing to the product. Is able to explain problems encountered and solutions.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the contents and purpose of the cookbook.

Food: Just Grow It! 5ADAY
PROCESS OUTCOMES:

Observation rating:

• **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

• **Student is aware of and uses necessary resources.**

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.
Self Assessment:

- **I plan carefully before I begin my project.**

  4  I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.

  3  I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.

  2  I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.

  1  I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- **I am aware of available resources that could help me complete a task.**

  4  I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.

  3  I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.

  2  I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.

  1  As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
**WORKSHEET: SAUCES-DIPS-DRESSINGS**  
(Hawaii EFNEP – News, Summer 1998)

**Instructions:** Use the categories listed below as a guide to choosing ingredients for your recipes.

<table>
<thead>
<tr>
<th>Favorite Ingredient</th>
<th>Combinations</th>
<th>Measurements</th>
</tr>
</thead>
</table>
| Example: Pine Colada Sauce | Frozen juice concentrate  
Low-fat cottage cheese/yogurt  
Flavor extract | Example continued:  
Pineapple juice  
Low-fat cottage cheese  
Coconut | Ex. continued:  
12 oz.  
16 oz.  
to taste |

<table>
<thead>
<tr>
<th>Favorite Ingredient</th>
<th>Combinations</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen Juice Concentrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mashed Beans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-fat Cottage Cheese or Yogurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooked or Canned Fish/Chicken/Turkey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooked Cereals</td>
<td></td>
<td></td>
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<tr>
<td>Flavor Extracts</td>
<td></td>
<td></td>
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<tr>
<td>Fresh Herbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables/Fruits</td>
<td></td>
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<tr>
<td>Pickles</td>
<td></td>
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<tr>
<td>Seeds</td>
<td></td>
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<tr>
<td>Spices</td>
<td></td>
<td></td>
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<tr>
<td>Fresh Citrus Juices and Zests</td>
<td></td>
<td></td>
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<tr>
<td>Vinegars</td>
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<tr>
<td>Other Ingredients</td>
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</tbody>
</table>
“Keep It Clean”

INTRODUCTION:

Accidents and misfortunes can occur anywhere and anytime, but many of them can be prevented or avoided if people follow safety practices. Knowing and practicing safety rules at home, on the road, at work, and even at play can prevent accidents and help maintain a healthy, happy environment.

CONTENT STANDARDS:

Across the activities in this unit, several content standards provide the thrust for the student learning tasks. Specific references are made to directly related standards and their respective benchmarks. At the same time there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

Health Education
- Students comprehend concepts related to health promotion and disease prevention, including injury prevention.
- Students practice health-enhancing behaviors and reduce health risks.

Science
- Safety: Students demonstrate the importance of safety by applying safety skills in all activities.

Career and Life Skills
- Skills for Life and Work: Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.

Physical Education
- Students demonstrate responsible personal and social behavior in physical activity settings.

LIFE SKILLS:

Although a range of life skills is reflected among the activities in this unit, particular focus should be on developing the skills for Decision Making. The standards and the performance indicators for decision making include:
Identification of important and appropriate alternatives to be considered.
• Students present a comprehensive list and the details of the most important alternatives.
Identification of important and appropriate criteria for assessing the alternatives.
• Students identify the criteria by which the identified alternatives will be assessed. The criteria reflect an unusually thorough understanding of the nature of the decision task.
Identification with accuracy the extent to which each alternative possesses each criterion.
• Students provide thorough, fully developed assessment of each alternative based on criteria.
Selection of alternative that adequately meets the decision criteria and answers the initial decision question.
• Students select an alternative that meets or exceeds the criteria and that represents well-supported answer to the initial decision question.

CONCEPTS:

Understanding of the theme of safety is developed in the activities through concepts such as:

• Accidents are often the result of carelessness and non-attention to safe practices.
• There are some common safety practices that apply to multiple situations.
• Specific safety guidelines and rules have been promulgated by government and technical/scientific specialists.
• Adherence to safety guidelines is an individual decision that is not without consequence.
ACTIVITY NAME:  "A - Z" SAFETY SENSE

Subject Area(s):  FOOD SCIENCE, AGRICULTURE, SCIENCE, INDUSTRIAL EDUCATION

Duration:  Two - three class periods

PROJECT SUMMARY:
Students begin identifying safety guidelines, starting with common sense rules and practices. This activity is a game development project, recycling old playing cards. As students learn more formal safety rules, they can add cards to the "deck."

CONTENT STANDARDS:

Science:  Safety
• Doing Safety: Students demonstrate the importance of safety by applying safety skills in all activities.
  • Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.

Mathematics:  Data Analysis, Statistics and Probability
• Students pose questions and collect, organize, and represent data to answer those questions.
  • Systematically collect and organize data (e.g., using tables, line graphs, or pie charts).*

Physical Education:
• Students demonstrate responsible personal and social behavior in physical activity settings.
  • Evaluate responsible and safe personal behavior during physical activity settings.

Career and Life Skills:  Skills for Life and Work
• Students develop skills and attributes that are critical to a person's ability to successfully navigate the work in and out of school, at work, and at home.
• Personal Qualities: Explain the difference between rules of conduct and one’s responsibility to self and others.

Life Skills: Complex Thinking
• Decision Making: Selecting among apparently equal alternatives.
  • Identifies important and appropriate alternatives to be considered.

DRIVING QUESTION(S):
• What are some basic safety rules?
• When are safety regulations needed?
• How are rules developed?

MATERIALS:
• Decks of old playing cards
• Paper pieces (cut to the size of a card)
• Rubber cement or adhesive stick

ACTIVITY PROCESS:
• Pre-task: Have students pick a letter of the alphabet.
  • Ask for the name of a place or action that starts with the letter and has some safety conditions that relate to it. (Example: “E” - escalator)
  • Have students suggest and agree on safety guidelines or rules for that place or action. More than one rule may be suggested, provided the rule makes sense.
    Example:  Place/Action       Safety Rule
               Escalator       Wear shoes or slippers.
                               No running.
                               No baby strollers.
                               No walking in opposite direction.
• Task 1: Naming Place/Action and Rules
  • Divide students into teams of about 5 students.
  • Each team will identify a place/action for each letter of the alphabet.
    (Dictionaries may be used.)
  • For each place/action named, the team is to agree on important safety rules (at least one).
• Have a member of the team record the place/action and the related rules. Rotate the recording responsibility among all members.

• **Task 2: Building Decks**
  • Each team takes a set (or more) of old playing cards and covers the face sides by pasting on blank pieces of paper.
  • Divide the cards among team members.
  • Each member transfers the action/place and rules he/she was responsible for recording on to the blank cards —ONE NAME OR RULE PER CARD. PRINT NEATLY!
  
  **Example:**

  ![Safety Rules Example]

  • When completed, each team should have a deck of more than 52 cards (unless they skipped several letters and/or were unable to identify safety rules).

• **Task 3: “Safety Sense” Challenge**
  • Have teams exchange decks of cards.
  • Team members challenge each other using another team’s deck of cards.
  • Winner is the one who get rid of all his/her cards first. Suggested game rules are attached.
  • Have students discuss or debrief the activity. Were they able to get insights to questions such as:
    • What is safety?
    • Why do we need safety rules?
    • Are there rules that apply in more than one place/action?
    • What are some of these rules?
    • Are there some rules that apply to only one place or to highly specific situations?
    • What might these be?
    • What are some of the differences between “common” rules and “unique” rules?
CONTENT:

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</thead>
<tbody>
<tr>
<td>Many safety precautions &amp; accident prevention actions are based on common sense.</td>
<td>Complex thinking</td>
<td>Working in groups</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>Decision Making</td>
</tr>
</tbody>
</table>

STRATEGIES:

- **Grouping:** Students work together to complete their names/places and rules. Everyone’s participation is necessary because agreement is required. In addition to completing a team listing, the members work together in preparing the final “deck” of cards.

- **Information Source:** The students are the sources of information. Mediators may be selected from the team where the “deck” was developed. Thus, the students also become the interpreters and translators.

COMPONENTS:

- **Product:** The product of this activity will be a thinking/learning card game. Each team’s “deck” will be different, but will share common safety patterns.

- **Student Learning Tasks:** In this activity, the “answers” are provided by the students; that is, we’re trying to capitalize on what the students already know. Because the students select the places or actions that are familiar to them, the rules will be those that the students consider important to prevent accidents or negative incidents in those situations. The first task, especially, is experience-based, and highly student-oriented.

  When playing the game, the students are practicing some thinking and communication skills. The process of matching and justifying each match requires some complex thinking and highly persuasive explanations.
**Instructional Support:** Instructional support initially is to facilitate the group’s selection of names/rules and, of course, doing the logistical things like pasting paper and recording in an orderly manner.

Mediating or officiating during the playing of the game may be required when players cannot decide whether to accept or reject an explanation. This kind of instructional support is really “modeling.”

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The development of the game is the final outcome. But in completing the “decks” and in playing the game, the students are demonstrating how much they already know about safety, while concurrently learning from each other.
**ASSESSMENT RUBRICS: Samples**

**PRODUCT OUTCOMES:**
Project: Safety Sense Deck of Cards

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The team’s deck was comprehensive in rules, covering a range of places/</td>
<td></td>
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<td></td>
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<tr>
<td>actions.</td>
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<tr>
<td>2. The information provided shows that members seriously addressed their</td>
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<td></td>
</tr>
<tr>
<td>task.</td>
<td></td>
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<td></td>
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<tr>
<td>3. The decks met standards of useable quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Optimum use of team members’ strengths were evident in the project.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Content Knowledge:**
- **Student relates safety rules to familiar places or actions, and explains their importance.**

  4 Demonstrates a thorough understanding of the importance of safety rules/practices at specified sites/action. Explains the relationship between the rule and the site/action.

  3 Displays a complete and accurate understanding specific to the project.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the interrelationship of safety rules/practices with specific places/actions.
PROCESS OUTCOMES:
Observation rating:

- **Student identifies potentially unsafe situations and provides rules for preventing accidents.**
  
  4 Demonstrates a thorough understanding of safety and recognizes unsafe situations where rules can prevent accidents or mishappenings. Explains relationships between rules and the situation; provides insights.

  3 Displays a complete and accurate understanding of safety and the need for rules to prevent accidents or mishappenings.

  2 Displays incomplete understanding of safety and how rules can prevent accidents or mishappenings.

  1 Demonstrates severe misconceptions about safety and need for rules.

- **Student accurately identifies the extent to which each rule helps to remedy an unsafe situation.**
  
  4 Provides a thorough, fully developed assessment of each rule relative to the specific situation. Compares and contrasts situations to provide greater insight into the rule.

  3 Presents an accurate assessment of the extent to which the rule possesses criteria to help the situation.

  2 Does not completely address the criteria to the rule; or is not completely accurate in assessing how well the rule will help the situation.

  1 Does not address the extent to which the rule relates to the situation.
SAFETY SENSE RULES

The objective of the game is to dispose of all your cards by matching or relating each to the face cards. Two or more people can play (more than four is not advised). A mediator or official would be helpful in the evident there is no agreement as to the match "making sense."

Dealer shuffles all the cards and gives each player seven cards. The rest of the cards remain in the deck, face down, except the top card. It is turned over in the middle of the table and becomes the first face card. The first player is usually seated to the left of the dealer with play continuing clockwise.

The face card can be matched or related to a card from the player's hand in various ways: place to place, place to action, action to place, rule to place, rule to action, rule to rule.

Examples: Escalator - Store
          Escalator - Shopping
          Shopping - Store
          No running - Store
          No running - Shopping
          No running - Wear shoes or slippers

The player takes the related card from his/her hand and places it on the face card, explaining how his/her card matches the face card. If everyone agrees with the explanation, this related card now becomes the new face card and play continues with the next player. If the player cannot relate or match any card from his/her hand with the face card, he/she must take a card from the deck until he/she comes to one that makes a match. (Note: If the deck has few cards, the player in this case would take only one card and lose his/her turn.) When the deck is used up and the face card pile is high, redeal the stack of face cards to become the deck, except the one on top which remains the face card.

The key to the game is the player being able to explain the match between the face card and the card from his/her hand. If the explanation is turned down, the player must pick from the deck as a player with no matches would. If the explanation is bought by everyone, game continues with the next player.

Winner is the first player who matches all his/her cards and has none left in hand.
ACTIVITY NAME: MOLDS

Subject Area(s): FOOD SCIENCE, SCIENCE, AGRICULTURE

Duration: Five - seven class periods

PROJECT SUMMARY:
Students use scientific inquiry/experimentation to study growth of molds, one of the most common signs of potential problems in the kitchen and the home, as a whole. This activity gives the students insights into prevalent health hazards that require safety precautions.

CONTENT STANDARDS:

Science:
• Doing Scientific Inquiry: Students demonstrate the skills necessary to engage in scientific inquiry.
  • Design and conduct scientific investigations to test hypothesis.
• Cells, Tissues and Organs: Students explain the structure, functions, and reproduction of living cells.
  • Explain how living things have basic parts that work together to sustain life.

Career and Life Skills: Skills for Life and Work
• Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.
  • Thinking and Reasoning: Use efficient learning techniques to acquire and apply new knowledge and skills.

Health Education:
• Students practice health-enhancing behaviors and reduce health risks.
  • Distinguish types and degrees of risk encountered in daily living.*

Life Skills: Complex Thinking
• Experimental Inquiry: Students test hypotheses that have been generated to explain a phenomenon.
• Sets up and carries out an activity or experiment that effectively tests the prediction.

Life Skills: Complex Thinking
• Problem Solving. Developing and testing a method or product for overcoming obstacles or constraints to reach a desired outcome.
• Selects and adequately tries out alternatives.

DRIVING QUESTION(S):

• What are molds?
• Why do they grow?
• How do they grow? Do they grow?
• How do you identify a mold?
• Are molds plants or animals?

MATERIALS:

• Article - “Your Home, A Hidden Health Hazard”
• Old bread
• Swabs
• Plastic wrap
• Disposable gloves (optional)

ACTIVITY PROCESS:

• Task 1: Hidden Health Hazard
  • Have students read the article, “Your Home, A Hidden Health Hazard.” This may be a homework assignment or the lesson organizer on day 1.
  • Discuss the reading, asking students to share the gist of the article, how it might relate to them, and how familiar they are with molds.
  • Share the driving questions:
    • What are molds?
    • Why do they grow?
    • How do they grow?
    • Do they grow rapidly? Slowly?
• How do you identify a mold?
• Are molds plants or animals?

• List any and all answers or conjectures of the students on the board. (Keep list for next task.)
• Assign the vocabulary words for students to find definitions and create sketches to illustrate some of the words: (to be done outside of class)
  • Animal
  • Alive
  • Hyphae
  • Stolons
  • Plant
  • Spore
  • Rhizoids

• Ask students to share their definitions and illustrations. (Put some on the bulletin board.)
• Then have them review their responses to the driving questions and ask them to select those that are accurately describe important characteristics of molds.

• **Task 2:** Designing an Experiment
  • Divide students into work groups.
  • Each group is to discuss possible causes of mold growth and select one to “prove” using bread sealed in plastic zip top bags. For safety, minimize the spread of mold spores.
  • Have students brainstorm to decide how they will control variables so that the experiment can isolate (and demonstrate) their selected cause.
  • Have students then decide on possible causes of mold and the control and experimental treatment to the pieces of bread for each.
    Example: damp/dry
    refrigerated/not refrigerated
    in a gas oven with pilot light on/at room temperature in a drawer/on the window sill
    opened daily/left alone
    light/dark
  • Each group is to form dyads assigned to a cause and within each dyad, determine who will be responsible for what variable (experimental or control).
  • Group should also decide on:
    • Daily chart or log to be used.
    • Anecdotal records.
    • Taking photographs or making sketches.
• Ways to report and present the experiment and the findings.

• **Task 3: Conduct Experiment**
  • Each group conducts the experiment within a week’s time.
  • At the end of the week, have each group review the logs, sketches, and anecdotes, as well as the bread pieces. **What did they find? What can they conclude? Can they conclude anything? Or do they have to redo their experiment?**
  • Each group will prepare a final report for presentation to the whole class. **The report should describe the cause they selected, the paired groups, findings, and conclusions. Illustrations or photos will enhance the report.**
  • To check on what each student learned individually, develop a question (*Zinger*) for the students to respond to giving a tentative conjecture (hypothesis) and how they would test it. **Assessment for credit should be based, not so much on the correct answer, but on the method proposed for supporting the conjecture.**

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some molds produce toxins that cause sickness.</td>
<td>Scientific Inquiry</td>
<td>Working in groups</td>
</tr>
<tr>
<td>Some molds cause food to look, taste, or smell bad.</td>
<td></td>
<td>Experimental Inquiry</td>
</tr>
<tr>
<td>Some molds are good, like the <em>Penicillium</em> mold.</td>
<td></td>
<td>Problem Solving</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

• **Grouping:** Students work together on designing and conducting the experiment. **Having members of the group be responsible for conducting or taking care of one of the possible causes and the paired variables is an important part of the experimentation. Each person shares in the data collection, documentation, and contributes to deciding on the conclusion.**

• **Feedback:** Because this activity has three major tasks, feedback along the way will be important. **Encourage students to be as orderly as possible. Provide probing questions when they report their findings, such as “What about….?” or ask for**
clarity. Putting feedback in the form of a question is usually helpful to the students.

**COMPONENTS:**

- **Tasks:** The activity is divided into three major task sets. The first task is applied reading and serves as an advanced organizer for the activity. The second task is one of setting up a scientific inquiry. The third task relates to the collection of data from the experiment and arriving at some conclusion.

- **Student Learning Tasks:** The students are provided the opportunity to learn through exploring, with hands-on “mold growing.” The learning progresses through the collection of information, written and/or oral.

- **Instructional Support:** Instructional support is largely facilitating discussions and asking probing questions such as, “What about...“ or “What would happen if...“ It will be helpful to students who have not done experiments to get some guidance in understanding the concepts of control and experimental variables and how they affect the outcome of the experiment.

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. For the individual challenge, a Zinger such as the following may be posed:
  - How can you make mold grow faster?
  - Which liquids work best to promote mold growth?
  - How can you kill mold?
  - How can you prevent mold?
NOTES:

There are possible hazards in growing mold spores, especially in smelling, dusting, and touching mold. Beth Schultz (S & Cs) suggested the following procedures for growing mold.

*Watch growing mold through a transparent cover (like petri dishes or zip top plastic bags).*

*Don’t blow or dust dry mold.*

*Don’t smell, touch, or eat mold.*

*Use a cotton swab, not hands, to transfer elements (skin oil, dirt, liquids) to the mold.*

*Don’t use mold in the classroom if children are too young to understand these rules.*

Researching possible hazards of growing mold is a further extension into the theme of safety. Within science courses, the possible health hazards scientists face in laboratory research can be explored. In agriculture, some propagation methods are subject to contamination. In Food Sciences, there are many occasions to extend this activity.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

<table>
<thead>
<tr>
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<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT: All essential, relevant information included.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>ORGANIZATION: At least three main ideas with elaborate supporting details provided. Transitions are smooth.</td>
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</tr>
<tr>
<td>MECHANICS: Word usage, sentence structure, punctuation, spelling, capitalization.</td>
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<td></td>
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</tr>
<tr>
<td>VOCABULARY: Word choice, accuracy, appropriate selection.</td>
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</tbody>
</table>

Content Knowledge:
- Student explains what molds are and how they grow.

4 Demonstrates a thorough understanding of mold growth and their potential hazard to health.

3 Displays a complete and accurate understanding of mold growth and effects.

2 Displays an incomplete understanding and has some notable misconceptions.

1 Demonstrates severe misconceptions about molds and the relationships to an individual’s health.
PROCESS OUTCOMES:
Observation rating:

- Student sets up and carries out an activity or experiment that effectively tests the prediction.
  
  4  Sets up and carries out an activity or experiment that is a complete and valid test of the prediction and addresses all important questions raised by the prediction. The activity or experiment is designed to provide complete and accurate data and a model of the experimental design.

  3  Sets up and carries out an activity or experiment that is a fair test of the prediction and addresses the most important questions raised by the prediction. The activity or experiment provides accurate data for evaluation.

  2  Sets up and carries out an activity or experiment that addresses some important aspects of the prediction, but omits others. The design of the activity or experiment produces some errors in data collection or interpretation.

  1  Sets up and carries out an activity or experiment that does not test the central features of the prediction. The experimental design is seriously flawed and the collection of accurate data is unlikely.

- Student identifies viable and important alternatives for mold growth.

  4  Identifies creative but plausible solutions to growing mold. The alternatives address the conditions under which mold growth is greatest.

  3  Proposes alternatives that appear plausible and that address the most important conditions for mold growth.

  2  Presents alternatives for growing mold, but the solutions do not address the important conditions.

  1  Presents alternatives that fail to address primary conditions for growth of molds.
Self Assessment:

- I set up and carry out an experiment (or activity) to find out whether my prediction is accurate.
  
  4  I set up and carry out an experiment that tests all aspects of my prediction. The experiment also produces other useful information and gives answers to other questions related to my prediction. I carefully plan every step of the activity or experiment so that the results are accurate, clear, and usable.

  3  I set up and carry out an experiment that does a good job of testing the prediction. I get some accurate, clear, and usable results.

  2  I set up and carry out an experiment that tests some parts of my prediction but does not give me complete information. Some of the results are difficult to use in finding out whether my prediction is accurate.

  1  I set up and carry out an experiment, but it does not test the prediction. The set-up of the experiment is sloppy and my results are inaccurate or not usable.

- I suggest workable and effective solutions for dealing with the barriers to growing mold.

  4  I suggest a number of interesting and workable solutions for dealing with the barriers to growing mold. My suggestions show I have thought carefully and have attempted to directly address the primary conditions.

  3  I suggest a number of workable solutions for dealing with the barriers to growing mold. My suggestions will help me deal with the conditions present.

  2  I suggest several solutions for dealing with the mold growth, but some of them do not solve important conditional differences.

  1  I suggest solutions, but my suggestions do not relate to what needs to be done and the conditions that may vary.
“Your Home, A Hidden Health Hazard”

Sneezing and sniffling? Maybe the problem isn’t a cold but mold. It’s more dangerous than you think.

By Anne Underwood

Newsweek, December 4, 2000

Deena Karbell had lived in her New York City apartment for 15 years, so when she fell ill in 1983, she never suspected that her apartment itself could be to blame. Over the next 15 years she grew progressively weaker. Finally, in the spring of 1998, she lost 30 pounds and went into anaphylactic shock three times. She literally lay dying in her bedroom when a hired nurse noticed a strong odor of mold in the closet. Suddenly things clicked. Karbell’s family moved her out immediately. Today—at a safe distance from the mold—she is almost back to normal. “People are amazed at my recovery,” she says.

Molds have been an underrecognized health problem, but that is changing. Health-care professionals now know that molds can cause allergies, trigger asthma attacks and increase susceptibility to colds and flu. Anyone with a genetic predisposition can become allergic if exposed repeatedly to high enough levels. Last year Dr. David Sherris at the Mayo Clinic performed a study of 210 patients with chronic sinus infections and found that most had allergic fungal sinusitis. “The prevailing medical opinion has been that mold accounted for 6 to 7 percent of all chronic sinusitis,” says Sherris. “We found that it was 93 percent—the exact reverse.

More rarely, molds appear to cause problems like Karbell’s. These aren’t just allergies but reactions to toxins. Certain molds produce poisons in order to kill off competing fungi and bacteria. Risks of toxicity increase with the amount of mold—and flooding and leaks can supply the moisture that molds need to thrive.

If you believe you have a mold-related illness, consult an allergist or an environmental-health specialist. (If you can see or smell mold, that’s a good clue.) They will at least be able to confirm the diagnosis and proceed accordingly. The best remedy of all is simply to get rid of the mold. Small blooms on the surface of walls can be removed with a weak solution of chlorine bleach. Wear rubber gloves, open the windows for ventilation and throw out the sponge afterward. A face mask could also be a good idea. “Dead or alive, mold still contains the proteins that provoke allergies,” says J. David Miller, a mold specialist at Carleton University in Canada.
If your home has more extensive water damage, remediation may be the only answer. Seek professional help. You need to fix leaks, replace moldy drywall and improve ventilation. Beware of built-in humidifiers in forced-air heating systems. “Molds and slime build up there and never get cleaned out,” says Jack Spengler of Harvard. New York City has guidelines on remediation at www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html. California State also has fact sheets at cal-iaq.org/iaqsheet.htm to help you to a healthier home environment.
### ACTIVITY NAME: MICRO-ORGANISMS ARE EVERYWHERE!
(Adapted from Mission: Possible, Site Activity Guide, Purdue University Cooperative Extension Service, October 8, 1996.)

**Subject Area(s):** FOOD SCIENCE, AGRICULTURE, SCIENCE

**Duration:** Three - five class periods

### PROJECT SUMMARY:
Students practice and get feedback regarding proper handwashing techniques. Supplementary information and materials emphasize the ubiquitous nature of microorganisms, magnifying the importance of thorough and repeated hand washing when handling food.

### CONTENT STANDARDS:

**Science: Organisms and Development**
- **Unity and Diversity:** Students examine the unity and diversity of organism and how they can be compared scientifically.
  - Explains how different organisms need specific environmental conditions in order to survive.

**Health Education:**
- **Students practice health-enhancing behaviors and reduce health risks.**
  - Distinguish types and degrees of risk encountered in daily living.

**Life Skills: Habits of Mind**
- **Students have the ability to control their own behavior and thinking by using effective habits of mind.**
  - Engages intensely in tasks even when answers or solutions are not immediately apparent.

**Life Skills: Effective Communication**
- **Effective communicators are clear, can communicate with diverse audiences, use a variety of methods, for various purposes.**
  - Effectively communicates for a variety of purposes.
**DRIVING QUESTION(S):**

- What are microorganisms? Where can they be found?
- What do they do?
- Are they helpful or harmful?
- How can we avoid harmful bacteria?

**MATERIALS:**

- Timing device
- Soap and paper towels
- Inoculated petri plates
- 3x5 cards
- Hand washing fact sheets
- Glo Germ Oil and UV light or baby oil and cinnamon.

**ACTIVITY PROCESS:**

- **Task 1:** Petri Plates Preparation (5 - 7 days in advance of activity; may be done with students participation or by the teacher alone.)
  - Obtain petri plates with sterile agar. (See NOTES for a less formal process.)
  - Collect the bacterial sources to use to inoculate the plates. (Examples: dirty fingers, clean fingers, gloved fingers, gloved fingers after touching face/hair/floor; lips, piece of hair, cough, coin, saliva, raw meat, nose, drag finger across a table, floor, counter.
  - Inoculate the petri plates using a different bacterial source for each place.
    - Fingers - gently touch fingers to the agar
    - Lips - touch your lips lightly to the agar (kiss the agar). Note: agar is nontoxic.
    - Hair - remove a piece of hair from your head and gently lay it on the agar.
    - Cough - hold the petri plate 2-3 inches from mouth and cough on the agar.
    - Coin - place a coin on top of the agar, or gently rub the coin on the agar surface.
    - Saliva - place a clean cotton swab in mouth and moisten it with saliva. Gently rub the moistened swab over the surface of the agar.
    - Raw meat - place a small piece of raw meat on top of the agar in the center of the plate, or gently rub the meat over the surface of the agar.
• Nose – place a clean cotton swab in the nose and move it around with a circular motion. Gently rub the moistened swab over the surface of the agar.
• Counter – drag finger across the floor or a counter top, then trace an "S" pattern on the agar with the same finger.
• If students are participating, they should not be involved in this step. Label the bottom of each plate with a code (i.e., A, B, C) and document the code, date of inoculation and source of bacteria for each petri plate. (The teacher should keep this key confidential until the next task.)
• Write each inoculation source on a separate 3x5 card and save.
• Tape each plate closed by running scotch tape around the edge of the plate.
• Place the plates upside down in a warm place (70 -85 degrees F) to grow. Note: Keep the plates away from windows since UV light kills bacteria. When plates have grown the desired amount, place them in the refrigerator until ready to use.

**Task 2: Guessing the Growth**
• Review the inoculation sources with the students.
• Have the students examine the petri plate and try to match each plate to its contamination source.
• Students are to record their answers on the attached Petri Plate Activity Worksheet.
• Discuss any questions or ideas the students might have about what they have been observing.
• Place the 3x5 source identification cards by the appropriate plate and have everyone check their worksheets.

**Task 3: Hand Washing**
• Divide the students into work groups (average 3 students per group).
• Assign rotating responsibilities: (1) Hand washer; (2) Timer; (3) Recorder on the Handwashing Techniques Rating Sheet.
• When done, have the students check their handwashing results against the Handwashing Factsheet.

**Task 4: Reporting**
• Groups are to discuss what they saw in the petri plates, the sources of contamination, and the handwashing practices they recorded.
• If they need more convincing or cannot see relationships, have the students in the group do the following:
  • **Glo Germ Oil Test**
  • Place 2-3 drops of glo germ oil on hands.
• Rub hands together to distribute the oil evenly.
• Shine UV light on hands. “Germs” will glow green.
• Wash hands normally.
• Shine UV light on washed hands and observe the number and location of remaining “germs.”

• **Cinnamon and Oil Test**
  • Place a few drops of oil on hands.
  • Rub hands together to distribute the oil evenly.
  • Sprinkle cinnamon lightly over the oiled hands.
  • Wash normally and observe the remaining cinnamon “germs.”

• Have groups write a conclusion paragraph of the activity for submittal to the teacher. Include what the group thinks are the ramifications or relationships to each person’s health practices.

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**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some of the microorganisms are molds, bacteria, or yeasts.</td>
<td>Observation</td>
<td>Engaging</td>
</tr>
<tr>
<td>Some microorganisms can cause sickness, some can be used for good things, many are neither good nor bad.</td>
<td></td>
<td>Communicating</td>
</tr>
<tr>
<td>People who handle food can keep harmful bacteria out of food by practicing good personal hygiene, including frequent and thorough hand washing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Food: Just Grow It! KEEP IT CLEAN 317
STRATEGIES:

• **Grouping:** The activity is conducted with students working independently (Task 2) and in a group (Tasks 3 and 4). For Task 4, encourage students to arrive at a concise conclusion.

• **Engaging:** The tasks are quite involving, but students at this level should be aware of the level to which they are “engaged” in the tasks. Students should be asking questions, actively seeking information, and feeling comfortable in making conjectures based on their information and observations.

COMPONENTS:

• **Tasks:** The activity expands the students’ awareness of microorganism from the “fuzzy” molds to bacteria/yeast. The growths that develop on the agar are glaring evidence that microorganisms are everywhere! With this awareness, the handwashing practice is highlighted in order for students to realize that there are things they can do to prevent illness or minimize the potential hazards to others.

• **Student Learning Tasks:** The basic learning task is having students learn by seeing and doing.

• **Instructional Support:** Instructional support will involve a lot of pre-activity preparation: Getting the petri plates ready, making copies of the fact sheets and work sheets, and securing the timers, etc. If students are to be involved in inoculating the petri plates, instructional support in laboratory procedures will be needed for students with little lab experience. Modeling and explaining the consequences of carelessness will be important.

ASSESSMENT: Samples are attached.

• **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

• **Product Outcomes:** The written reports may be graded using a simple rubric as shown in the samples. Or an arrangement with a Social Studies teacher could be
made where the students would also submit the paper for Social Studies credit (and therefore the paper would be rated by two teachers).

**NOTES:**

If the petri plates with agar are difficult to obtain, a less formal medium would be gelatin. Taking plates with covers, gelatin is dissolved in hot water, poured into the plates and left to cool. This means will not be as “clean.”
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Written Report

<table>
<thead>
<tr>
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<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>The conclusion reflects consideration of the evidence observed and of information collected.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Relationships have been made between the activity and personal hygiene practices by most of the group.</td>
<td></td>
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</tr>
<tr>
<td>The written submittal is clear and mechanically sound.</td>
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</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains how prevalent microorganisms are in our environment and the importance of cleanliness.**

  4  Demonstrates a thorough understanding of how easily microorganisms can spread and grow. Explains how a practice such as handwashing can be improved to control their spreading and growing.

  3  Displays a complete and accurate understanding of the ease of microorganisms growth in our environment and the effect of thorough handwashing.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about microorganisms and personal practices such as handwashing.
PROCESS OUTCOMES:
Observation rating:

- **Student engages intensely in tasks even when answers or solutions are not immediately apparent.**
  
  4 Demonstrates strong determination in the pursuit of a solution. Monitors his or her level of involvement and develops and uses a number of strategies to keep self on task.

  3 Shows determination in the pursuit of a solution. Uses strategies to keep self on track.

  2 Makes some effort to resolve a difficult problem but does not spend sufficient time and effort on the problem. Is easily derailed and does not use strategies to keep self on task.

  1 Shows evidence of quitting the challenge early, before really trying to solve a problem.

- **Student effectively communicates for a variety of purposes.**
  
  4 Clearly communicates a purpose in a highly creative and insightful manner.

  3 Uses effective techniques to communicate a clear purpose.

  2 Demonstrates an attempt to communicate for a specific purpose but makes significant errors or omissions.

  1 Demonstrates no central purpose in the communication or makes no attempt to articulate a purpose.
Self Assessment:
• I work hard on tasks even when the answers or solutions are difficult to find.

   4 I show that I will not give up, no matter how difficult it is to find the answers or solutions. I evaluate how hard I am trying and I use a variety of techniques to keep myself on task.

   3 I show that I don’t give up when I am trying to find the answers or solutions. I keep myself on task.

   2 I try to complete tasks when the answers or solutions are difficult, but I give up when I have to try too hard. I don’t have good techniques for keeping myself on task.

   1 I give up quickly on difficult tasks.

• I communicate well for different purposes.

   4 I clearly explain the purpose of my communication by selecting and using very effective and original methods. My explanation goes beyond just stating the purpose; it adds meaning to the information I am communicating.

   3 I clearly explain the purpose of my communication by selecting and using effective methods.

   2 I try to explain the purpose of my communication, but I make errors in the explanation or leave out information that would make it clear.

   1 I do not try to explain the purpose of my communication or I don’t really have a clear purpose.
PETRI PLATE FACT SHEET

The nutrient agar in the petri plates is a general purpose food source for microorganisms. Although not all microorganisms like it, many do and will grow. Use the information on this page when examining the petri plate display. Note the following characteristics:

- Number of colonies seen
- Color of colonies
- Presence of fuzziness
- Shape of colony (blob)
- Any other characteristic observed.

It is not important to identify the organisms on the plates. These plates illustrate the fact that microorganisms are everywhere and can grow under favorable conditions.

- Fuzzy things are molds. You will frequently see molds that are green, black, or white. Some molds are good, like the *Penicillium* mold that provides us with the antibiotic, penicillin. Some molds, as you may have learned in an earlier activity, produce toxins that can make us very sick. Some molds make our food look, taste, or smell bad.

- Blobs that aren’t fuzzy may be bacteria or yeasts. Some yeasts are used to make foods, like the yeast that makes bread rise or the yeast that turns the sugar in grapes to alcohol in wine.

- Each blob is a colony. Each colony is made up of millions of individual cells. Each colony started out as a single cell (one microorganism).

- Note the different colors and shapes of the colonies.

- Remember that some of the microorganisms on the plates can make you sick, some of them can be used for good things, and many are neither good nor bad.

- Ideally, all glass petri plates and contents should be sterilized prior to clean up and disposal by using an autoclave. Plastic petri dishes and contents

Food: Just Grow It!  KEEP IT CLEAN 323
should be incinerated. A less than ideal method is to soak glass and plastic petri plates and contents in a bucket with a strong solution of Lysol (alkyl dimethylbenzylammonium chloride) for a few hours prior to disposal.

DON'T OPEN THE PETRI PLATES! BE SURE TO WASH YOUR HANDS AFTER HANDLING THE PLATES.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description: Number, types, colors, appearances, amount of growth</th>
<th>Suspected Source of Contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
HANDWASHING FACT SHEET

Bacteria are everywhere. Some of them are useful, many of them neither good nor bad, but a few can make us sick. Many bacteria get from place to place by hitch-hiking on people. They can be found in the folds of skin, in our noses and throats, on our hair, and under our fingernails. We can also pick up bacteria from things we touch.

Bacteria can be transferred to food from dirty hands, dirty aprons, utensils, food contact surfaces, and equipment. More than 16% of food borne disease outbreaks have been traced to poor personal hygiene of people working with food.

People that handle food can keep harmful bacteria out of food by practicing good personal hygiene. Simple steps like bathing or showering every day before going to work and wearing a clean uniform or apron can help. Washing hands often and properly is also important.

YOU SHOULD ALWAYS WASH YOUR HANDS:
- Before you handle food.
- After using the bathroom.
- After eating or drinking.
- After smoking or chewing tobacco.
- After handling dirty plates or garbage.
- After working with raw foods.
- After touching other parts of your body like your nose, mouth, hair, and skin.
- After handling dirty utensils, objects, or equipment.

TO WASH HANDS PROPERLY, YOU SHOULD:
- Use soap and hot water.
- Wash for at least 20 seconds.
- Wash between fingers and under nails.
- Dry with a single-use towel.
- Use single-use towel to turn off faucets.

Remember that bacteria are tenacious. Proper hand washing will remove many microorganisms, but some may remain.
HANDWASHING TECHNIQUE RATING SHEET

Observe the person washing hands as done normally before handling food. Use the stopwatch or timer to monitor the length of time he/she takes to wash hands. Also watch to see whether or not the handwasher does the other items listed below and indicate each by checking the appropriate response. Compare the results with the information provided in the Handwashing Fact Sheet. Share the results among your group and discuss ways to introduce improved handwashing procedures to others.

<table>
<thead>
<tr>
<th>Handwashing Procedure</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Used soap?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Used hot water?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total washing time of at least 20 seconds?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Washed between fingers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Washed under nails?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dried with a single use towel?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Used paper towels to turn off faucet?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**ACTIVITY NAME:**  
*KITCHEN SAFETY*  
(Adapted from *KITCHEN SAFETY - CTAHR, MISSION: POSSIBLE - Purdue Univ.*)  
**Subject Area(s):** FOOD SCIENCE, SCIENCE

**Duration:** Three class periods over a couple of weeks

**PROJECT SUMMARY:**  
Students look into the kitchen and begin identifying safety procedures that are being practiced. They then build on what they believe are good practices and expand into other essential practices, based on information provided.

**CONTENT STANDARDS:**

**Science: Safety**
- *Doing Safety:* Students demonstrate the importance of safety by applying safety skills in all activities.
  - Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.

**Health Education**
- *Students practice health-enhancing behaviors and reduce health risks.*
  - Evaluate the effectiveness of positive health practices in overcoming setbacks in achieving health goals.

**Career and Life Skills: Individual, Family, and Community Development**
- *Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.*
  - Demonstrate knowledge of basic procedures for maintenance of safe and healthful personal and family lifestyle.

**Life Skills: Collaboration/Cooperation**
- *General Learner Outcome:* Students understand that it is essential for human beings to work together.
  - Effectively performs a variety of roles within a group.
**DRIVING QUESTION(S):**

- What safety practices and procedures are important in the kitchen?
- Which of these are being conducted regularly in a familiar kitchen?
- What can be done to insure that all safety practices and procedures are attended to in the kitchen?

**MATERIALS:**

- Safe Kitchen Guide
- Perishable Food Decision Tables

**ACTIVITY PROCESS:**

- Have students imagine their kitchen at home (or at their favorite relative’s home) before and during the preparation of a Thanksgiving luncheon for the family.

**Task 1:** Preparations in the Kitchen

- Have them identify the safety procedures or practices used (or that should be used) in the kitchen in preparing the luncheon. They should be as thorough as possible, considering the facility, the equipment, the food, the dishes and utensils, the handling of food, etc.
- Divide the students into groups to share their descriptions and lists of safety procedures/practices.
- As a group, develop a report of the composite safety procedures and practices in the kitchen for the Thanksgiving luncheon.
- Have each group report on the composite safety procedures and practices.
- Reports by the groups are to be rated against the Safe Kitchen Guide; give a point for a match. Extra points may be given for practices that are not listed on the guide, but are good practices or procedures to have.
- Celebrate the group(s) with the most points.
- Have group leaders meet separately to develop a class Kitchen Safety Guide, using the best of their reports together and the Safe Kitchen Guide. They should determine the format that would be most user-friendly.

**Task 2:** After the Preparation

- Group leaders should share the class Kitchen Safety Guide that was developed from everyone’s input.
• Have groups now address what safety procedures or practices were used (or should have been used) after the preparation for the luncheon. This covers the serving of food and the cleaning up.
• Have members brainstorm, keeping in mind that the procedures and practices will eventually contribute to the Kitchen Safety Guide.
• With the suggestions from everyone, each group will refine the list of procedures and practices for the “after preparation” phase of the luncheon.
• Distribute the Perishable Food Decision Table to groups so they can add practices, if needed.
• Have group leaders meet again to use the “After the Preparation” lists of the groups to develop a final, comprehensive class Kitchen Safety Guide.

**Task 3: In Your Kitchen**
• Group leaders should share the final Kitchen Safety Guide with the class, insuring that everyone has a copy.
• The leaders should entertain any questions or need for clarification.
• Each student is to take the Kitchen Safety Guide home and check their kitchen and the practices/procedures used (or a favorite relative’s).
• Each student is to identify a procedure or practice that follows the guide (may be more than one), and write a description of the practice/procedure for submittal to the teacher. Students should be as detailed as possible, giving examples of specific meals.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The kitchen, the heart of many homes and public establishments, is full of health and hazard risks.</td>
<td>• Observation</td>
<td>• Working Together</td>
</tr>
<tr>
<td>• Safety procedures and practices are critical in all phases of meals: preparation, service, clean up.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>
STRATEGIES:

- **Grouping:** The groupings for this activity include total group, small group, and individual. Research on effective teaching indicates that learning is enhanced when students’ grouping is varied, rather than total group or individual all the time.

- **Meaning Base:** Safety decisions are made by individuals. Having the students start with what is most meaningful to them establishes a “prior knowledge” basis upon which additional information may be more easily acquired. Further, this is an opportunity for correcting misconceptions.

COMPONENTS:

- **Product:** This activity begins the collection of safety guidelines. In this case, the guidelines relate to the kitchen.

- **Student Learning Tasks:** While there are many safety guidelines published by various expert groups (couple of which are used in this activity), the students are asked to “develop” their own. This learning task is expected to be more meaningful than having students merely read and regurgitate someone else’s list.

- **Instructional Support:** The activity can be supported by providing students with prompts or guide questions such as the following:
  - What do you see as an ideal food preparation area?
  - Do you expect more from the kitchens of restaurants than you do for your home?
  - What practices or procedures make you feel that the food is safe to eat?
  - Which of these practices or procedures do you observe at home?
  - Which of these practices or procedures are not observed at home?
  - Do you think the practice/procedure is important enough to call attention to?
  - How would you introduce it to your family?
ASSESSMENT: Samples are attached.

- **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

- **Product Outcomes:** The first product is the set of preparation safety guidelines. Assessment is based on comparison with *Safe Kitchen Guide*. The final class Kitchen Safety Guide will become part of a safety handbook for each student. Its assessment comes in the students using it to assess their own kitchen. The written description of a practice/procedure at home that complies with the guidelines has the students focus on the *positive*. This written description should be assessed mainly for structure, rather than the contents, since each will vary.

NOTES:

There are many learning activities that are already part of a Food Science or home economics course. This activity is not meant to replace those; in fact, this is more of an exploratory activity and could easily be followed by more in depth study of specific food handling practices, appropriate use of appliances and equipment, and other health-based applications in food science.

In a travel industry related course, students may want to visit a restaurant or fast foods outlet to observe the practices or procedures in a commercial kitchen. A guest speaker such as a chef from a hotel or an instructor in culinary arts from the community college may be invited to share their practices and procedures. These sources of information will help the students to validate their own guidelines and may provide other information, which students may want to include in their guidelines.

In a lab science class, there are many parallels in terms of laboratory safety. Teachers may be able to spin off from an activity such as this into having students develop their own Lab Safety Guidelines. These guidelines can also become part of the students’ Safety Handbook.

RESOURCES:
ASSESSMENT RUBRICS:  Samples

PRODUCT OUTCOMES:

Guidelines:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The guidelines are comprehensive and accurate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The guidelines reflect high standards of quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Input from most of the students is evident.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Content Knowledge:

- Student identifies potentially hazardous conditions in the kitchen and presents practices or procedures to avoid accidents or harmful results.

  4  Demonstrates a thorough understanding of kitchen safety and provides specific examples of good practices/procedures.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about safety practices and procedures in the kitchen.
PROCESS OUTCOMES:
Observation rating:

- **Student is accurate and seeks accuracy.**
  
  4  Pays close attention to detail when appropriate. Checks against all important sources. Recognizes inaccuracies quickly and makes corrections that not only clear up the identified errors, but add greater clarity to the whole.
  
  3  Pays adequate attention to detail. Checks several sources. Recognizes and corrects major inaccuracies.
  
  2  Tries to be accurate but overlooks important details. Doesn’t check enough sources to assure accuracy of important points. Doesn’t recognize and correct some important errors.
  
  1  Does not check important details for accuracy. Makes little effort to review for accuracy.

- **Student effectively performs a variety of roles within a group.**
  
  4  Effectively performs multiple roles within the group.
  
  3  Effectively performs two roles within the group.
  
  2  Makes an attempt to perform more than one role within the group but has little success with secondary roles.
  
  1  Rejects opportunities or requests to perform more than one role in the group.
Self Assessment:

- I am accurate in my work.

  4 I pay close attention to details. I check every useful source to make sure my work is complete and accurate. When I find errors, I quickly correct the errors in a way that improve the value of the entire project.

  3 I pay attention to details when I work. I check other sources to make sure my work is complete and accurate. I find and correct major errors.

  2 I try to pay attention to details when I work, but miss some important ideas. I check some sources to see if my work is complete or accurate, but miss important places I should check. I miss important errors and fail to correct others.

  1 I don't check to make sure my information is complete or accurate. I make little effort to find and correct errors.

- I perform a variety of jobs in my group.

  4 I perform many jobs in my group and do them all well.

  3 I perform two jobs in my group and do both well.

  2 I try to perform two jobs in any group but don’t perform both well.

  1 I don’t even try to perform any more than one job in my group.
SAFE KITCHEN GUIDE

<table>
<thead>
<tr>
<th>Topic</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cans</td>
<td>Be careful with opened cans. Edges are sharp and could cut you.</td>
</tr>
<tr>
<td>Cupboards</td>
<td>Keep cupboard doors closed.</td>
</tr>
<tr>
<td>Cupboards</td>
<td>Use a stool or mini-step ladder to reach for things on high shelves. Avoid reading over stove top when it is in use.</td>
</tr>
<tr>
<td>Disposal</td>
<td>Wrap sharp objects in newspaper before throwing into garbage.</td>
</tr>
<tr>
<td>Dress</td>
<td>Remove dangling jewelry, roll up sleeves, and pull back hair, if necessary.</td>
</tr>
<tr>
<td>Electrical Appliances</td>
<td>Check appliances for frayed cords and replace those immediately. Do not overload your outlets and circuits.</td>
</tr>
<tr>
<td>Electrical Appliances</td>
<td>Do not operate the microwave oven if the door glass is broken or the door seal is worn.</td>
</tr>
<tr>
<td>Food: buying</td>
<td>Buy cold foods last, get them home fast.</td>
</tr>
<tr>
<td></td>
<td>Check “sell by” and “use by” dates on packages.</td>
</tr>
<tr>
<td></td>
<td>Have raw meats, poultry, and seafood placed in separate bags to prevent transfer of juices and bacteria.</td>
</tr>
<tr>
<td></td>
<td>Unload the perishables first at home and refrigerate or freeze.</td>
</tr>
<tr>
<td>Food: preparing</td>
<td>Keep everything clean.</td>
</tr>
<tr>
<td></td>
<td>Thaw frozen food in the refrigerator.</td>
</tr>
<tr>
<td></td>
<td>Wash hands with soap and hot water at least 20 seconds before starting any food preparation.</td>
</tr>
<tr>
<td></td>
<td>Never chop vegetables, salad ingredients, or other ready-to-eat foods on a cutting board that was used for raw meat or poultry without first cleaning and sanitizing it.</td>
</tr>
<tr>
<td></td>
<td>Never partially cook foods and then refrigerate or set them aside to finish cooking later.</td>
</tr>
<tr>
<td></td>
<td>Cook meat (especially ground meat), poultry, and fish thoroughly.</td>
</tr>
<tr>
<td>Food: storing</td>
<td>Keep perishables refrigerated.</td>
</tr>
<tr>
<td></td>
<td>Wrap meat, poultry, and fish or place in separate plastic bags in meat drawer or on a plate on the lowest shelf of refrigerator to keep juices from dripping on other foods.</td>
</tr>
<tr>
<td></td>
<td>Keep cold foods cold (40 degrees F or below) and hot foods hot (above 140 degrees).</td>
</tr>
<tr>
<td>Hands</td>
<td>Dry hands after washing them. Wet hands are slippery.</td>
</tr>
</tbody>
</table>
| • Hands | • Wash hands often with soap and hot water for at least 20 seconds often.  
• Bandage any cuts or sores on hands, or wear plastic gloves. |
| --- | --- |
| • Knives | • Store all knives in a separate place and out of the reach of children.  
• Use a cutting board and always cut away from you.  
• When drying knives, turn blade away from hand and dish towel.  
• Never chop vegetables, salad ingredients, or other ready-to-eat foods on a cutting board that was used for raw meat or poultry without first cleaning and sanitizing it. |
| • Mess | • Wipe up spills immediately.  
• Clean up broken glass right away with a wet paper towel. |
| • Oil | • Use extreme caution when cooking with oil. Becomes a fire hazard and/or may cause burns on the person.  
• Keep container of cooking oil away from heat source. |
| • Oven | • Avoid using dish rags to remove foods from the oven. Becomes a fire hazard. |
| • Pots | • Turn handles of pots and pans away from you, over the range (but not over another burner) so no one will bump or spill the hot food.  
• Lift pot covers away from you. This allows steam to escape away from you. Hot steam can burn your face. |
| • Refrigerator | • Clean the refrigerator regularly to remove spoiled foods so that the bacteria cannot be passed on to other foods. |
| • Stirring | • Use a wooden spoon when stirring foods during cooking. |
| • Stove/range | • Keep range clean of food spills and grease. |
| • Towels | • Change kitchen towels often and launder in hot water.  
• Clean sponges and dishcloths frequently, using soap and hot water. |
| • Counters/surfaces | • Clean work surfaces often to remove food particles and spills.  
• Use paper towels to wipe up spilled meat, poultry, or fish juice, then use sanitizing solution.  
• Sanitizing: First, clean surface with hot, soapy water & rinse.  
  • For hard, nonporous surfaces: Use 1 Tbsp. Liquid bleach in 1 gallon of water; Leave wet for 2 minutes; Don’t rinse - air dry.  
  • For porous surfaces: Use 3 Tbsp. Liquid bleach in 1 gallon of water; Leave wet for 2 minutes; Rinse and wipe dry or air dry. |
# Perishable Food Decision Tables

*(Adapted from Purdue University Cooperative Extension Service, MISSION: POSSIBLE, 1996)*

## 1. Frozen Foods

<table>
<thead>
<tr>
<th>Type of Food</th>
<th>Partially Frozen (some ice crystals)</th>
<th>Completely Thawed Still Cold (below 40° F)</th>
<th>Completely Thawed - Warm (above 40° F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meats (beef, veal, lamb, pork)</td>
<td>Refreeze</td>
<td>Cook &amp; serve or Cook and refreeze</td>
<td>Discard</td>
</tr>
<tr>
<td>Poultry (chicken, turkey, cornish game hen, etc.)</td>
<td>Refreeze</td>
<td>Cook and serve or Cook and refreeze</td>
<td>Discard</td>
</tr>
<tr>
<td>Organ Meats (liver, kidney, heart)</td>
<td>Use within 48 hours DO NOT REFREEZE</td>
<td>Cook and serve</td>
<td>Discard</td>
</tr>
<tr>
<td>Fish and Shellfish</td>
<td>Refreeze</td>
<td>Cook and serve or Cook and refreeze</td>
<td>Discard</td>
</tr>
<tr>
<td>Combination Dishes (stews, casseroles, meat pies)</td>
<td>Cook and serve or Cook and refreeze*</td>
<td>Cook and serve</td>
<td>Discard</td>
</tr>
<tr>
<td>Dairy Items (milk, cheese, butter)</td>
<td>Refreeze</td>
<td>Refreeze or refrigerate</td>
<td>Discard</td>
</tr>
<tr>
<td>Produce (vegetables, fruit)</td>
<td>Refreeze</td>
<td>Cook and serve or cook and refreeze</td>
<td>Discard</td>
</tr>
<tr>
<td>Juices</td>
<td>Refreeze</td>
<td>Refreeze</td>
<td>Discard</td>
</tr>
<tr>
<td>Baked Goods (bread, fruit pies, plain cakes)</td>
<td>Refreeze</td>
<td>Refreeze</td>
<td>Serve**</td>
</tr>
</tbody>
</table>

*Refreeze only those dishes containing raw ingredients. Do not refreeze previously cooked dishes.*

**Discard warm fruit pies.**
2. Refrigerated Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>Discard if held above 40° F over 2 hours.</td>
</tr>
<tr>
<td>Fruit Juices</td>
<td>Generally safe unrefrigerated for short periods, but discard if cloudy, moldy, or fermented.</td>
</tr>
<tr>
<td>Eggs - fresh or hard boiled</td>
<td>Discard if held above 40° F over 2 hours.</td>
</tr>
<tr>
<td>Hard cheeses, butter, margarine</td>
<td>Generally safe unrefrigerated if well-wrapped, but discard if mold or rancid odor develops.</td>
</tr>
<tr>
<td>Fresh fruits and vegetables</td>
<td>Generally safe unrefrigerated, but discard if mold, yeasty odor, or slimy texture develops.</td>
</tr>
<tr>
<td>Fresh meats and poultry</td>
<td>Discard if held above 40° F over 2 hours.</td>
</tr>
<tr>
<td>Lunch meats and hot dogs</td>
<td>Discard if held above 40° F over 2 hours.</td>
</tr>
<tr>
<td>Mayonnaise (opened)</td>
<td>Discard if held above 40° F over 2 hours.</td>
</tr>
</tbody>
</table>

3. Prepared Foods: Discard prepared foods that are between 50° F and 135° F. Be sure to take the temperature at the edge of the package where it tends to warm up or cool down first.

NOTE: Unsafe foods do not always smell, taste, or look bad. WHEN IN DOUBT, THROW IT OUT! (CTAHR: “Be Safe: A Home Guide to Help Keep Food Safe.”)
ACTIVITY NAME: **ON THE JOB**

Subject Area(s): AGRICULTURE, FOOD SCIENCE, BUSINESS

Duration: Three class periods

**PROJECT SUMMARY:**

Students are asked to collect safety rules from different job sites. In groups, the students organize and synthesize the safety practices deemed important in the world of work. They seek as much work-related information as possible and create additional safety guidelines from the information they collect.

**CONTENT STANDARDS:**

**Science: Safety**
- **Doing Safety:** Students demonstrate the importance of safety by applying safety skills in all activities.
  - Identify potentially unsafe conditions prior to the activity, and explain how accidents can be prevented.

**Career and Life Skills: Skills for Life and Work**
- **Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.**
  - Explain the difference between rules of conduct and one's responsibility to self and others.

**Health Education**
- **Students comprehend concepts related to injury and violence prevention.**
  - Analyze the short and long term benefits and consequences of injury prevention.

**Life Skills: Complex Thinking**
- **Decision Making:** Selecting among apparently equal alternatives.
  - Makes a selection that adequately meets the decision criteria and answers the initial decision question.
Life Skills: Information Processing

- Students must be able to effectively interpret and synthesize data if they are to really learn something.
- Effectively interprets and synthesizes information.

**DRIVING QUESTION(S):**

- Do work places all have safety rules?
- What are they?
- Which rules appear to be common to most sites? Why?
- What are some rules that are unique to specific sites? On what basis are these rules developed?

**MATERIALS:**

- OTJ General Safety Guide (attached)

**ACTIVITY PROCESS:**

- Have the students identify the major types of work and job sites that are around them. List them, grouping by job site. (Examples: hotel, plantation, stores, hospital, law office, construction site, gas station, school cafeteria, etc.)
- Have the students discuss the possible kinds of safety rules or procedures that exist at each. Questions: Do these places have safety rules? What safety rules do you think these work places have?
- **Task 1:** Data Collection
  - Divide the students into groups.
  - Members of each group are to decide who will be responsible for collecting the safety rules from each of the major work places.
  - Have groups discuss how the information will be collected. In some places, the rules are clearly posted; in others, they may need to speak to a manager or interview a worker.
  - Each group is to plan their strategy and schedule for collecting as many workplace safety rules as possible within the allocated time (outside of school).
- **Task 2:** Organization and Synthesis
• Provide group work time in class for members to share the information collected.
• Each group is to decide how to pull the information together in an organized manner and to what extent the information can be synthesized.
• When the information is compiled, members are to decide if more information is needed.
• Each group then develops its list in the format that is most helpful to the members.
• Groups share their safety lists with the whole class. At this point, a group may learn from other groups and decide to add or change their lists.
• After revisions are done, as needed, each member should have a copy of the Job Site Safety Guidelines they developed.

**Task 3: Validation**

• Invite a safety officer or OSHA specialist to speak to the students about requirements for various job or work sites.
• Students, individually, are to take notes and insure that their lists cover the requirements presented by the speaker.
• Provide the students with the OTJ General Safety Guide as another source to check their lists, and amend as needed. These lists will be part of the students’ safety handbook to be completed by the end of the quarter/semester/year.
• Each student is to submit a written report to the teacher discussing in general what he/she found to be common safety rules across work places, regardless of the nature of the work, and unique safety rules that apply only to specific sites. The student should explain the bases for these types of rules and give examples.
### CONTENT:

<table>
<thead>
<tr>
<th><strong>Content Knowledge</strong></th>
<th><strong>Content Skills</strong></th>
<th><strong>Process Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>There are general or common safety rules that apply to most work places and prevent accidents from occurring due to carelessness.</td>
<td>Decision Making</td>
<td>Work in groups</td>
</tr>
<tr>
<td>Specific safety rules are developed in keeping with the risks involved in the work itself, the equipment, the supplies used, the time or movement patterns that create risks, etc.</td>
<td></td>
<td>Information Processing</td>
</tr>
<tr>
<td>Government regulation adds clout to safety rules and requirements.</td>
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</tbody>
</table>

### STRATEGIES:

- **Grouping:** By working in groups or teams, information may be collected from more sources during a limited amount of time. Also, the groups can take advantage of members’ connections with work places through family and friends. Groups that feel the need to get more information can use the Internet or library as an additional information source.

### COMPONENTS:

- **Product:** This activity has two products:
  - Group generated Job Site Safety Guidelines; and
  - Written report submitted by each student describing “common” and unique rules.
Student Learning Tasks: The students' learning entails collecting information from the work sector. Planning for this collection with others can be a learning experience in and of itself.

Once the data are collected, students work together and apply some basic thinking skills (sorting, comparing/contrasting, synthesizing) to organize the information. In some cases, it is anticipated that the information collected will simply be listed, without analysis and organization (other than the work site from which they came). In this situation, the individual students will need to do some of the thinking and organizing in order to do a good job on the written report.

Instructional Support: The activity can be supported by providing students with suggested work places, identifying (and informing ahead of time) contact people. The guest speaker will be contributing authentic information, as well as providing students with the opportunity to learn about careers in the safety field.

ASSESSMENT: Samples are attached.

Process Outcomes: Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

Product Outcomes: The group guidelines will be assessed by members of the group. They will determine the completeness, the accuracy of details, and the usefulness of information. For the individual writings, the teacher's assessment should include the extent to which the students are able to extrapolate the "common" rules and differentiate among the rules that are necessitated by unique conditions at certain work places.

NOTES:

In the work sector, safety is an economic as well as human consideration. Major causes of accidents at job sites have been attributed to carelessness, forgetting or disregarding safety practices/procedures, not knowing how to operate equipment properly, and improper use of equipment.
The seriousness of safety in the work place is evident in the extent to which government has interceded to insure adequate precautions and effective practices are instituted.

RESOURCES:
### ASSESSMENT RUBRICS: Samples

**PRODUCT OUTCOMES:**

**Written Report: Task 3**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The written report was comprehensive.</td>
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<tr>
<td>2. The information provided shows in depth analysis of the types of rules, reasons for them, and applicability to different sites.</td>
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<tr>
<td>3. The report reflects high standards of reasoning and decision making.</td>
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<tr>
<td>4. The group interaction appears to have benefited the individual.</td>
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</tr>
</tbody>
</table>

**Content Knowledge:**
- Student explains the common and unique safety rules at major work places.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Demonstrates a thorough understanding of the safety rules on the job. Explains the different bases for rules: common and unique.</td>
</tr>
<tr>
<td>3</td>
<td>Displays a complete and accurate understanding specific to the activity.</td>
</tr>
<tr>
<td>2</td>
<td>Displays an incomplete understanding and has some notable misconceptions.</td>
</tr>
<tr>
<td>1</td>
<td>Demonstrates severe misconceptions about the safety rules in the work place.</td>
</tr>
</tbody>
</table>
PROCESS OUTCOMES:
Observation rating:

• **Student makes a selection that adequately meets the decision criteria and answers the initial decision question.**

  4 Selects an alternative that meets or exceeds the criteria and that represents a well-supported answer to the initial decision question. Provides a useful discussion of issues and insights that arose during the selection process.

  3 Successfully answers the decision question by selecting an alternative that meets or exceeds established criteria.

  2 Selects an alternative that does not entirely conform to the student’s assessment of the alternatives.

  1 Makes a selection that does not appear reasonable or cannot be justified by the student’s evaluation of the alternatives.

• **Student effectively interprets and synthesizes information.**

  4 Interprets the information gathered for a task in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3 Accurately interprets information gathered for the task and concisely synthesizes it.

  2 Makes significant errors in interpreting the information gathered or synthesizes the information imprecisely or awkwardly.

  1 Grossly misinterprets the information gathered for the task or fails to synthesize it.
**Self Assessment:**
- **I select the choice that meets my criteria and answers the question that created the need for a decision.**

  4 I select a choice after carefully considering how the choices match the criteria. I can explain why my choice effectively answers the question that originally created the need for a decision. I also explain any important and interesting ideas that occurred to me or other things I learned during the process of making this decision.

  3 I select the choice that best matches my criteria. The choice provides a satisfactory answer to the question that originally created the need for a decision.

  2 I select a choice that matches some criteria, but it may not be the best choice because I ignored or did not see a better match.

  1 I select a choice without giving much thought to how it matches the criteria, or I cannot explain how my choice matches the criteria.

- **I find meaning in information and then combine and organize information to make it useful for my task.**

  4 I find useful and accurate meaning in information I gather for my task. I understand meanings in information that other people do not see. I then combine and organize information in my own way to express certain ideas.

  3 I find useful and accurate meaning in the information I gather for my task, and I combine and organize the information so that it makes sense.

  2 I make errors when I look for meaning in information, and I combine the information inaccurately or in a way that makes it confusing.

  1 I make major errors when I look for meaning in information, and I do not combine or organize the information.
**General Job-Safety Rules**

- Keep alert and conduct yourself in a safe manner.
  
  *Note: Nobody likes to work around a person who is careless; that person is a threat to others and to the business or project.*

- Be aware of where others are and what they are doing.
  
  *Example: You are pouring gas into the lawn mower in an enclosed garage. Your friend begins to check out the propane gas grill right next to the mower. What will you do?*

- Know the location of fire-fighting and first-aid equipment.

- Report all accidents to your instructor, no matter how minor they seem.

- Use proper techniques for lifting a heavy object.
  
  *One of the most painful and common on-the-job injuries is damage to back muscles and spine from improper lifting techniques. Other injuries caused by improper lifting include torn or strained muscles, ligaments, or joints in your arms, shoulders, neck or legs.*

  *Once injured, these areas never heal completely and because they are weak, are easily sprained or torn again. These injuries can be avoided by using the simple techniques listed on the following page.*

**Safe Practices for Lifting Heavy Objects**

- Study the load to be carried.
  
  *How heavy is it?*
  
  *What is its size and shape?*
  
  *How able are you to carry it?*

- Place both feet close to the object to be lifted; feet should be 8 to 12 inches apart for good balance.

- Bend the knees to the degree that is comfortable and get a good handhold.
• Use both leg and back muscles to lift the load straight up smoothly and evenly. Pushing with your legs, keep the load close to your body.

• Lift the object into carrying position, making no turning or twisting movements until the lift is completed. Avoid awkward positions or twisting movements while lifting.

• Turn your body with changes in the position of your feet. Don’t try to twist your body without moving your feet toward the same direction.

• Make sure your path of travel is clear of obstacles. Stack materials in such a manner as to permit full view while carrying.

• Set the load down in a similar manner as picking it up. Use the leg and back muscles and lower load by bending your knees. Avoid strain by storing heavy objects at least 12 inches above the floor.

• When lifting and carrying with another person, teamwork is important. The load should be equally distributed. Movements should be coordinated so both persons start and finish the lift action at the same time. Perform turning movements together. Long objects should be held at the same level by both persons and on the same side of the body.

• Over-reaching and stretching to reach overhead objects can also result in strains. Use a ladder instead of chairs, boxes, or over-stretching.

**Protective Clothing**

• **Hard-toed, hard-soled shoes** - Protect feet from dropped objects, cutting edges on equipment, and from thrown objects.

• **Close-fitting clothing** - Prevent clothes from getting caught and tangled or pulled by equipment. Example: A loose shirttail can get caught in rotating parts and pull your body into the machine.
• **Hat** – Protects the head from sun and helps prevent heatstroke. Buffers small falling objects.

• **Unlined neoprene apron** – Protects skin and clothing when mixing chemicals such as pesticides, herbicides, and fertilizers.
  
  *Note: Cloth gloves or lined rubber gloves will hold the chemical against the skin.*

• **Unlined neoprene boots** – Protect feet when working with chemicals.

• **Safety glasses** – Protect eyes from thrown and flying objects when working with power tools.

• **Face shield** – Protects eyes and face from flying or thrown objects.
  
  *Example: Chipper/shredder machines, weed cutters, and power edgers can throw sticks, branches, and other debris to head level.*

• **Respirators** – Prevent inhalation of pesticides and other toxic chemicals during application.

• **Hearing protectors** – Reduce continued noise levels that can damage hearing.

• **Spray suit** – Protects entire body when fogging or spraying highly toxic chemicals.

**Dress Precautions**

• Wear clothing and protective gear appropriate for the work to be done.

• Tie back long hair before using power equipment or working around moving parts.

• Do not wear gloves when hands are around moving parts.

• Remove rings and other jewelry before working with power equipment.

• Bare feet or slippers are never appropriate.

• Do not carry tools or sharp objects in your pockets.
Federal Safety Code Colors - Go to a hospital or department store and check out the color codes.

- **Federal Safety Red**
  - Indicates danger
  - Identifies fire-protection equipment and its location
  - Identifies portable containers of flammable liquids
  - Identifies emergency stop buttons and switches on machinery

- **Federal Safety Yellow**
  - Indicates caution and marks physical hazards such as low beams, steps, ramps
  - Indicates waste containers for explosive or combustible materials
  - Indicates equipment that should NOT be started, used, or moved (e.g., defective equipment)

- **Federal Safety Orange**
  - Identifies dangerous parts of equipment that could cut, crush, shock, or otherwise injure

- **Federal Safety Purple (or Black on Safety Yellow)**
  - Indicates radiation hazards

- **Federal Safety Blue**
  - Identifies tags that indicate equipment should not be used or moved

- **Federal Safety Green**
  - Identifies first-aid equipment and its location
  - Identifies safety equipment other than fire-fighting equipment and its location

- **Federal Safety Black and White**
  - Indicate traffic flow paths
  - Indicate storage areas
  - Identify housekeeping equipment and its location

Safety Rules for Using Tools

- Know how to use or operate a tool properly before using it.
CAUTION - Read operating manuals for power equipment, follow all safety precautions. Always ask for help if you don't know how a machine works.

- Use tools as they are intended to be used.
  Example: Do not use a long-handle shovel as a pry bar. The handle can split or break, causing puncture wounds, sprained muscles, or other injuries.

- Keep tools sharp and well adjusted.
  Note: Accidents happen with dull tools because they require more effort and greater pressure to make them work properly. Fatigue and frustration mixed with greater pushing or pressure can cause a tool to slip and cut, and can cause back injuries or other problems.

- Properly maintain and store all tools.

- Tag and report to the instructor any defective tools, machines, or equipment.

- Disconnect power equipment from power source before fueling, adjusting, or performing maintenance.
  Examples: Unplug electrical equipment; disconnect spark plug on gas-powered equipment.

Safety Rules for the Work Area

- Store materials and supplies safely in their proper places.

- Store tools and equipment safely in a suitable storage area.

- Keep work areas organized and clear of debris and other hazards.

- Clear floors of obstacles and slippery substances; clean up spills immediately.

- Keep aisles, exits, and traffic areas free of materials and debris.

- Dispose of combustible and hazardous materials properly.

- Keep enough housekeeping tools and supplies on hand to keep the work area clean.
ACTIVITY NAME:  ONE-TWO-THREE FIRE!

Subject Area(s):  SCIENCE, AGRICULTURE, FOOD SCIENCE

Duration:  Two weeks

PROJECT SUMMARY:
Fire Prevention Week is brought back into the experience of high school students with this activity. They study fire safety with related information about electrical safety practices. This review provides students with more information to add to their safety handbook. It also sets the stage for a possible series of service learning activities.

CONTENT STANDARDS:

Science:  Safety
- **Doing Safety:** Students demonstrate the importance of safety by applying safety skills in all activities.
  - Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.

Health Education
- **Students comprehend concepts to health promotion and injury prevention.**
  - Implement ways to help others promote and protect their health.

Life Skills:  Complex Thinking
- **General Learner Outcome:** Students have the ability to be involved in complex thinking and problem solving.
  - Decision making: Identifies important and appropriate alternatives to be considered.

Life Skills:  Effective Communication
- **Students effectively use tools for communicating findings and information.**
  - Effectively communicates for a variety of purposes.
DRIVING QUESTION(S):

- What causes fires?
- What actions or non-actions of people create hazardous conditions?

MATERIALS:

- General Fire and Electrical Safety Guide (attached)

ACTIVITY PROCESS:

- Have students discuss practices and procedures that would apply to fire and electrical safety.
- Have them begin a list of those that they feel are important and should be included in their individual safety handbooks.
- Distribute the General Fire and Electrical Safety Guide to the students.
- Students are to use the guide to find other practices or procedures that they may have missed and to expand their lists.
- **Task 1:** Community Fire Safety Program
  - Invite a representative of the Fire Department to present students with information on fire safety.
  - Students should be prepared to ask questions in order to add to and/or improve their list of fire and electrical safety practices and procedures.
  - After the presentation, students should refine their fire and electrical safety list.
  - Divide students into groups of 3 and have the members of the groups share their lists with each other.
  - Each group, then, is to develop a fire and electrical inspection checklist.
  - Checklists are to be submitted to the teacher.
- **Task 2:** Fire Inspection Simulation
  - Assign each group an area on the school campus to inspect, with the approval of administration and the respective staff. (Example: Custodial storeroom, school supply room, cafeteria, athletic locker rooms, administration office, food services classroom, wood shop, etc.)
  - Schedule a date and time for the inspections to be made.
  - Groups are to use their safety checklist when inspecting the assigned area.
• Each group is to complete the inspection report: identifying the findings (noncompliance and compliance), and providing recommendations for remedying the noncompliance area. These reports are to be submitted to the teacher.
• Each student is to update or improve his/her fire and electrical safety list for inclusion into his/her safety handbook.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire needs three elements in order to burn: fuel, oxygen, heat.</td>
<td>Observation</td>
<td>Decision making</td>
</tr>
<tr>
<td>Preventing or extinguishing fires involves removing one or more of the three elements.</td>
<td></td>
<td>Communicating</td>
</tr>
<tr>
<td>Electrical equipment generally have protection devices (e.g., fuse, circuit breaker, wire receptacles).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carelessness and disorderliness create hazardous conditions.</td>
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</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** The “we are smarter than me” theme is used as students work in groups to improve their individual safety lists and to develop comprehensive inspection lists.

• **Information Sources:** In addition to the speaker and the attached general guidelines, students may benefit from further search on the Internet or in safety manuals.
COMPONENTS:

- **Product:** Collecting and compiling safety information become part of the student safety handbook. For this activity, the fire and electrical safety information will be used to develop an inspection checklist.

- **Student Learning Tasks:** Students have the opportunity to learn from the practitioner: the fire safety officer. They collect information to help them develop their own safety guidelines, but they must also convert that information into items that are observable through inspection of a facility.

- **Instructional Support:** Students are provided contact with a key community worker who is an expert in fire safety. As they collect information and work on their own safety lists, the teacher can provide instructional support by asking probing questions to get the students to be more comprehensive, to seek accuracy, and to look for viable alternatives.

ASSESSMENT: Samples are attached.

- **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

- **Product Outcomes:** The group inspection checklists may be submitted to the community fire safety specialist for review/reaction. The inspection reports may likewise be shared with the specialist. Good reports may indicate the appropriateness of those students working at the fire department/station and developing activities as part of (or in support of) the fire department’s community awareness program (e.g., Fire Prevention Week activities).

NOTES:
As important as these safety areas are, students in high school are provided the information only if they enroll in particular courses. The activity as designed may be integrated into almost an course from Leadership Training to Social Studies.
Having the students work closely with a community worker such as a fire safety officer is another career development effort. An extension of this activity can be a service learning assignment, as noted earlier.

**RESOURCES:**

Food: Just Grow It!  KEEP IT CLEAN
ASSESSMENT RUBRICS:  Samples

PRODUCT OUTCOMES:

Checklist:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The checklist is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided is clear and easy to use in the inspection.</td>
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<tr>
<td>3. The checklist reflects high standards of quality.</td>
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<tr>
<td>4. The checklist has the potential to be useful in other facilities such as the home.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains fire and electrical safety and the indicators of potential hazards.

  4  Demonstrates a thorough understanding of the primary fire and electrical safety practices and procedures. Is able to explain conditions that pose a hazard.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about fires and electrical safety and indicators of hazards.
PROCESS OUTCOMES:
Observation rating:

- **Student identifies important and appropriate alternatives to be considered.**

  4  Presents a comprehensive list of the most important possible alternatives and describes each in detail.

  3  Identifies alternatives that represent most of the important possible alternatives.

  2  Identifies some alternatives that are important and others that are not.

  1  Selects alternatives that are clearly not relevant to the decision or action.

- **Student effectively communicates for a variety of purposes.**

  4  Clearly communicates a purpose in a highly creative and insightful manner.

  3  Uses effective techniques to communicate a clear purpose.

  2  Demonstrates an attempt to communicate for a specific purpose but makes significant errors or omissions.

  1  Demonstrates no central purpose in the communication or makes no attempt to articulate a purpose.
Self Assessment:

- I identify important and useful choices for my decision-making task.

  4  I identify all the important and useful choices for my task and describe them in detail.

  3  I identify and describe the most important and useful choices for my decision-making task.

  2  I identify some choices that are important and useful to the task, but I also identify some that are not very important or useful.

  1  I identify choices that are not at all important or useful for the decision-making task.

- I communicate well for different purposes.

  4  I clearly explain the purpose of my communication by selecting and using very effective and original methods. My explanation goes beyond just stating the purpose; it adds meaning to the information I am communicating.

  3  I clearly explain the purpose of my communication by selecting and using effective methods.

  2  I try to explain the purpose of my communication, but I make errors in the explanation or leave out information that would make it clear.

  1  I do not try to explain the purpose of my communication or I don’t really have a clear purpose.
GENERAL FIRE AND ELECTRICAL SAFETY GUIDE

Fire Safety

• Fire needs three elements in order to burn:
  - **Fuel** - wood, grease, paper, rubber, plastic, cloth, hair
  - **Oxygen** - air
  - **Heat** - the fuel has to be hot enough to flame or smolder

• Fire will be extinguished if any one of the three elements is removed.
  - **Remove Fuel** - Let the fire burn all the fuel; stop the flow of flammable liquids; remove burnable materials from the path of the fire or wet them.
  - **Remove Heat** - Water and carbon dioxide extinguishers put out a fire by cooling it. Water turns to steam, which smothers the fire.
  - **Remove Oxygen** - Carbon dioxide (CO₂) extinguishers put out a fire by cooling and replacing the oxygen with carbon dioxide, smothering it.

    Dry chemical extinguishers put out a fire by smothering it.

    Gas extinguishers (Halon) robs oxygen out of the air by combining with it chemically.

• Some fires (Class D) require carbon dioxide or nitrogen instead of oxygen. The purple K (a potassium-based dry powder) breaks the chemical reaction that allows metals to burn. Using carbon dioxide on this kind of fire will make it burn faster and hotter.

• The type of fire will determine the type of fire extinguisher needed to put out the fire.
  - **Class A** - Fires that occur in ordinary combustible materials such as paper, wood, rags, rubber, plastics, chemicals.
• **Class B** - Fires that occur with flammable liquids such as gasoline, oil, grease, paint, and solvent.

  Note: Ammonium nitrate fertilizer is combustible. If it is stored too long or comes into contact with acid or oil, it can burn.

• **Class C** - Fires that occur in or near electrical equipment such as motors, air-conditioning and electric heating units, computers, and electrical wiring.

• **Class D** - Fires that occur with combustible metals such as iron dust and fine particles suspended in air, magnesium, and sodium.

  Note: Volkswagen engines contain magnesium and create a Class D fire when they burn. In your school and work, it is unlikely that you will be confronted with Class D fires.

• Fire extinguishers stop fires on specific types of burning material and are classified according to the material. The right extinguisher must be used or it might multiply the hazard.

<table>
<thead>
<tr>
<th>Kind of Fire</th>
<th>Approved Types of Extinguisher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td><strong>CLASS A:</strong></td>
<td></td>
</tr>
<tr>
<td>Ordinary Combustibles</td>
<td>X</td>
</tr>
<tr>
<td><strong>CLASS B:</strong></td>
<td></td>
</tr>
<tr>
<td>Flammable Liquids, Grease</td>
<td>X</td>
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<tr>
<td><strong>CLASS C:</strong></td>
<td></td>
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<tr>
<td>Electrical Equipment</td>
<td>X</td>
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<tr>
<td><strong>CLASS D:</strong></td>
<td></td>
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<tr>
<td>Combustible Metals</td>
<td></td>
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</tbody>
</table>

Food: Just Grow It! KEEP IT CLEAN 364
• Action must be taken immediately in the face of a fire.

  • First step: Determine the correct response. Ask yourself, "What’s burning? Can I put it out? If I can, what’s the best way?"
  • Sometimes the best response is to get out.
  • Call for help.
  • When plastic burns, it releases highly poisonous fumes. Leave immediately and get up wind of the smoke.
  • If your clothes catch on fire, DO NOT RUN! Keep in control.

    • STOP where you are.

    • DROP to the ground.

    • ROLL until you smother the flames.

  • Use a blanket or coat or other non-nylon, non-plastic fabric to help smother flames on someone else.
**Electrical Safety**

- **Definitions:**
  
  - **Voltage** - A term used to describe the pressure of electricity.
    
    *Note: Voltage is expressed in volts, the basic unit of electromotive (electrical + motion) force. Common voltages are 120 and 240; or it can be said that an electrical circuit will furnish 120 volts or 240 volts.*

  - **Amp (ampere)** - Term used to describe the amount, or strength, of electrical flow through a circuit.
    
    *Note: Tools normally rate between 2 and 40 amps. The amperage is always listed on the label.*

  - **Watt** - Term used to describe the rate of electrical output.

  - **Short** - A disruption in the flow of electricity so that only a part or none of the current gets through the circuit.
    
    *Note: A short can cause the circuit to burn out and can cause sparks and a fire.*

- **Voltage Applications:**
  
  - 120 v - used for small hand tools and equipment such as edgers, trimmers, shears, and small mowers.

  - 240 v - used to run one-half horse power and larger motors and electrical heaters.

- **Electrical Protection Devices**
  
  - **Fuse** - A wire or strip of easily-melted metal placed in a circuit as a safeguard; when the current becomes too strong, the metal melts, breaking the circuit.

  - **Circuit breaker** - switch-type mechanism that automatically interrupts the flow of electricity when the flow becomes excessive.
Note: When a circuit breaker "trips," the breaker should not be reset until after the source of overload has been fixed and the breaker has cooled.

- **Bimetal thermal protector** - a devise built into an electric motor that automatically interrupts an electric circuit if a short occurs or if the motor overheats.

- **Wire receptacles** - designed for specific use and includes grounding.
  - 120 v - 15 amps
  - 120 v - 20 amps
  - 240 v - 30 amps

- **Electrical Safety Rules**

  - Always make sure power is disconnected before adjusting or servicing an electrical motor or tool.

  - Always service and use electrical equipment in a dry area.

  - Always use approved wiring practices.
    
    *Note: If a hand tool has a three-wire plug, always use a three-wire adapter. Never remove the third prong from a three wire plug.*

  - Always use insulated tools and wear protective clothing when working on wiring (insulated rubber boots and gloves, eye protection).

  - Always have an approved fire extinguisher nearby when working with electrical equipment or tools.
ACTIVITY NAME: "... CIDE" SAFELY?

Subject Area(s): AGRICULTURE, SCIENCE

Duration: One week

PROJECT SUMMARY:
This activity follows the same format as ONE-TWO-THREE FIRE! The focus, however, is on Chemical Safety as related to agriculture. Every science class already addresses chemical safety in the laboratory safety procedures.

CONTENT STANDARDS:

Science: Safety
• Doing Safety: Students demonstrate the importance of safety by applying safety skills in all activities.
  • Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented.

Health Education
• Students comprehend concepts to health promotion and injury prevention.
  • Implement ways to help others promote and protect their health.

Life Skills: Complex Thinking
• General Learner Outcome: Students have the ability to be involved in complex thinking and problem solving.
  • Decision making: Identifies important and appropriate alternatives to be considered.

Life Skills: Effective Communication
• Students effectively use tools for communicating findings and information.
  • Effectively communicates for a variety of purposes

DRIVING QUESTION(S):
• What are chemicals used for in the environment?
• What effects do the chemicals have on the environment?
• What are the reasons for the increasing controls on the use and disposal of chemicals in the environment?

**MATERIALS:**

• *Chemical Safety Guide* (attached)

**ACTIVITY PROCESS:**

• Have students discuss practices and procedures that would apply to chemical safety.
• Have students review the results of their study of “...cides.”
• Have them begin a list of practices that they feel are important when dealing with chemicals and should be included in their individual safety handbooks.
• Distribute the *Chemical Safety Guide* to the students.
• Students are to use the guide to find other practices or procedures that they may have missed and to expand their lists.
• **Task 1:** Chemical Safety Specialists
  • Invite representatives of the EPA, UH Hazardous Waste Control, CTAHR, and Dept. of Agriculture to present students with information on chemical safety.
  • Students should be prepared to ask questions in order to add to and/or improve their list of chemical safety practices and procedures. Have students develop questions that reflect on the consequences of chemical use in the environment, the reasons for user-certification and control, and the regulating of disposal.
  • After the presentation, students should refine their safety lists.
  • Divide students into groups of 3 and have the members of the groups share their lists with each other.
  • Each group, then, is to develop a chemical inspection checklist.
  • Checklists are to be submitted to the teacher.
• **Task 2:** Chemical Safety Inspection Simulation
  • Assign each group an area on the school campus to inspect, with the approval of administration and the respective staff. (Example: Custodial storeroom, school supply room, science laboratories, automotive shop, wood shop, art/ceramics classroom, etc.).
  • Schedule a date and time for the inspections to be made.
  • Groups are to use their safety checklist when inspecting the assigned area.
• Each group is to complete the inspection report: identifying the findings (noncompliance and compliance), and providing recommendations for remedying the noncompliance area. These reports are to be submitted to the teacher.
• Each student is to update or improve his/her chemical safety list for inclusion into his/her safety handbook.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of chemicals in the environment has come under increased control.</td>
<td>Observation</td>
<td>Decision making</td>
</tr>
<tr>
<td>The extent of control is proportionate to the known level of toxicity (the capacity of a substance to produce injury).</td>
<td></td>
<td>Communicating</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

• **Grouping:** The “we are smarter than me” theme is used as students work in groups to improve their individual safety lists and to develop comprehensive inspection lists.

• **Information Sources:** In addition to the speakers and the attached general guidelines, students may benefit from further search on the Internet or in safety manuals.

**COMPONENTS:**

• **Product:** Collecting and compiling safety information become part of the student safety handbook. For this activity, the chemical safety information will be used to develop an inspection checklist.
• **Student Learning Tasks:** Students have the opportunity to learn from the practitioners: the regulator, potential user, certifier. They collect information to help them develop their own safety guidelines, but they must also convert that information into items that are observable through inspection of a facility.

• **Instructional Support:** Students are provided contact with key community workers who are experts in chemical safety. As they collect information and work on their own safety lists, the teacher can provide instructional support by asking probing questions to get the students to be more comprehensive, to seek accuracy, and to look for viable alternatives.

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual and group assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

• **Product Outcomes:** The group inspection checklists may be submitted to the community fire safety specialist for review/reaction. The inspection reports may likewise be shared with the specialist.

**NOTES:**
As important as these safety areas are, students in high school are provided the information only if they enroll in particular courses. The activity as designed may be integrated into almost an course from Leadership Training to Social Studies.

Having the students work closely with a community worker such as an University extension staff member is another career development effort.

Extensions of this activity may be planned with topics such as hydrologic cycle and water quality, environmental protection issues, historical investigation of past practices and current/future consequences, etc.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Checklist:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The checklist is comprehensive and accurate.</td>
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<tr>
<td>2. The information provided is clear and easy to use in the inspection.</td>
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<tr>
<td>3. The checklist reflects high standards of quality.</td>
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<td></td>
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</tr>
<tr>
<td>4. The checklist has the potential to be useful in other facilities such as the home.</td>
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</tr>
</tbody>
</table>

Content Knowledge:

- **Student explains chemical safety and the indicators of potential hazards.**

  4  Demonstrates a thorough understanding of the primary chemical safety practices and procedures. Is able to explain conditions that pose a hazard.

  3  Displays a complete and accurate understanding specific to the activity.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about chemical safety and indicators of hazards.
PROCESS OUTCOMES:
Observation rating:

- **Student identifies important and appropriate alternatives to be considered.**
  
  4  Presents a comprehensive list of the most important possible alternatives and describes each in detail.
  
  3  Identifies alternatives that represent most of the important possible alternatives.
  
  2  Identifies some alternatives that are important and others that are not.
  
  1  Selects alternatives that are clearly not relevant to the decision or action.

- **Student effectively communicates for a variety of purposes.**
  
  4  Clearly communicates a purpose in a highly creative and insightful manner.
  
  3  Uses effective techniques to communicate a clear purpose.
  
  2  Demonstrates an attempt to communicate for a specific purpose but makes significant errors or omissions.
  
  1  Demonstrates no central purpose in the communication or makes no attempt to articulate a purpose.
Self Assessment:

• I identify important and useful choices for my decision-making task.

  4 I identify all the important and useful choices for my task and describe them in detail.

  3 I identify and describe the most important and useful choices for my decision-making task.

  2 I identify some choices that are important and useful to the task, but I also identify some that are not very important or useful.

  1 I identify choices that are not at all important or useful for the decision-making task.

• I communicate well for different purposes.

  4 I clearly explain the purpose of my communication by selecting and using very effective and original methods. My explanation goes beyond just stating the purpose; it adds meaning to the information I am communicating.

  3 I clearly explain the purpose of my communication by selecting and using effective methods.

  2 I try to explain the purpose of my communication, but I make errors in the explanation or leave out information that would make it clear.

  1 I do not try to explain the purpose of my communication or I don’t really have a clear purpose.
CHEMICAL SAFETY

• Restricted Use Pesticide

A pesticide designated by EPA that is available for purchase and use only by certified pesticide applicators or persons under their direct supervision, and only for those uses covered by the Certified Applicator’s Certification.

This group of pesticides is not available for use by the general public because of the very high toxicities and/or environmental hazards associated with these materials.

• Chemical Safety Precautions

• Follow all directions on the label.

Chemical application can be dangerous. Misuse can cause personal injury and kill nonthreatening animals, or beneficial insects and soil microorganisms. Some chemicals are effective only when applied within the temperature range listed on the label.

• Do not spray outdoors on windy days.

Drift wastes chemicals and can harm other plants. If a light breeze comes up, apply chemicals from the windward side of the area being treated. The breeze will blow the chemical away from you, not on to you.

• Spray chemicals away from animals and humans.

Even if people or animals are not in the immediate area, drift can expose them to toxic materials.

• Do not apply chemicals near water sources, nor near rainfall or irrigation runoff.

Pollution from chemical controls can kill fish and poison the water supply. Runoff carries chemicals from hillsides to small creeks and streams, and on to larger bodies of water.
• Check label for reentry and harvest regulations.
  If the label reads, "Reentry 8 days," workers must wear protective clothing and equipment, stay out of the field, or must not come into contact with treated foliage for that period. Reentry time may be as short as 2 days or as long as 30 or more days.

• Mix chemicals outdoors or in a well-ventilated area.
  Poisoning, asphyxiation, brain or skin damage can occur as a result of breathing chemical fumes.

• Avoid pressure-release fumes or contact with the material.
  When opening containers, lean body and face away from the container.

• Use the proper amount of chemical.
  Overapplication can harm or burn crops; underapplication is ineffective.

• Do not mix chemicals unless allowed by label directions.
  Some chemicals will cancel the effects of others; chemical reactions can burn or harm plants, animals, and beneficial insects.

• Keep records of all injuries.
  Written records of chemically-related injuries can reveal patterns that indicate the individual should avoid those specific chemicals. Individuals may react to certain chemicals.

• Provide proper storage.
  State and federal regulations govern proper storage. Proper storage will also help avoid contamination and spoilage.

• Personal Safety Precautions for Handling Chemicals

  • Wear protective clothing as needed.
    • Waterproof apron
    • Raincoat
    • Goggles
• Respirator
• Coveralls or long-sleeve shirt and heavy pants
• Unlined neoprene gloves
• Wide brim, waterproof hat
• Rubber bands around ankles
• Unlined neoprene boots

• Never eat, drink, or smoke while handling chemicals.

• Wash all exposed body surfaces with soap and water immediately after handling chemicals.

• If chemicals are spilled onto clothing, remove clothing immediately and wash exposed skin with soap and water. Dispose of contaminated clothing.

• Avoid inhaling sprays, dusts, or vapors.

• If chemical gets into eyes, flush eyes with water for 10-15 minutes and get medical attention.

• If chemicals are accidentally swallowed get immediate medical attention or call a poison control center; have chemical label by the phone or take the label to the doctor or hospital.

• If illness or other reaction occurs shortly after chemical use, get immediate medical attention or call a poison control center; have chemical label by the phone or take it to the doctor or hospital.

• Toxicity Definitions

• **Acute Toxicity** - How poisonous a chemical is after one exposure. Acute poisoning can occur after a single small or large exposure. Symptoms develop quickly, within a few minutes or within a few hours.

• **Chronic or Cumulative Toxicity** - How poisonous a chemical is after repeated exposure to small doses. Chronic poisoning occurs over a period of time. Symptoms appear within a week or toxic buildup can take many years before symptoms appear.
• **Oral Toxicity** - Poisoning in or through the mouth.
  
  *Note: Not necessarily eating or drinking pesticides or herbicides. But pesticides on hands can get into the body’s system through the mouth.*

• **Dermal Toxicity** - Poisoning on or through the skin.
  
  *Note: Pesticides and other poisons can be absorbed into the body through the skin whenever the chemical comes in contact with the body. Chemicals splash or drip onto the skin or clothing are risks.*

• **Inhalation Toxicity** - Poisoning by breathing in fumes or particles.
  
  *Note: This is especially dangerous because the toxin goes to the lungs, is carried directly into the bloodstream, and then goes to the brain. Fumes or vapors may not have a smell.*

• **Symptoms of Pesticide Poisoning**

  • **Mild Poisoning** - Irritation of the skin, nose, throat, and eyes; weakness, dizziness, headache, nausea, diarrhea.

  • **Moderate Poisoning** - Difficult breathing, blurred vision, rapid pulse, flushed skin, stomach cramps, vomiting, muscle twitches, poor muscle coordination, constricted pupils.

  • **Severe Poisoning** - Convulsions, loss of consciousness, secretions from nose and mouth, inability to breathe, often accompanied by fever; may be fatal.
ACTIVITY NAME: BOOK IT, TOO!

Subject Area(s): AGRICULTURE, SCIENCE, FOOD SCIENCE, LANGUAGE ARTS, GRAPHIC ARTS, BUSINESS

Duration: Two weeks (may overlap with other activities)

PROJECT SUMMARY:
Students create safety guidelines for different areas or functions. The guidelines have the benefit of information made available by many community experts. Students develop the guidelines so they will be most meaningful and useful to themselves. This activity is to compile all the guidelines into a handbook for each student.

CONTENT STANDARDS:

Health Education: Health Advocacy
• Students advocate for personal, family, and community health.
  • Develop a plan for persuading others to make healthful choices.*
  • Design a health advocacy campaign.
  • Defend a position which encourages a health enhancing behavior.
  • Evaluate effectiveness of strategies in communicating health information and ideas.

Career and Life Skills: Skills for Life and Work
• Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  • Managing Resources: Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Educational Technology: Technology as a Tool For Productivity
• Students use technology tools to enhance learning, increase productivity, and promote creativity. Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.
  • Use technology tools and resources for managing and communicating information in situations individuals encounter in the world of work.
Life Skills: Habits of Mind
- Controls own behavior and thought processes.
  - Makes effective plans.
  - Is aware of and uses necessary resources.

Life Skills: Effective Communication
- Students effectively use tools for communicating information about what they learned.
  - Effectively communicates for a variety of purposes.

DRIVING QUESTION(S):
- How do we organize the safety information we have acquired?
- What are elements that make a handbook useful?

MATERIALS:
- Computer access for development of the handbook

ACTIVITY PROCESS:
- **Task 1:** Planning to “Book It, Too”
  - Provide students with various samples of handbooks.
  - Have students identify the primary organization for their handbook (ideas may differ):
    - Each student should select the binding or folder type and format.
  - In planning, the students should agree on some major points such as:
    - What is the purpose of our handbook?
    - What shall the title be?
    - Who will review it besides the teacher?
    - How will I use it?
  - Have students draft out the order of the contents and identify sections that must still be written (e.g., Introduction, Index).
  - Identify students who need help on the computer and schedule accordingly.
• **Task 2: Giving a Hand**
  - The completed handbook should meet high standards of quality and comprehensiveness. Ease of use and appeal are also good criteria to use.
  - Have a display of the students' handbooks in the Library, administration office, or classroom.
  - Invite the community resource people to a celebration of the efforts.

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety guidelines should be reviewed periodically.</td>
<td>Organization and Production</td>
<td>Planning and Managing Resources</td>
</tr>
<tr>
<td>A handbook can be useful for reference.</td>
<td></td>
<td>Communicating Effectively</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

- **Grouping:** The development and finalization of the handbook is an individual activity. But students will benefit from discussing and sharing ideas.

- **Information Sources:** Resource persons, reference books, or sample handbooks may be made available to the students.

**COMPONENTS:**

- **Product:** The primary product of this activity is a handbook that compiles all the important safety information and procedures acquired by the students.

- **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  - Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  - Advocacy: Identifying the worthiness of disseminating safety guidelines; determining values to be accrued by different audiences; having a sense of
“service” as an outcome of the learning experience where they may be able to share what they have learned.

- **Instructional Support:** The activity can be supported by providing feedback to students throughout the process.
- How can the process be simplified?
- Who else might be interested in your handbook?
- Who needs the help or could benefit from what you are working on?

**ASSESSMENT:** Samples are attached.

- **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the individuals as they engage in completing the project.

- **Product Outcomes:** The criteria such as time, cost, production process, and quality of product should be shared with the students before the project starts. The assessment of success in this activity is the completion of the handbook within the given criteria and the extent of acceptance.

**NOTES:**
The possibilities of this activity are embedded in the concepts of health advocacy, career exploration, and service learning. It is hoped that teachers will work together toward elaborating on each since safety is a very important topic.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Handbook:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The book is comprehensive, accurate, and attractive.</td>
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<tr>
<td>2. The information provided shows health and safety consciousness.</td>
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<td></td>
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<tr>
<td>3. The handbook reflects high standards of quality.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Illustrations and other additions make the book clear and easy to understand.</td>
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</tbody>
</table>

Content Knowledge:

- **Student explains the safety guidelines and the organizational logic.**
  
  - **4** Demonstrates a thorough understanding of the different factors and processes contributing to the product. Is able to explain problems encountered and solutions.
  
  - **3** Displays a complete and accurate understanding specific to the activity.
  
  - **2** Displays an incomplete understanding of the activity and has some notable misconceptions.
  
  - **1** Demonstrates severe misconceptions about the contents and purpose of the handbook.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student is aware of and uses necessary resources.**

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.
Self Assessment:

- I plan carefully before I begin my project.

  4 I set clear goals and describe each step I must take to finish my handbook. I make a detailed schedule for each step and follow the schedule.

  3 I set clear goals and describe some steps I must take to finish my handbook. I make and use a schedule.

  2 I begin working with only unclear goals. I describe few of the steps I must take to do my handbook and I make an incomplete schedule.

  1 I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I am aware of available resources that could help me complete a task.

  4 I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.

  3 I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.

  2 I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.

  1 As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
“It’s the Dirt”

INTRODUCTION:

The activities in this thematic unit use the context of plants and horticulture as the means toward improved physical and mental health of individuals. Although these are isolated and simple activities, they may suggest other ways that teachers can integrate the therapeutic value of growing and appreciating plants into their lessons.

CONTENT STANDARDS:

The primary content standards are from Health and Career and Life Skills. At the same there are content standards that tacitly guide the development of concepts and ideas. Collectively, the activities seek to address the following:

**Health Education**
- Students practice health-enhancing behaviors and reduce health risks.
- Students advocate for personal, family, and community health.

**Science**
- Habits of Mind: Living the Values, Attitudes and Commitments of the Inquiring Mind. Students apply the values, attitudes and commitments characteristics of an inquiring mind.

**Social Studies**
- Cultural Anthropology: Cultural Diversity and Unity. Understand and respect the myriad of ways that society addresses human needs and wants.

**Career and Life Skills**
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work and at home: thinking and reasoning skills, personal qualities, skills for managing resources, interpersonal skills, skills for managing information, and skills and knowledge related to systems.

LIFE SKILLS:

As a therapeutic tool, horticultural activities support the total development of individuals. The life skills focus for these activities is on the development of Habits of Mind. More specifically, the standards and the performance indicators selected include:
Awareness of Own Thinking
• Students explain the sequence of thoughts used when facing a task or problem.

Evaluation of Effectiveness of Own Actions
• Students are sensitive to variety of feedback. They respond and adjust when correction is needed and listen to the advice of others.

Restraint of Impulsivity
• Students consider a situation carefully to determine if more study is required before acting.

Engagement in Tasks
• Students show determination in the pursuit of solutions, using strategies to keep on track.

CONCEPTS:

Plants and the growing of plants are used to support or reinforce therapeutic concepts such as:

• Plants are fascinating!
• Sensitivity to one’s surroundings increases one’s ability to observe and perceive details.
• Working together requires respect, cooperation, and sharing of responsibility.
• Pride in completing a project can lead to improved confidence and self esteem.
• Horticulture provides opportunities for creativity and self expression.
ACTIVITY NAME:  UP-SIDE-DOWN-SIDE-UP

Subject Area(s):  SCIENCE, AGRICULTURE, WORK PLACE READINESS

Duration:  Three class periods

PROJECT SUMMARY:
Students observe the wonder of plants: roots always grow downward toward water and stems grow upward toward light.

CONTENT STANDARDS:

Science:  Science as Inquiry
- Doing Scientific Inquiry:  Students demonstrate the skills necessary to engage in scientific inquiry.
  - Design and conduct simple investigations to answer their questions or to test their ideas about the environment.*

Career and Life Skills:  Skills for Life and Work
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  - Use the elements of reasoning to present or analyze an argument or point of view.*

Life Skills:  Habits of Mind
- Students control their own behavior, even their own thought processes, by using effective habits of mind.
  - Is aware of own thinking.
  - Restrains impulsivity.

DRIVING QUESTION(S):
- What happens when seeds grow?
- Which way do roots grow? Why?
- Which way do stems grow? Why?
**MATERIALS:**

- Dried lima beans
- Two pieces of glass (about 4 inches square)
- One piece of blotter paper
- String
- One dish of water

**ACTIVITY PROCESS:**

- **Task 1:** Growing
  - Soak the lima beans overnight.
  - Place the blotter on one piece of glass and place the beans on the blotter.
  - Cover the blotter and beans with the other piece of glass and tie the two pieces of glass together.
  - Place the tied glasses upright in the dish of water.
  - Ask the students to predict what will happen. (They may write out their prediction or do a sketch/drawing.)
  - Leave the dish in a sunny spot.
  - Collect or post the students predictions on the bulletin board.
  - After a few days, have the students evaluate their predictions and discuss what they observe and the possible reason(s) for the result.

- **Task 2:** Turning
  - Turn the glass so that the roots are pointing upward and place this "miniature" garden in the dish again.
  - Ask the students to predict what will happen this time. Collect the predictions.
  - Leave the dish in a sunny spot for a few days.
  - Once again have the students evaluate their predictions and discuss what they observe and the possible reason(s) for the result.
  - If the students are ready, have them agree on a conclusion statement.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The roots of a plant always grow downward toward water from which they draw food.</td>
<td>• Prediction</td>
<td>• Self Regulation</td>
</tr>
<tr>
<td>• The stems of plants grow upward toward the light, which the leaves need for manufacturing food.</td>
<td>• Observation</td>
<td>• Critical Thinking</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** This activity assumes that the class size is relatively small and that the discussions and facilitation thinking will be manageable. It may be conducted so that discussions and predictions are done in groups. However, in groups it will be important to insure that every student’s prediction is recorded, as well as the formulation of a group prediction.

• **Metacognition:** Students are asked to discuss their prediction in view of the actual result. They are helped to “think back” to see how they arrived at their prediction. As they do this and they acquire additional information, they should be helped in “thinking forward” again, but this time the prediction should be more thoughtful.

COMPONENTS:

• **Product:** This activity has a product that is shared with the students: the growing seeds. More important than the product in this activity are the thinking and observation processes that the students engage in.

• **Student Learning Tasks:** The students are guided in their observation, and thinking about what they already know, and are asked to verbalize a prediction. The activity has the students recycle through the processes a second time; each time they are asked to review their prediction in view of the result. Opportunities to think, verbalize, and assess one’s ideas may significantly curb impulsivity. Developing a conclusion or generalization at the end of the activity is the capstone.
• **Instructional Support:** Instructional support will be in the form of questions, probes to have students think:
  • What do you think will happen? Why?
  • What are the important things to the seeds?
  • What will happen if...?
  • What do you think happens to seeds when they are in the ground?

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the individuals as they engage in predicting and discussing their predictions.

• **Product Outcomes:** The predictions (written or drawn) may be considered products of this activity. The students may want to celebrate their “correct” predictions by having their work posted.

**NOTES:**

This simple demonstration illustrates the facts that roots grow downward toward water and stems grow upward toward the sun, to meet their respective needs. Depending on the students, this activity may be extended into more in depth study of plant growth and concepts such as photosynthesis. The notions of stimulus (gravity) and tropism may be discussed if students start raising “How come” questions.

The main point of this demonstration is to show how wonderful and fascinating plants and their growth can be. For students wanting to continue the lima bean growths, have them pot the growing seeds.
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Predictions:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The prediction was clearly presented (written or drawn).</td>
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<tr>
<td>2. The prediction showed careful thought.</td>
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<tr>
<td>3. The written or visual product was done with pride.</td>
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<tr>
<td>4. Explanation of how the prediction was arrived at showed logical thinking.</td>
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<tr>
<td>5. The results validated the prediction and led to a viable conclusion.</td>
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</tbody>
</table>

Content Knowledge:

- Student describes the directional growths of roots and stems and provides a clear explanation about them.

  4 Demonstrates a clear understanding of how roots and stems grow and how they relate to water and sun.

  3 Displays a complete and accurate understanding specific to the project.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about how roots and stems grow.
PROCESS OUTCOMES:
Observation rating:

- **Student is aware of own thinking.**

  4  Explains in detail the sequence of thoughts he/she used when facing a task or problem. Provides a detailed analysis of how an awareness of his/her own thinking has enhanced performance.

  3  Describes how he/she thought through a task or problem. Provides some ideas about how an awareness of his/her own thinking has enhanced performance.

  2  Provides a vague or incomplete description of how he/she thought through a task or problem. Provides only few ideas about how an awareness of his/her own thinking has enhanced performance.

  1  Provides a confusing report of the thinking he/she used in completing a task or problem. Cannot describe how performance has been improved.

- **Student restrains impulsivity.**

  4  Carefully considers a situation to determine if more study is required before acting. When further study is required, investigates thoroughly before acting.

  3  Considers whether more study is required before acting. When further study is required, gathers sufficient information before acting.

  2  Cursorily considers whether more study is required before acting. When further study is required, does not gather sufficient information.

  1  Does not consider whether more study is required before acting.
Self Assessment:

- I am aware of my own thinking.

  4 I make clear, general conclusions from the specific pieces of information or observations; the conclusions make sense and show that I understand how to think about and combine specific information and observations to come to interesting general conclusions.

  3 I make general conclusions from the specific pieces of information or observations; the conclusions generally show I have used the information or observations in a way that makes sense.

  2 I make conclusions from the specific pieces of information or observations and describe how I used the information, but some conclusions and descriptions don’t make sense.

  1 I make conclusions that don’t make sense, and I can’t really describe how I used the information and observations.

- I use a variety of methods and resources when gathering information for my task.

  4 I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don’t think of or don’t know about. My methods are unusual but effective.

  3 I use important information resources and useful methods when I gather information for my activity.

  2 I miss some important information resources and fail to use some of the best methods when I gather information for my activity.

  1 I do not use important information resources or the best methods when I gather information for my activity.
ACTIVITY NAME: SCENTS AND SENSES

Subject Area(s): SCIENCE, AGRICULTURE, WORKPLACE READINESS

Duration: One - two class periods

PROJECT SUMMARY:

Students use their senses to describe characteristics of selected plants. The students begin to make connections between certain characteristics and their functions in the plant world. Those students who already know some of the relationships have the opportunity to share and get validation of what they learned before.

CONTENT STANDARDS:

Science: Science as Inquiry
• Doing Scientific Inquiry: Students demonstrate the skills necessary to engage in scientific inquiry.
  • Generate ideas, questions, and/or predictions about objects, organisms, events, places, and/or relationships in the environment.

Life Skills: Habits of Mind
• Students control their own behavior, even their own thought processes, by using effective habits of mind.
  • Engages intensely in tasks even when answers or solutions are not immediately apparent.

Life Skills: Information Processing
• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
  • Effectively uses a variety of information-gathering techniques and information resources.

DRIVING QUESTION(S):
• What characteristics do plants have?
• What function or role does each of these characteristics play in the survival of the plant?

**MATERIALS:**

- Small brown paper bags
- Tape
- A variety of plant parts with distinct smell or feel (Examples: petals of different kinds of roses, pakalana blossoms, lang lang blossoms, semi-dried ripe noni, rosemary sprig, basil leaves, parts of breadfruit leaf, oregano leaf, wild ilima leaf, etc.)
- The actual plants or pictures of the plants being used

**ACTIVITY PROCESS:**

• **Task 1:** Preparation (by teacher)
  - Place the plant parts, individually, into the brown bags and label with a letter or code.
  - Tape the opening so that the space remaining is:
    - Large enough for a hand to fit through (for items that need to be felt).
    - Small enough for the odor to waft through without allowing touching.

• **Task 2:** Sensing
  - Students are to smell or feel the contents of the brown bags.
  - Have them describe in writing or by sketching what they think is in the bag.
  - Have students share their guess before opening each bag.
  - Discuss the relationship between the characteristic(s) observed and the survival of the plant.

• **Task 3:** Expanding
  - Create a list of characteristics, beginning with those that the students “sensed.”
  - Have students identify other characteristics of plants (e.g., thorns).
  - Let students select one of the characteristics. They are to find a plant with that characteristic, learn about it, and share what they learned with the whole class.
**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plants have various characteristics that serve to enhance their survival.</td>
<td>• Observing</td>
<td>• Oral communication</td>
</tr>
<tr>
<td>• Many of the plant characteristics are means to overcome their immobility.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

**STRATEGIES:**

- **Grouping:** Students work independently in this activity. However, interacting and sharing ideas are important as they discuss characteristics and purposes.

- **Hands-on:** This activity is an example of “full-on” hands-on. Students are to use all their senses in learning about plants.

**COMPONENTS:**

- **Product:** This activity has a required report for each student to submit:
  - Describing the selected characteristic of some plants (e.g., smell, fuzzy leaves, thorns, bright flowers, etc.)
  - Describing a plant that has this characteristic.
  (Note: The extensiveness/comprehensiveness of the report will depend on the students.)

**Student Learning Tasks:** Students are asked to use various senses and make observations. Both these processes are learning tasks because there are many students who do not have the skills or opportunities to do either.

- **Instructional Support:** Support to the students should include prompts or guide questions as they observe and formulate/articulate their observations. These may include the following:
  - What is it you are sensing? How would you describe it?
• What might it be? Have you ever smelled/felt anything like this before?
• Why do you think this characteristic is important?
• What other plants have this characteristic?

ASSESSMENT: Samples attached.

• Product Outcomes: The report that the students submit should demonstrate some information processing skills. Also, it should reflect an understanding of the relationships between the characteristics of plants and their survival.

• Process Outcomes: Individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate individuals as they engage in completing the project. Students may also be asked to do a self-assessment.

NOTES:

Part of using plants as a therapeutic tool is the improvement of mental health and, in particular, intellectual development. This activity tries to arouse the students' sense of curiosity. It seeks to increase their skills in observation using various senses.

A characteristic such as smell may be assumed by the students as an attribute of flowers (e.g., sweet-smelling). This activity enables the teacher to take the students to the next step: the purpose of the smell. In the case of a sweet smell, the function of attracting should surface. Besides being attractive to people, the smell serves as an attractant to pollinators. This can serve as the concept for development in another lesson.

But students' learning can be expanded by considering "stink" smells. Some flowers such as marigolds have smells that often serve to repel certain insects. Likewise, students' thinking can be expanded as they consider other characteristics such as large, smooth leaves. What kinds of plants have large, smooth leaves? Where do they grow? What are the weather conditions there? Now what about plants with soft, fuzzy leaves? Where do they grow?

The success of the students will certainly contribute to their overall wellness. In this activity, the use of plants and their characteristics is authentic, hands-on learning.
Facilitating learning through the study of a range of plant examples makes more complex thinking natural and relevant to the students.

**RESOURCES:**
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Report:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The report was comprehensive.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The presentation reflected high standards of quality.</td>
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<tr>
<td>4. Pictures and illustrations made the information interesting.</td>
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</table>

Content Knowledge:

- Student explains key characteristics of plants and their functions in helping the plant survive.

  4 Demonstrates a thorough understanding of how different characteristics help the plants to survive. Provides examples of plants with these characteristics.

  3 Displays a complete and accurate understanding specific to the project.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about the interrelationships between plant characteristics and its survival.
PROCESS OUTCOMES:
Observation rating:

- **Student engages intensely in tasks even when answers or solutions are not immediately apparent.**
  
  4  Demonstrates strong determination in the pursuit of a solution or answer. Monitors his/her level of involvement and develops a number of strategies to keep self on task.
  
  3  Shows determination in the pursuit of a solution or answer. Uses strategies to keep self on track.
  
  2  Makes some effort to resolve a difficult problem but does not spend sufficient time and effort on the problem. Is easily derailed and does not use strategies to keep self on task.
  
  1  Shows evidence of quitting the challenge early, before really trying to solve a problem.

- **Student effectively uses a variety of information-gathering techniques and information resources.**
  
  4  Uses the important information-gathering techniques and information resources necessary to complete the activity. Identifies little-known information resources or uses unique information-gathering techniques.
  
  3  Uses the important information-gathering techniques and information resources necessary to complete the activity.
  
  2  Fails to use some significant information-gathering techniques and resources.
  
  1  Fails to use the most important information-gathering techniques or information resources.
Self Assessment:

- **I work hard on tasks even when the answers or solutions are difficult to find.**
  4 I show that I will not give up, no matter how difficult it is to find the answers or solutions. I evaluate how hard I am trying and I use a variety of techniques to keep myself on task.
  3 I show that I don’t give up when I am trying to find the answers or solutions. I keep myself on task.
  2 I try to complete tasks when the answers or solutions are difficult, but I give up when I have to try too hard. I don’t have good techniques for keeping myself on task.
  1 I give up quickly on difficult tasks.

- **I use a variety of methods and resources when gathering information for my task.**
  4 I use important information resources and useful methods when I gather information for my activity. I even find resources that other people don’t think of or don’t know about. My methods are unusual but effective.
  3 I use important information resources and useful methods when I gather information for my activity.
  2 I miss some important information resources and fail to use some of the best methods when I gather information for my activity.
  1 I do not use important information resources or the best methods when I gather information for my activity.
ACTIVITY NAME: LOBBY A HOBBY

Subject Area(s): AGRICULTURE, WORKPLACE READINESS, FAMILY LIVING

Duration: Five class periods

PROJECT SUMMARY:
Students are provided the opportunity to enjoy the results of a horticultural hobbyist's efforts. The hobbyist(s) describes what is involved, the benefits and pleasure derived from the hobby, and how the hobby started.

CONTENT STANDARDS:

Science: Understanding Ourselves and the World Around Us
• Wellness: Students appraise the relationships between their bodily functions and their physical and mental well-being.
  • Explain how experiences affect a person's mental well-being.

Health Education:
• Students analyze the influences of media, culture, technology, and other factors to enhance health.
  • Explain how internal and external factors influence health outcomes.

Life Skills: Habit of Mind
• Students control their own behavior, even their own thought processes, by using effective habits of mind.
  • Evaluates the effectiveness of own actions.

Life Skills: Collaboration/Cooperation
• General Learner Outcome: Students understand that it is essential for human beings to work together.
  • Works toward the achievement of group goals.

DRIVING QUESTION(S):
• What benefits does a person acquire from a hobby?
• What hobbies relate to plants and their growth?
MATERIALS:

- Examples of hobbyists' products (e.g., bouquet of flowers, bonsai, potted plant, seed leis, etc. (These products should come from individuals willing to serve as a guest speaker and/or places that will be open for students to visit. There may be situations where the person turned a hobby into a business.)

ACTIVITY PROCESS:

- Share the various products of the hobbyists. Have students share what they like about each.
- Divide the students into teams. Try to organize them by preference of hobby, if possible.
- **Task 1:** Getting to Know the Hobby
  - Have each team assign responsibilities to members, e.g.,
    - Interviewer (of the hobbyist)
    - Gatherer of information about the hobby (history, etc.)
    - Presentation facilitator
    - Writer
  - The team develops questions that they would like answered about the hobby and the hobbyist. For example:
    - Why do you enjoy your hobby? What made you take up this hobby?
    - How many people have this hobby?
    - What is involved? How do you get started?
    - Are there competitions or exhibits of the hobby results?
    - Is there a market for the products? Are there businesses?
  - The team may choose to divide up into smaller groups or pairs to collect information from the hobbyist (in person, by phone, or by email), doing research (library, Internet, classroom resources), and talking to other people.
  - Each team completes a preliminary report covering the hobbyist, the hobby, and the results or outcomes, including how people feel about it.
- **Task 2:** Hosting the Presentation or Visitation
  - Arrange for either the hobbyist coming to class to make a presentation/demonstration or taking the class out to the hobbyist’s location.
  - Each team will be responsible for introducing the hobbyist to the entire class and helping the hobbyist in making the presentation/demonstration.
• If the class will be going on-site, the responsible team should do a pre-visit with the hobbyist.
• At the end of the presentation, the facilitator of the team should ask if there are any questions from the class. If not, the facilitator will be responsible for thanking the hobbyist and closing the session.
• Have each team send an appreciation letter to the hobbyist.

• **Task 3:** Reporting
  • Have the members of each team work together to complete a report on the respective hobby.
  • Have the members address the question: Would you take up this hobby? Why?
  • The report will be a refinement of the preliminary report done earlier. It should be expanded to include a summary of the hobbyist presentation and pictures or illustrations, as appropriate.
  • Teams are to submit their reports to the teacher. If possible, the teams may choose to do a static display or multi-media presentation.

**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hobbies enable creativity and self expression.</td>
<td>• Information Collection</td>
<td>• Working in groups</td>
</tr>
<tr>
<td>• Outcomes of hobbies include emotional and aesthetic benefits.</td>
<td></td>
<td>• Information Processing</td>
</tr>
<tr>
<td>• Some hobbies can lead to a career or business.</td>
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</tbody>
</table>

**STRATEGIES:**

• **Grouping:** Students work in small teams. Each team member should have a role and assignment in completing the project. If there are indications that not every person is contributing, an individual report may be added. This assignment could have the individual answering a question such as: Which hobby would you like to undertake? Why?
• **Extensions:** The students may express interest in actually trying parts of a hobby. Interests may serve as the bases for subsequent activities or lessons. For example, if the students are interested in learning to make seed leis, the hobbyist may be willing to return to teach the students.

**COMPONENTS:**

• **Product:** This activity has a major product required by the end of Task 3. The teams are to produce a written report.

**Student Learning Tasks:** Students learn to prepare for meeting with and getting information from a community member. Key to this activity is working together; the students take the leadership in one aspect of the team’s tasks. They put their ideas together to produce a group report.

**Instructional Support:** There may be two parts of the task that the students would need support—meeting and interacting with a community member and facilitating a presentation to the whole class. Encouragement from the teacher, provision of time to “practice” or rehearse; and expressions of support from peers are ways that can help the students.

**ASSESSMENT:** Samples attached.

• **Product Outcomes:** Video taping the presentations may be used as part of a team’s report. Students’ growth and improvement in oral communications, learning and thinking skills, and research become evident in activities such as this. Also, the final reports, including static displays may be of such high quality and depth that they could be exhibited.

• **Process Outcomes:** Group and individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate groups and individuals as they engage in completing the project. Students may also be asked to do a self-assessment.

**NOTES:**

Engaging in a horticultural hobby of interest can be therapeutic: relieving stress, providing a sense of accomplishment, producing things of beauty, and, in many cases, bringing the individual public recognition.
Interacting with hobbyist, the students may develop interests in particular hobbies. Depending on the age of the students, this interest may be pursued on a small scale or may begin by shadowing or volunteering to help a hobbyist.

RESOURCES:
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Group Reports:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The written report was informative and comprehensive.</td>
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<tr>
<td>2. The interaction with the hobbyist was well documented.</td>
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<tr>
<td>3. The report reflects high standards of quality.</td>
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<tr>
<td>4. Optimum use of team members’ strengths were evident in the product and the class presentation.</td>
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</tbody>
</table>

Content Knowledge:
- Student explains the benefits of a hobby and what is involved in taking it up.

  4  Demonstrates a thorough understanding of what’s involved in a specific hobby. Explains the benefits and values derived by the hobbyist.

  3  Displays a complete and accurate understanding specific to the hobby.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about the hobby and the benefits derived.
PROCESS OUTCOMES:
Observation rating:

- **Student evaluates the effectiveness of own actions.**

  4  Is sensitive to a wide variety of feedback. Responds promptly when the current approach is clearly not working. Seeks out advice and responses from knowledgeable sources.

  3  Is aware of major sources of feedback. Responds and adjusts when correction is needed. Listens to the advice of others.

  2  Is insensitive to some important sources of feedback. Rejects some negative feedback. Has difficulty accepting advice.

  1  Ignores major sources of feedback. Responds negatively to unfavorable information.

- **Student works toward the achievement of group goals.**

  4  Actively helps identify group goals and works hard to meet them.

  3  Communicates commitment to the group goals and effectively carries out assigned roles.

  2  Communicates a commitment to the group goals but does not carry out assigned roles.

  1  Does not work toward group goals or actively works against them.
Self Assessment:

- I evaluate how well I am doing.

  4  I evaluate, in detail, how well I am doing by looking at my performance from my own point of view and by making sure I find out how others would evaluate my work. I describe the effect my work has right now and what effect it might have later. I explain how I can learn from my success and failures.

  3  I evaluate how well I am doing and describe the effect my work has right now. I try to find out how others would evaluate my work. I explain how I can learn from what I do well on the task.

  2  I evaluate how well I am doing, but I use only my own opinion. I don't describe the effects of my work and don't explain how I can learn from what I am doing.

  1  I don't try to evaluate how well I am doing.

- I work to help achieve the goals of the group.

  4  I participate actively and even help lead the group in setting goals. I do the jobs assigned to me better than anyone expects.

  3  I participate in group discussions and show that I care about the group goals. I complete the jobs assigned to me.

  2  I participate in group discussions and show that I care about the group goals, but I do not do the jobs assigned to me.

  1  I don't participate in group discussions or show that I care about the group goals; or I actually work against the goals.
**ACTIVITY NAME:** I'M A PLANT!

**Subject Area(s):** SCIENCE, AGRICULTURE, WORKPLACE READINESS

**Duration:** Two - three class periods

**PROJECT SUMMARY:**
Students take a walk-about on campus or the grounds of an institution. They identify the plants around and their common/scientific names. Major differences are pointed out to the students (e.g., type, growth pattern, water needs, maintenance requirements, etc.).

**CONTENT STANDARDS:**

**Social Studies: Geography**
- *Environment and Society:* Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.
  - Explain how people depend on, adapt to, and modify the physical environment in their community, and demonstrate stewardship of a local environment.

**Career and Life Skills: Skills for Life and Work**
- Students develop skills and attributes that are critical to a person’s ability to successfully navigate the world in and out of school, at work, and at home.
  - Interpersonal Skills: Seek ideas and information from others.*

**Life Skills: Habits of Mind**
- Students control their own behavior, even their own thought processes, by using effective habits of mind.
  - Is accurate and seeks accuracy.

**Life Skills: Information Processing**
- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a variety of reference materials, primary sources, computerized data banks, etc.
  - Recognizes where and how projects would benefit from additional information.
DRIVING QUESTION(S):

- What kinds of plants are on our campus?
- How and why were these plants planted?
- What are the benefits of the plants on our campus?

ACTIVITY PROCESS:

- Prepare students for the campus walk-about by describing some observation techniques and key questions to ask.
- Have students take notes and make sketches on the walk-about.
- Have the head custodian and/or an administrator accompany the class on the walk-about so they can help share information about the plants.
- Identify the important plants (e.g., those with historical significance, plants serving a particular purpose, or those that are part of a landscaping design).
- Provide students with common names (scientific names also, if students can handle the nomenclature). This list can be given to the students before they begin the walk-about.
- Describe key characteristics.
- Share relevant stories about the plant (e.g., who planted it; where did it come from; how long has it been growing on campus, etc.).
- Have students work on the follow-up tasks:
  - Submit an individual report on one of the plants from the walk-about—describing the information received on the walk-about, identifying other places on the island where the same kind of plant may be found growing, and sharing some information about it found by conducting research.
  - Develop as a class a planting map of the campus for the bulletin board—dividing responsibilities and assignments by type of plant or area on campus.
  - Play “I’m a Plant” charades where the names of plants and locations from the walk-about serve as the answers.
**CONTENT:**

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
</table>
| • Plants in a public area may be selected for aesthetic, functional, and thematic reasons.  
• Beautification of an area requires everyone to share in the maintenance responsibility. | • Reporting | • Working in groups  
• Information Processing |

**STRATEGIES:**

- **Grouping:** The activity has students working individually and then varies the setting by having them work cooperatively in a large group.

- **Questioning:** This activity tries to get students to ask good questions in order to complete a comprehensive report. For example, the student who does not feel comfortable in doing thorough research (print and non-print) has opportunities to gather detailed information from the resource people on the walk-about.

**COMPONENTS:**

- **Product:** This activity requires a written report by each individual.

- **Student Learning Tasks:** The walk-about is an important learning task for the students. They see things that they never noticed before and are provided information to associate with the identified plants. Note-taking is a basic learning skill that students are asked to apply. In addition, demonstration of learning occurs in various forms: written report, class map, and the charades game.

- **Instructional Support:** Involvement of the custodian and administrator provides students with instructional support from different players.
ASSESSMENT: Samples attached.

- **Product Outcomes:** The individual reports will be assessed by the teacher. However, the class map may be "assessed" by inviting the head custodian and the administrator to review it when completed.

- **Process Outcomes:** Group and individual assessments of selected process skills may be done using rubrics. The teacher may use the rubrics to evaluate groups and individuals as they engage in completing the project. Students may also be asked to do a self-assessment.

NOTES:

The walk-about has some obvious physical benefits, especially on a large campus. More importantly, students have the opportunity to learn more about their surroundings. Most school or institutional campuses have had professional landscaping done (initially, at least). Students get to learn what things were planted and the reasons, also.

By learning more about the plants and the reasons they are on the campus can help students see value in them. Instilling pride and some sense of responsibility in the students will, of course, be highly desirable outcomes.
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

**Written Report:** (a look at writing, rather than content)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT: All essential, relevant information included.</td>
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<tr>
<td>ORGANIZATION: At least three main ideas with elaborate supporting details provided. Transitions are smooth.</td>
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<tr>
<td>MECHANICS: Word usage, sentence structure, punctuation, spelling, capitalization.</td>
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<tr>
<td>VOCABULARY: Word choice, accuracy, appropriate selection.</td>
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</table>

**Content Knowledge:**

- **Student names and describes the plants found on campus and the related reasons/functions.**
  
  4  Demonstrates a thorough understanding of how the campus was planted. Names most of the important plants and explains why they were planted.

  3  Displays a complete and accurate understanding specific to the walk-about.

  2  Displays an incomplete understanding and has some notable misconceptions.

  1  Demonstrates severe misconceptions about plants on the campus.
PROCESS OUTCOMES:
Observation rating:

- **Student is accurate and seeks accuracy.**

  4  Pays close attention to detail when appropriate. Checks against all important sources. Recognizes inaccuracies quickly and makes corrections that not only clear up the identified errors, but add greater clarity to the whole.

  3  Pays adequate attention to detail. Checks several sources. Recognizes and corrects major inaccuracies.

  2  Tries to be accurate but overlooks important details. Doesn’t check enough sources to assure accuracy of important points. Doesn’t recognize and correct some important errors.

  1  Does not check important details for accuracy. Makes little effort to review for accuracy.

- **Student recognizes where and how projects would benefit from additional information.**

  4  Insightfully determines the types of information that will benefit a task and effectively seeks out that information.

  3  Accurately assesses a task to identify areas requiring additional information for clarification or support and seeks out the needed information.

  2  Does not accurately assess the information needs of the task or fails to seek out needed information.

  1  Makes little or no attempt to assess whether a task would benefit from additional information.
Self Assessment:

- I am accurate in my work.

  4  I pay close attention to details. I check every useful source to make sure my work is completely accurate. When I find errors, I quickly correct the errors in a way that improves the value of my project.

  3  I pay attention to details when I work. I check other sources to make sure my work is accurate. I find and correct major errors.

  2  I try to pay attention to details in my work, but miss some important ideas. I check some sources to see if my work is accurate, but miss important places I should check. I miss important errors and fail to correct others.

  1  I don't check to make sure my information is accurate. I make little effort to find and correct errors.

- I recognize when more information is needed and explain how the new information would improve the completed project.

  4  I recognize when more information is needed, even when other people may think the project is fine. I explain who the report would benefit from additional information and I formulate appropriate questions to get that information.

  3  I recognize that more information would make the completed project better and explain how additional information would improve it. I then find the information.

  2  I do not recognize when a project needs more information. Even if I decide more is needed, I do not find the information.

  1  I do not try to recognize when a project needs more information.
ACTIVITY NAME: INDOOR FARMER

Subject Area(s): AGRICULTURE, SCIENCE, WORKPLACE READINESS

Duration: Two weeks to a month

PROJECT SUMMARY:
Students learn that plants can grow or propagate in many ways. The classroom growing activity provides the students with experiences that lead to appreciating nature. Success for the students leads to improved self-concepts and pride in their accomplishments.

CONTENT STANDARDS:

Science: Organisms and Development
• Cells, Tissues, and Organs: Students explain the structure, functions, and reproduction of living cells.
  • Explain how living things have basic parts that work together to sustain life.

Career and Life Skills: Skills for Life and Work
• Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.
  • Interpersonal Skills: Participate effectively in varied roles as a member of a work team.

Life Skills: Collaboration/Cooperation
• Requires commitment to the group goal and effectively carry out assigned roles.
  • Effectively performs a variety of roles within a group.

Life Skills: Habits of Mind
• Students control their own behavior, even their own thought processes, by using effective habits of mind.
  • Engages intensely in tasks even when answers or solutions are not immediately apparent.

DRIVING QUESTION(S):
• How do plants propagate?
- What are the differences for plants to grow outdoors and to grow indoors?
- How can we help plants grow well indoors?

**MATERIALS NEEDED:**

- Potting soil
- Part of plants, including leaves (e.g., Rex Begonia, African Violet, Coleus, Wandering Jew) for asexual reproduction
- Kentucky Wonder Bean for sexual reproduction
- Wax paper or foil
- Pots
- Milk cartons
- 4-quart pail
- Hanging basket
- Molding

**ACTIVITY PROCESS:**

- Have students share their ideas about how plants grow and reproduce.
- **Task 1:** Asexual Reproduction - Spare Parts (about 2 weeks)
  - Divide the class in four groups.
  - Assign each group to be responsible for producing new plants from different starts:
    - Parts of a leaf - e.g., Rex Begonia
    - Whole leaf - e.g., Piggy Back or Peperomia
    - Leaf and its stem - e.g., African Violet
    - Stems with leaves/leafy stems - e.g., Coleus or Wandering Jew
  - Provide students with instructions for rooting their respective parts. Suggestions are attached to the end of this activity.
  - Groups should develop a schedule and responsibility list for maintaining and monitoring the plants' growth.
  - Have students discuss what might be done with the plants that they propagate.

- **Task 2:** Sexual Reproduction - Seeds (about a month)
  - Students may remain in groups, or work individually (the latter would require more seeds, potting medium, and containers).
  - Provide students with instructions for propagating pole bean plants from seed. Suggestions are attached.
• If the students are working in groups, assignments should be made for maintaining and monitoring the plant’s growth. Otherwise, each student will be responsible, every day.
• Each student submits a paper describing what they learned from both tasks. Encourage the inclusion of drawings or pictures to illustrate the process used and the growth pattern over time.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plants may be propagated in more than one way.</td>
<td>• Propagation</td>
<td>• Working in groups</td>
</tr>
<tr>
<td>• Plants grown indoors need some help in attaining the balance it requires (water, sun, soil, air).</td>
<td></td>
<td>• Engagement</td>
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</table>

STRATEGIES:

• Grouping: Students work in small teams. Each team member should have an “assignment” in completing the project. For example, the team members could be assigned roles such as researcher, waterer, observer/recorder. The teams also have the opportunity to meet as a larger group. Skills in interpersonal relating and leadership become important as this larger group plans for the future of the plants they grow.

• Hands-on: The process of planting and seeing the results are powerful teaching/learning strategies. From the therapeutic perspective, the potential for success in this activity is very high and can help lead to improved self-concept.

COMPONENTS:

• Product: The students are responsible for producing new plants. As part of this process, each student will complete a written report on the experience.
• **Student Learning Tasks:** In order to complete the activity, the students should be guided through tasks that will enhance their products and their learning.
  - Observing: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  - Following Directions: Cutting, maintaining moisture, planting.
  - Collaborating: Understanding and being sensitive to others; clarifying goals.
  - Documenting: Keeping growth/development logs and writing reports.

• **Instructional Support:** The activity can be supported by providing students with prompts or guide questions as the plants are developing/growing:
  - What do you think will happen?
  - What are some influencing factors, including those that are not “visible?”
  - What would happen if .... ?
  - What do you think is happening?
  - Why is this happening?

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Group and individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the groups and individuals as they engage in completing the project.

• **Product Outcomes:** The individual reports may be assessed using rubrics or criteria established by the teacher/class. Another means of assessment would be to have the class put together an exhibit of the plants they grew. Invite school and community representatives to see the exhibit and listen to presentations by individuals or groups. The students' products will be appreciated and expressions to this effect will be a means of external “assessment.”

**NOTES:**

Improved confidence and self esteem may be supported by activities such as this, where the potential for success is high. Besides learning about plant propagation and indoor growing the students can develop pride in the completed project, demonstrate a sense of responsibility, and exhibit concern for others.

One of the steps in this activity calls for the students to discuss and plan for the future of their plants. A possible decision may be to share the plants (e.g., hanging...
baskets) with elders at home or in a long-term facility. Getting students to see that they can share the product of their work with people less fortunate should be encouraged. Should the students agree, the activity can be linked with a service learning project.

The activity can also be extended into a more permanent growing project such as building a terrarium. This extension would take the students into understanding balance and the cycling of energy and resources.

**RESOURCES:**

Food: Just Grow It! IT'S THE DIRT
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Projects:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
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<tbody>
<tr>
<td>1. The products and the written report were informative.</td>
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<td>2. The information provided shows careful documentation.</td>
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<td>3. The results reflect high standards of quality.</td>
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<tr>
<td>4. Optimum use of team members’ strengths were evident in the products.</td>
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</table>

Content Knowledge:

• **Student explains different ways of plant propagation and some of the considerations needed for indoor growing.**

  4 Demonstrates a thorough understanding of the propagation processes learned. Is able to elaborate beyond simply exhibiting the product.

  3 Displays a complete and accurate understanding specific to the activity.

  2 Displays an incomplete understanding and has some notable misconceptions.

  1 Demonstrates severe misconceptions about propagation and indoor growing of plants.
PROCESS OUTCOMES:
Observation rating:

- **Student effectively performs a variety of roles within a group.**

  4  Effectively performs multiple roles within the group.

  3  Effectively performs two roles within the group.

  2  Makes an attempt to perform more than one role within the group but has little success with secondary roles.

  1  Rejects opportunities or requests to perform more than one role in the group.

- **Student engages intensely in tasks even when outcomes are not immediately apparent.**

  4  Demonstrates strong determination in the pursuit of an outcome. Monitors his/her level of involvement and develops a number of strategies to keep self on task.

  3  Shows determination in the pursuit of the project outcomes. Uses strategies to keep self on track.

  2  Makes some effort to carry out the steps but does not spend sufficient time and effort on the project. Is easily derailed and does not use strategies to keep self on task.

  1  Shows evidence of quitting the challenge early, before really trying to get into the project.
Self Assessment:

- **I perform a variety of jobs in my group.**
  
  4 I perform many jobs in my group and do them all well.
  
  3 I perform two jobs in my group and do both well.
  
  2 I try to perform two jobs in my group but don't perform both well.
  
  1 I don't even try to perform any more than one job in my group.

- **I work hard on tasks even when the outcomes are not clear.**
  
  4 I show that I will not give up, no matter how difficult it is to determine the outcomes. I evaluate how hard I am trying and I use a variety of techniques to keep myself on task.
  
  3 I show that I don't give up when I am trying to complete the requirements of the project. I keep myself on task.
  
  2 I try to complete tasks when the outcomes are difficult to understand, but I give up when I have to try too hard. I don't have good techniques for keeping myself on task.
  
  1 I give up quickly on difficult tasks.
REPRODUCTION BY SPARE PARTS

Overview: A part of a leaf, a leaf, a leaf with its stem, and stems with leaves all can be used to produce new plants. In most cases, roots will form where the leaf or the stem comes in contact with the rooting medium. There seems to be a concentration of roots at the nodes (the node is the place where the leaves are attached to the petiole). The original leaf is seldom a part of the new plant. Choose one of the best-looking leaves on the plant when making a leaf cutting. Select a leaf in perfect health and one that is mature. When propagating succulents, remove the cutting one day before placing it in a medium. This reduces the chance of rot.

Parts of Leaf (Snake Plant & Rex Begonia): Take a leaf, cut it into sections three or four inches long, and mark the leaf parts in such a way that the pieces are planted right side up. Cutting a small notch out of the top of each section will help you remember the top side.

Rex Begonias can be propagated by cutting a leaf into a number of pieces so that each piece contains part of a large vein. If the leftover pieces are thin, discard, but if the leaf is large, the outside can be rolled into a cone and planted in a pot filled with growing media.

Whole Leaf (Piggy Back Plants & Peperomia): Leaves can be laid on damp potting mix and kept in a warm humid spot until a new plantlet appears. To encourage growth, make cuts into the veins of the leaves and keep the cut places in contact with the soil. A large piece of gravel placed on the leaf will secure it.

A Leaf and Its Stem: A healthy African Violet leaf can be snapped or cut off its plant and put into a partially filled glass of water. This method works as well as covering the top of a glass of water with wax paper or aluminum foil and putting the stem through the opening.

A leaf with a one or two inch stem can also be inserted in moist vermiculite or potting soil. Cover the leaf with an inverted jar or enclose the pot and the leaf in a clear plastic bag.

Stems with Leaves and Leafy Stems: Coleus, Wandering Jew, and Swedish Ivy all do rather well if terminal growth is pinched off and the cutting is placed in growing medium. The completed project is then covered with a plastic bag and set in a
warm spot away from direct sunlight. In a week, the growing slip can be transplanted into a hanging basket (put several slips in one handy pot).

Good light, high humidity, and air temperature that does not get much above 80°F will give the optimum results. Bottom heat applied to keep the rooting medium warmer than air temperature encourages root growth and gives the roots a headstart over the stem and leaves. Rooting hormones are helpful in starting some slips; follow directions printed on the container.

**STARTING FROM SEED**

**Overview:** A viable seed is a developing embryo that has the potential of developing into a plant. The seed is a bundle of basic requirements needed to nurture the embryo until it is self-sufficient. Seeds contain a primary root and a primary shoot attached to an original or "seed leaf" called cotsy/ledons. These elemental parts are packaged in a coating of one kind or another. On one end of the coating is a small scar where the seed was attached to the parent. Close to this scar is a hole through which the roots will grow when the time is right. Inside the coating is a certain amount of stored nutrients that will be used to produce the enormous amount of energy that is needed for the embryo to develop and exist on its own.

**The Magic Bean:** Kentucky Wonder bean plants can reach the height of eight feet in one month. Seeds are available from garden suppliers. It is a very exciting experience for students to see the rapid growth of pole beans.

- Start the pole beans in a small container, styrofoam cup, paper cup, or a two-inch peat pot.
- After the bean is six inches tall, transfer it to a half-gallon milk carton. When this transplanting is being done, be sure to set the plant deeper than the original planting. Actually, the plant can be set as deep as the first set of true leaves. The set of leaves above the cotsy/ledons are true leaves.
- The last transplanting is done by transferring the milk carton pots to a four-quart pail. Put three of the plants into the large pail and spot them along the circumference of the pail. In the center of the pail, insert a wooden window screen molding that will reach the ceiling. Attempt to get the molding the length that will reach the ceiling when one end is inserted in the potting pail. The molding does not have to be attached to the ceiling. It will be secure as long as it is pushed firmly against the ceiling.
ACTIVITY NAME:  PAPER PARADISE

Subject Area(s):  AGRICULTURE, WORKPLACE READINESS, ART

Duration:  Three class periods over a couple of weeks

PROJECT SUMMARY:

Students create their ideal garden paradise on paper: collages, drawing or painting, or computer graphics. They are to select plants that would do well in the environment (using the school setting).

CONTENT STANDARDS:

Science:  Habits of Mind

• Using Unifying Concepts and Themes: Students use concepts and themes such as system, change, scale, and model to help them understand and explain the natural world.
  • Use geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, or stories to represent corresponding features of objects, events, and processes in the real world. Identify ways in which the representations do not match their original counterparts.*

Social Studies:  Geography

• Environment and Society: Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.
  • Explain how people depend on, adapt to, and modify the physical environment in their community, and demonstrate stewardship of a local environment.*

Life Skills:  Habits of Mind

• Controls own behavior and thought processes.
  • Makes effective plans.
  • Is aware of and uses necessary resources.

Life Skills:  Information Processing

• The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a
variety of reference materials, primary sources, computerized data banks, etc.

- Effectively interprets and synthesizes information.

**DRIVING QUESTION(S):**

- What is an ideal garden for the campus area?
- What plants will grow well in this environment?
- What is a model?

**MATERIALS:**

- Grid or graphing paper
- Old seed catalogs
- Magazines such as Home & Garden, Sunset, Horticulture, etc. (Students should be able to cut pictures out of most of these materials.)

**ACTIVITY PROCESS:**

- Have students study the school grounds and identify an area that needs to be “beautified.”
- Take the class to the site (or sites, if there is no agreement) and have the students identify the feasibility of having a garden there. Consideration could be given to:
  - Type of soil
  - Traffic (foot)
  - Accessibility to water
  - Surrounding areas
  - Size
- Have students share what they found and their ideas on feasibility.
- Arrive at a tentative agreement on the site to consider for “beautification” and summarize the description of the site (size, soil, access to water, etc.) so everyone will have the same starting information.
- Students may work in pairs or independently on designing the ideal garden paradise for the site.
- Explain that the project is to present their design on paper in the most attractive and creative way so that the proposals may be sent to the Principal.
• Invite a landscape architect to share his/her ideal garden paradise plans. Ask the architect to show the students some of his actual landscaping plans, as well as pictures of finished gardens.
• Provide students with grid paper, magazines and other references for ideas. Explain USDA Hardiness Zones.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants can be identified by the region within which they grow well.</td>
<td>Planning</td>
<td>Resource Utilization</td>
</tr>
<tr>
<td>A landscape can be planned by creating a model.</td>
<td>Model Building</td>
<td>Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping:** This is primarily an individual activity, although it may be accomplished with dyads (pairs of students). Pairing may be helpful in heterogeneous situations.
• **Information Sources:** The landscape architect will be a career resource as well as information provider. Reference books or Internet addresses may be made available in the classroom for students to review.
• **Recognition:** Students’ works should be recognized by exhibiting the models created. Note that there may be many different kinds of models: 2-d, 3-d, collages, drawing/painting, or computer-generated products. Celebrate each.

COMPONENTS:

• **Product:** The product of this activity will be the creation of a model of a garden, accompanied by a description of its components.

• **Student Learning Tasks:** In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  • Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  • Conducting research: Locating and collecting information, synthesizing information relating to plants and other elements to be included in the design.
• Composing: Developing the model, seeking feedback, assessing own work.

• **Instructional Support:** The activity can be supported by providing students with prompts or guide questions such as the following:
  - What do you think will grow well? Where can they be gotten from?
  - How much work will be required to maintain the plants? The area?
  - How would the garden look from afar? From close up?
  - Where might you look for information?
  - Who would find the garden attractive?
  - Who might you interview or ask?
  - About how long would it take to complete the garden? How much would it cost?

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

• **Product Outcomes:** The models and accompanying descriptions will probably be rated by the teacher. Provide students with criteria for rating such as: neatness, clarity, attractiveness, appropriate plants, composition, feasibility, etc.

**NOTES:**

The activity precedes the actual planting of a garden. Students with the opportunity to see pictures of different gardens will appreciate the beauty of plants and understand that there are many kinds of gardens.

The students may express their creativity in designing their ideal garden. However, built into the activity is the development of awareness that not all plants do well in every environment; some plants take longer to establish themselves; and some designs are easier to maintain than others.
Should the students be reading the recommended hardiness zone codes, remind them that:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Average Annual Minimum Temperature</th>
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<tbody>
<tr>
<td>1</td>
<td>Below -50°</td>
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<tr>
<td>2</td>
<td>To -40°</td>
</tr>
<tr>
<td>3</td>
<td>To -30°</td>
</tr>
<tr>
<td>4</td>
<td>To -20°</td>
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<tr>
<td>5</td>
<td>To -10°</td>
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<tr>
<td>6</td>
<td>To 0°</td>
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<tr>
<td>7</td>
<td>To 10°</td>
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<td>8</td>
<td>To 20°</td>
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<td>9</td>
<td>To 30°</td>
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<tr>
<td>10</td>
<td>To 40°</td>
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<tr>
<td>11</td>
<td>above 40°</td>
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**RESOURCES:**
### ASSESSMENT RUBRICS: Samples

**PRODUCT OUTCOMES:**

**Design Model:**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Outstanding</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The model is clear and attractive.</td>
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<tr>
<td>2. The information provided shows that a range of data sources were used.</td>
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<tr>
<td>3. The model reflects high standards of quality.</td>
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<tr>
<td>4. The description makes the design clear and easy to understand.</td>
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</table>

**Content Knowledge:**

- **Student explains the composition and design of his/her ideal garden.**

  4  
  Demonstrates a thorough understanding of the factors that contribute to an ideal garden in a given environment. Is able to elaborate on plants, maintenance, and costs.

  3  
  Displays a complete and accurate understanding specific to the activity.

  2  
  Displays an incomplete understanding and has some notable misconceptions.

  1  
  Demonstrates severe misconceptions about designing a garden and developing a model for the design.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**
  
  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student effectively interprets and synthesizes information.**
  
  4  Interprets the information gathered for the report in accurate and highly insightful ways. Provides a highly creative and unique synthesis of the information.

  3  Accurately interprets information gathered for the report and concisely synthesizes it.

  2  Makes significant errors in interpreting the information gathered for the report or synthesizes information imprecisely or awkwardly.

  1  Grossly misinterprets the information gathered for the report or fails to synthesize it. Often appears to simply copy or lift sentences or passages from information sources.
Self Assessment:

- I plan carefully before I begin my project.

  4 I set clear goals and describe each step I must take to finish my model and description. I make a detailed schedule for each step and follow the schedule.

  3 I set clear goals and describe some steps I must take to finish my model and description. I make and use a schedule.

  2 I begin working with only unclear goals. I describe few of the steps I must take to do my project and I make an incomplete schedule.

  1 I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- I find meaning in information and then combine and organize information to make it useful for my project.

  4 I find useful and accurate meaning in information I gather for my report. I understand meanings in information that other students do not see. I then combine and organize information in my own way to express certain ideas.

  3 I find useful and accurate meaning in the information I gather for my report and I combine and organize the information so that it makes sense.

  2 I make errors when I look for meaning in information that I gather for my report, and I combine the information inaccurately or in a way that makes it confusing.

  1 I make major errors when I look for meaning in information that I gather, and I do not combine or organize the information.
ACTIVITY NAME: OUR CORNER OF THE WORLD

Subject Area(s): AGRICULTURE, WORKPLACE READINESS

Duration: Two - four weeks

PROJECT SUMMARY:
Students secure approval to plant a garden in a designated area on campus. They work with the administration and the custodial staff to set up the infrastructure. The students install the garden and turn it over to the school as a contribution.

CONTENT STANDARDS:

Science: Malama i ka 'Aina
- Sustainability: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- Conservation of Resources: Explain how methods for obtaining and using resources such as water, minerals, and fossil fuel have consequences on the environment.

Career and Life Skills: Skills for Life and Work
- Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.
- Managing Resources: Identify, organize, plan, and allocate time, money, material, facilities, and human resources to accomplish a task.

Life Skills: Habits of Mind
- Controls own behavior and thought processes.
- Makes effective plans.
- Is aware of and uses necessary resources.

Life Skills: Information Processing
- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information, including interviewing and direct observation. They will also need to effectively use a
variety of reference materials, primary sources, computerized data banks, etc.

- Effectively interprets and synthesizes information.

**DRIVING QUESTION(S):**

- What does it take to install a garden on the school campus?
- What protocols are there?
- What resources do we need? Who can help us?
- How committed are we?

**MATERIALS:**

- Depends on the plan to be used for the garden. If funds are limited, students may be told what plants are not available and made to revise the plans accordingly. Get as much community support and donations as possible.
- Have students select two or three garden designs from the class work. In the selection process, have the students consider important criteria (which they help develop), including:
  - Appropriate plants for the environment (State DOE has list of allowable and non-allowable plants for campuses.).
  - Maintenance requirements.
  - Cost for installation (e.g., water fountains are costlier than dry, stone river beds).
  - Appeal to the students, staff, and community.
- Have class choose representatives, in addition to the designers of the selected plans, who will present the installation proposal and the recommended designs to the administration of the school.
- Student representatives will meet with the administration and make the proposal. Be sure administration is ready to accept and decide on one of the designs. Involve the custodial staff and community volunteers in the process.
- Have students assigned to help in preparing the area and setting up the infrastructure.
- Have students develop the installation schedule, to begin when the preparation is complete. Assign groups to work with community experts.
- Have students negotiate a maintenance and monitoring (weeding, etc.) plan with the custodial staff for the remainder of the school year.
- When the installation is complete, conduct a dedication ceremony.
CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There are many steps involved in preparing for a garden.</td>
<td>• Relating with Others</td>
<td>• Planning</td>
</tr>
<tr>
<td>• Many people from within the school and from the community need to work together.</td>
<td></td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

STRATEGIES:

• **Grouping**: Each member's diligence in completing his/her responsibility, as well as in taking ownership of the project will be important. Students learn to work with others toward a common goal. This includes adults from the community.

• **Leadership**: Students are put in a proactive, leadership role.

COMPONENTS:

• **Product**: This activity calls for individuals to work in teams over a rather prolonged period of time. The team's plans, schedule, and assignment of responsibilities will be critical to its success.

• **Student Learning Tasks**: In order to complete the product, the students should be guided through tasks that will enhance their products and their learning.
  • Observing: Paying careful attention to changes, developments, conditions, and possible causes or interactions.
  • Planning: Identifying key questions, projecting a working time line, developing an outline and criteria for the product.
  • Collaborating and cooperating: Knowing protocols, working with peers, working with community members.
  • Monitoring: Daily assessment of developments, reflecting on cause and effects, modifying process as needed.
  • Reflecting: Monitoring own learning, seeking feedback, assessing own work.
• **Instructional Support:** The activity can be supported by providing feedback to students with prompts or guide questions such as the following:
  • How do you think we’re doing? Are we on schedule?
  • If this is an obstacle, what are some alternatives?
  • If no one takes this responsibility, what will happen to our project?
  • How shall we celebrate?

**ASSESSMENT:** Samples are attached.

• **Process Outcomes:** Individual assessments of selected process skills are done using rubrics. Teacher may also use the rubrics to evaluate the dyads and individuals as they engage in completing the project.

• **Product Outcomes:** The final assessment is the completion of the garden. The students should participate in rating the outcome. Are they satisfied with their work?

**NOTES:**

There are many dimensions to this activity: academic outcomes related to planning and designing; physical benefits from the work of installation; emotional growth as the project takes shape and is completed; social reinforcements from working with peers and adults; and overall personal development as students get to see their accomplishment.

This could be considered a service learning unit, if the students are involved earlier in the annual campus inspection process. As part of the process, the students learn what the statewide criteria are for safe and attractive campuses. They participate as members of the community inspection committee and have a part in the discussion of findings, problems, and solutions. The installing of this garden would, then, be an extension of the process, fulfilling an identified need for the school.

**RESOURCES:**

Food: Just Grow It! IT’S THE DIRT
ASSESSMENT RUBRICS: Samples

PRODUCT OUTCOMES:

Garden Project:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Effective</th>
<th>Developing</th>
<th>Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The project was completed on schedule and within planned resources.</td>
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<tr>
<td>2. The project adds to the attractiveness of the environment.</td>
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<tr>
<td>3. The project reflects high standards of quality.</td>
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<tr>
<td>4. The garden is a result of the commitment and hard work of all the students.</td>
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</tbody>
</table>

Content Knowledge:

- Student explains the design and installation process for the project.
  
  4 Demonstrates a thorough understanding of the different factors involved in planning and installing a garden. Is able to explain problems encountered and solutions.
  
  3 Displays a complete and accurate understanding specific to the activity.
  
  2 Displays an incomplete understanding and has some notable misconceptions.
  
  1 Demonstrates severe misconceptions about the design and installation of a garden.
PROCESS OUTCOMES:
Observation rating:

- **Student makes effective plans to accomplish the assignment.**

  4  Sets a precise goal. Considers and carries out all necessary subgoals. Creates and adheres to a detailed time line.

  3  Sets a goal. Considers and carries out some subgoals. Creates and carries out a useful time line.

  2  Begins tasks without a completely defined goal. Makes little attempt to define subgoals or develop a time line.

  1  Makes no effort to identify a goal or its related subgoals and time line.

- **Student is aware of and uses necessary resources.**

  4  Performs a careful, detailed assessment of resource needs before beginning a task. Reviews available resources and considers alternatives. Anticipates steps in the process that might require additional demands on resources.

  3  Assesses a project to identify areas that require resources. Reviews available and alternative resources to determine whether they are suitable for the project.

  2  Considers resource needs as they come up, creating situations in which difficulties that could have been anticipated will stop or hamper a project. Overlooks alternative resources.

  1  Does not consider resource needs. Decides to use whatever resources are easily available. Overlooks obvious and necessary resources.
Self Assessment:

- **I plan carefully before I begin my project.**
  4. I set clear goals and describe each step I must take to finish my report. I make a detailed schedule for each step and follow the schedule.
  3. I set clear goals and describe some steps I must take to finish my report. I make and use a schedule.
  2. I begin working with only unclear goals. I describe few of the steps I must take to do my report and I make an incomplete schedule.
  1. I begin working and just let things happen as they happen. I do not describe the steps I must take and I do not make a schedule.

- **I am aware of available resources that could help me complete a task.**
  4. I describe in detail all the resources I think I might need before I start working on a task. I search for the resources available to me and, if something I need is not available, I describe other places I might get this help or information. I also predict what parts of the task will require the use of the most resources.
  3. I list the most important resources I might need before I start working on a task. I review the resources that are available and describe other resources that I may have to find.
  2. I begin working on a task and look for resources when I need them. This slows my work because I have to keep stopping to find the resources. When a resource is not available, I do not find other resources that might help.
  1. As I am working on a task, I use resources only if they happen to be readily available. I do not use many resources that are available.
INTRODUCTION:

Service-learning is an instructional strategy or method by which young people learn and develop through active participation in thoughtfully-organized service experiences that:

- Meet community needs;
- Are coordinated in collaboration with the school and community;
- Are integrated into the academic curriculum;
- Provide structured time for reflection—to think, talk, and write about what the student did and saw during the actual service activity;
- Provide young people with opportunities to use newly acquired academic skills and knowledge in real life situations in their own communities;
- Enhance what is taught in the school by extending student learning beyond the classroom;
- Help to foster the development of a sense of caring for others. (From The Alliance for Service-Learning in Education Reform)

This unit provides suggestions for mini-service-learning experiences, which may be integrated into existing courses as partial fulfillment of course requirements. Development of a comprehensive service-learning program should be done in conjunction with the school administration and resources from the respective support staffs from the DOE State Office and CTAHR.

CONTENT STANDARDS:

This STEWARDSHIP theme is linked with activities from the other components and classroom foci that teachers may have in their courses' instructional program. Because service-learning is not one-shot volunteerism, its integration with the year or semester instructional program is essential. This means that the content standards of the instructional area set the parameters for the service and selected course objectives become the bases for the learning. Therefore, the content standards that guided the development of activities in the other components will continue to be important since we will be linking with some of those activities. The primary content standards are:
Health Education
- Students comprehend concepts related to health promotion and disease prevention, including injury prevention.
- Students practice health-enhancing behaviors and reduce health risks.
  - Students advocate for personal, family, and community health.

Science
- Safety: Students demonstrate the importance of safety by applying safety skills in all activities.
- Malama i ka 'Aina: Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- Wellness: Students appraise the relationship between their bodily functions and their mental well-being.

Career and Life Skills
- Skills for Life and Work: Students develop skills and attributes that are critical to a person's ability to successfully navigate the world in and out of school, at work, and at home.
- Career and Life Planning: Students develop self-knowledge, explore different educational, career, and life options available, and design and implement educational, career, and life plans.
- Individual, Family, and Community Development: Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.

LIFE SKILLS:

Although a range of life skills can be reflected in service-learning activities, particular focus should be on developing the skills for those areas and their respective standards that are listed below:

Complex Thinking:
- Analyzing Perspectives
- Decision Making
- Problem Solving

Information Processing:
- Effectively uses a variety of information-gathering techniques and information resources.
Effective Communication:
• Effectively communicates with diverse audience.

Collaboration/Cooperation:
• Works toward the achievement of group goals.
• Effectively uses interpersonal skills.
• Effectively performs a variety of roles.

Habits of Mind:
• Evaluates the effectiveness of own actions.
• Is sensitive to the feelings and level of knowledge of others.
• Generates, trusts, and maintains own standards of evaluation.

CONCEPTS:

Concepts will vary depending on the suggested course(s) that the activities are linked with. However, the overall service-learning experience should contribute to students:

• Personal Development: Belief in self and one's ability to make a difference.
• Social Development: Opportunity to interact, work with, and experience a range of people, places, and issues.
• Value Development: Development of values and ethics in service, sense of community, working, and teamwork.
• Academic Development: Opportunity to apply and learn in real-world contexts.
• Career Development: Exploration and development of job-related skills.

PLANNING:

An effective service-learning experience is generally a result of planning. Involved in the planning should be the student, the teacher, and community mentor(s). For the suggestions that follow in this unit, the planning process should include:

• Identification of community service-sites with willing mentors or supervisors.
• Agreements between the site and the school (or teacher) relative to the concept of service-learning, the role that each plays in contributing to the students' development, and the expectations of the course(s) and of the site organization.
• Explanation to students of service-learning component for the course.
• Action planning by student participants, to document commitments to:
• Meeting the identified expectations of the course (academic connections) and the site (work expectations).
• Doing concurrent independent activities such as reading related materials, writing as part of the experience, making oral presentations as part of and about the experience, and self-monitoring.
• Assessing and documenting learning through: periodic reflections (written and oral), collecting work samples, and producing the end-of-experience portfolio.
• Arrangements for showcasing and sharing of the successful experiences of the participants to peers, school faculty, and community supporters.

ASSESSMENT:

Service-learning, as an adjunct to classroom instruction, has the potential of providing a myriad of real-life experiences that are spontaneous and, in many cases, unanticipated. This facet of service-learning, together with individual personalities of the students, will have varying impact on the students. Therefore, one of the ongoing assessment tools is the regularly conducted metacognitive review of experiences. Documentation of this review may occur as service-learning logs where students record experiences as they occur. These records generally cover experiences that served as:

• An “epiphany,” a reality check, that helped to change a perception or assumption;
• A problem-solving challenge;
• An opportunity to gain new knowledge in the real-world context;
• A clarification of value(s);
• A stimulus for personal integration of life-long learning;
• A validation of how essential it is for human beings to work together (HCPS II, General Learner Outcome).

In some programs, these metacognitive reviews are required as reflections. In the Halau ‘Ao Project of Maui Community College, reflections are asked of students at the end of each lesson or challenge. Each of these reflections has a set of probes or questions to help students to structure their responses.

According to DeAnn Johnson, USDA Youth Development Specialist, reflection is “more than just reporting what occurred in a service-learning activity. Reflection is a
strategic, engaging, ongoing process of examining the experience…. Consists of the use of critical thinking skills in order to prepare for, and to learn from, a service experience.” She includes a set of guidelines in the form of cyclical questions that may be useful for reflections that are recorded following the service experience:

- **What? … Do and Share:**
  - What are some adjectives that describe your experience?
  - What were your feelings?
  - What was most rewarding?
  - What was the most difficult?
- **So What? … Process:**
  - How did information and skills you’ve learned help you?
  - How was the experience different from what you expected?
  - Why is it important to serve your community?
- **So What? … Generalize:**
  - What issues did this experience make you think about?
  - What are the challenges that face us in these issues?
- **Now What? … Apply:**
  - How has this project changed your attitude about the issues?
  - What will you notice now that you didn’t notice before?
  - What can we do individually and as a group to have impact in this area?
  - What is one thing you can do next week that will make a difference with this issue?

A key question to ask is: How am I a different person as a result of this experience?

Within the context of secondary courses, service-learning experiences earn the students course credits. This requires systematic documentation, not only of the experiences from the perspective of the learner, but also of the knowledge and skills acquired. In the Konawaena High School Service-Learning Project, this documentation takes the form of a portfolio or “Evidence Folder” developed and compiled by the student. To get an idea of the demands on the students and their responses to these demands, one only needs to look at their portfolio. The table of contents indicates what the students are to include in their evidence folder:

- **Descriptions of the Service-Learning Experience**
  - Action Plan
• Reflections
• Scrapbook (Photo Journalism)
• Network
  • Community Resources
  • Post-secondary Contact
  • Profit/Non-Profit Organizations
• Service Learning Log
• Other

• **Focused Reading** (Related to SL Experience)
  • Professional Journals
  • News Articles
  • Newsletters
  • Internet Articles
  • Other
  • Best Work

• **Writing** (Related to SL Experience)
  • Articles
  • Letters
  • News Releases
  • Fliers/Brochures
  • Other documents
  • Mastery of Sentence Structure - samples
    • Simple sentence
    • Compound sentence
    • Complex sentence
  • Best Work

• **Oral Presentations** (Related to SL Experience)
  • Who:
  • When:
  • Where:
  • What:
  • Best Work

• **Academic Connections** (SL Experience related to course requirements)
  • Science
  • Math
  • Social Studies
  • Educational Technology
  • Other
• Best Work

• Core Abilities (Evidence of Growth and Development)
  • Act Responsibly
  • Communicate Clearly
  • Think Critically and Creatively
  • Work Productively
  • Work Cooperatively
  • Learn Effectively
  • Value Self Positively

Feedback and assessment are also done by the site mentor or supervisor. This assessment may be a form agreed upon by the teacher and the site staff or it may a modified evaluation form used at the site for regular staff members. In either case, categories such as work ethics, specified job skills, quality of service, and interpersonal skills should be addressed.
ACTIVITY NAME: HANDS ACROSS GENERATIONS

Subject Area(s): HOME ECONOMICS OCCUPATIONS, HEALTH OCCUPATIONS, SCIENCE, SOCIAL STUDIES

Duration: Quarter/Semester/Year

PROJECT SUMMARY:
Students interested in care services being provided to the growing number of elderly in the community may connect their course requirements with service-learning in organizations that provide these services.

DRIVING QUESTION(S):

- What is the average longevity of people in our country? In our community?
- What needs do the elderly in our community have?
- How are these needs being met?
- What is the role of the community in meeting these needs?

Possible related courses: (Determination by teachers)

- Social Studies
  - Directed Study:
    - To encourage in-depth research projects utilizing appropriate social science inquiry skills.
- American Problems:
  - To develop habits of critical thinking about current issues and controversies in contemporary America.
- Humanities:
  - To understand and appreciate the role of the arts, literature, music, history, and social sciences in human life.
- Science
  - Science for Self and Society:
    - Use process skills to manipulate data drawn from areas of scientific knowledge that have high public interest, high probability for personal application, and high authenticity in relation to scientific and social issues and problems.
• Practice and develop problem-solving and decision-making processes which entail changes in judgments, attitudes, and values.

• Home Economics Occupations
  • Cooperative Home Economics Education:
    • Develop desirable personal qualities which can contribute to employability in home economics related activities.
    • Apply basic skills, critical thinking and problem-solving skills, work habits, and attitudes essential to success in home economics related occupations.

• Health Occupations
  • Introduction to Health Occupations I:
    • Identify health care needs and services in the community.

**CONTENT STANDARDS:**

**Social Studies: Political Science**
- Citizenship/Participation: Students understand roles, rights (personal, economic, political) and responsibilities of American citizens and exercise them in civic action.
  - Explain the significance of citizenship and participate responsibly for the common good, e.g., select and study an issue or problem and plan and implement a civic action.*

**Science: Organisms and Development**
- Human Development: Students explain the important aspects of human development from fertilization to death and compare it with other organisms.
  - Analyze the social, moral, ethical, and/or legal issues brought on by the development and use of technologies to create, maintain, prolong, sustain, or terminate life.

**Health Education:**
- Students comprehend concepts related to health promotion and disease prevention.
  - Implement ways to help others promote and protect their health.

**Career and Life Skills: Individual, Family, and Community Development**
- Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
• Analyze the roles and responsibilities of communities in strengthening the well-being of individuals and families.

Life Skills: Complex Thinking
• Decision Making: Selecting among apparently equal alternatives.
  • Identifies important and appropriate alternatives to be considered.

CONTENT:

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<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>People are living longer.</td>
<td>Interpersonal Skills</td>
<td>• Decision Making</td>
</tr>
<tr>
<td>The proportion of elderly in the community is increasing.</td>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>Government &amp; community organizations have assumed responsibility for the care of some of the elders.</td>
<td></td>
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</tbody>
</table>

COMPONENTS:

• Potential Service Sites:
  • Retirement Centers
  • Senior Citizen Housing
  • Care Homes
  • Long-term Care Centers
  • Senior Citizens' Parks & Recreation Programs
  • Hospitals and Churches
  • Established Service Programs (Candy Stripers, Hospice, etc.)
  • Physicians in Geriatrics

• FJGI Activities Extensions:
  • “It’s the Dirt:” Mental Health - WELLNESS
• Lobby a Hobby: Students take what they have learned about a hobby and share the information in a presentation or workshop for the elderly at the service-learning site.

• Indoor Farmer: Students contribute the potted herbs or hanging baskets that are produced in this activity to the elderly at the site. In addition, students may want to work with the elderly on a similar growing project.

• Our Corner of the World: The students work on a plot at the site as part of the service-learning.

• “Keep It Clean” - SAFETY
  • Kitchen Safety: Students practice what they have learned. They may also have opportunity to “teach” some of the guidelines they learned to the elderly.
  • On the Job: Students will learn the rules and procedures of the service-learning site.

• Nutrition - WELLNESS
  • Cultural Fives: Students will have opportunity to learn from the elders a lot of what they prepared and ate in their youth. Some exciting recipes may also be shared.

• “Why Organic Growing?” - SUSTAINABILITY
  • Victory Gardens: Students can collect anecdotes from the elderly about victory gardens.
  • People’s Perception: Related to the above, students may want to get the perceptions of the elders on organic gardening.
  • WOG IT!: The products of the students’ organic garden may be distributed to the service-learning sites.
ACTIVITY NAME: ADVOCACY FOR DISEASE PREVENTION/CURE

Subject Area(s): HEALTH OCCUPATIONS, SCIENCE, SOCIAL STUDIES

Duration: Quarter/Semester/Year

PROJECT SUMMARY:
There are several local and national organizations dedicated to working for the prevention/cure of specific diseases. Students can contribute to the many tasks involved in the process of advocacy by becoming a part of the activities related to community advocacy.

DRIVING QUESTION(S):

- How are research efforts to prevent or cure widespread diseases or illnesses funded?
- In what ways can the community contribute?

Possible related courses: (Determination by teachers)

- Social Studies
  - Directed Study:
    - To encourage in-depth research projects utilizing appropriate social science inquiry skills.
- Science
  - Science for Self and Society:
    - Use process skills to manipulate data drawn from areas of scientific knowledge that have high public interest, high probability for personal application, and high authenticity in relation to scientific and social issues and problems.
    - Practice and develop problem-solving and decision-making processes which entail changes in judgments, attitudes, and values.
- Health Occupations
  - Introduction to Health Occupations I
    - Identify health care needs and services in the community.

CONTENT STANDARDS:
Social Studies: Political Science

- **Citizenship/Participation:** Students understand roles, rights (personal, economic, political) and responsibilities of American citizens and exercise them in civic action.
  - Explain the significance of citizenship and participate responsibly for the common good, e.g., select and study an issue or problem and plan and implement a civic action.*

Science: Historical Perspectives

- **Interdependence of Science, Technology, and Society:** Students analyze and evaluate the interdependence of science, technology, and society.
  - Health Technologies: Describe and elaborate how scientific knowledge impact the monitoring of people's health and the diagnosis and treatment of illness and diseases.

Career and Life Skills: Individual, Family, and Community Development

- **Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.**
  - Analyze the roles and responsibilities of communities in strengthening the well-being of individuals and families.

Health Education:

- **Students comprehend concepts related to health promotion and disease prevention.**
  - Implement ways to help others promote and protect their health.

Life Skills: Information Processing

- The information-rich world in which the students will live calls for additional techniques, besides reading and listening, to gather information.
  - Effectively uses a variety of information-gathering techniques and information resources
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<tbody>
<tr>
<td>• National and local organizations have been organized to support research and prevention of certain illnesses and diseases.</td>
<td>• Interpersonal Skills</td>
<td>• Information Processing</td>
</tr>
</tbody>
</table>

COMPONENTS:

- Potential Service Sites:
  - American Heart Association
  - American Lung Association
  - American Cancer Society

- FJGI Activities Extensions:
  - Nutrition – WELLNESS
    - Book It!: There are two possible linkages with this activity. First, an organization such as the American Heart Association is an excellent source of information for healthy eating. Students doing service-learning at these sites will be acquiring a lot of information on disease prevention strategies.

      Secondly, the Book It! activity has the possibility of raising funds through the sale of the recipe book. Students are asked to consider possible uses of the proceeds. The service-learning experience will undoubtedly influence many students’ decision toward contributing some of the funds to support these causes.
ACTIVITY NAME:  

GIVING A HAND

Subject Area(s):  HOME ECONOMICS, AGRICULTURE, SOCIAL STUDIES

Duration:  Quarter/Semester/Year

PROJECT SUMMARY:
Every community has an organized system for "giving a hand" to the less fortunate. The activities are most prominent during seasons such as Thanksgiving and Christmas. However, through service-learning, students become aware of the year-round efforts in collecting and distributing needed items, especially food.

DRIVING QUESTION(S):

• What are some of the basic needs of the disadvantaged in our community?
• How are these needs being met?
• How extensive is the problem?

Possible related courses:  (Determination by teachers)

• Social Studies
  • Directed Study:
    • To encourage in-depth research projects utilizing appropriate social science inquiry skills.
  • American Problems:
    • To develop habits of critical thinking about current issues and controversies in contemporary America.

• Home Economics
  • Independent Living:
    • Analyze influences which affect the socialization of the individual.
    • Apply communication and interpersonal skills to relationships.
    • Demonstrate ability to manage resources using problem-solving and critical-thinking skills.
    • Demonstrate effective management skills as they relate to selection, preparation, and service of food; and purchasing of food, clothing, and shelter to meet basic needs.
• Home Economics Occupations
  • Food Service I
    • Identify the types of food service operations and career opportunities in the food service industry.

CONTENT STANDARDS:

Social Studies: Economics
• Roles of Government: Students understand how the government influences the well being of people and institutions.
  • Explain economic roles of the government such as providing public goods and services, redistributing of income, encouraging employment, and sustaining reasonable rates of economic growth.

Career and Life Skills: Individual, Family, and Community Development
• Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
  • Analyze the roles and responsibilities of communities in strengthening the well-being of individuals and families.

Life Skills: Effective Communication
• Effective communicators are clear, can communicate with diverse audiences, use a variety of methods for various purposes.
  • Effectively communicates for a variety of purposes.

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<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic conditions are affecting the number of homeless and unemployed.</td>
<td>• Observation</td>
<td>• Communicating</td>
</tr>
<tr>
<td>Some of the needs of the disadvantaged, such as food, are met by community groups.</td>
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</tbody>
</table>
COMPONENTS:

- **Potential Service Sites:**
  - Food Banks
  - Community Service Kitchens

- **FJGI Activities Extensions:**
  - “Keep It Clean” - SAFETY
    - Kitchen Safety: Students may learn about and help check the donated foods using a checklist (attached).
    - On the Job: Students learn general safety procedures and rules at the site.
  - “Nutrition” - WELLNESS
    - Book It!: Part of the proceeds from the sale of recipe books may go to supporting the activities at the service sites.
  - “WOG” - SUSTAINABILITY
    - WOG IT!: Products from the organic gardens may be contributed to the food distribution centers or serving kitchens.
DONATED FOOD CHECKLIST
(From Purdue University Cooperative Extension Service, Mission Possible, pages 9-10)

Both SAFETY (whether a food is free of disease-causing bacteria and their toxins) and QUALITY (whether a food looks and smells acceptable to eat) should be kept in mind when examining donated food.

Beware of these signs that food may be UNSAFE to eat.

FOODS STORED AT ROOM TEMPERATURE:

Cans

__________ Too crushed to stack on shelves or open with a manual can opener.
__________ Crushed immediately under the double (end) seam.
__________ Moderate/severe dents at the juncture of side and double (end) seam.
__________ Rust pits severe enough to pierce the can.
__________ Swollen or bulging ends.
__________ Holes, fractures, or punctures.
__________ Evidence of leakage.
__________ Signs of spoilage (spurtling; unusual odor or appearance) when opened.
__________ Baby food or formula past the expiration date.
__________ Missing label.

Glass Jars

__________ Home-canned instead of commercially canned.
__________ Raised, crooked, or loosened lid.
__________ Damaged tamper resistant seal.
__________ Cracks or chips.
__________ Signs of spoilage (discolored food; cloudy liquid).
__________ Dirt under the rim.
__________ Baby food past the expiration date.

Paperboard Cartons

__________ Torn or missing inner packaging in cartons that are slit or opened.
__________ Evidence of insects.
__________ Baby food past the expiration date.
Plastic Containers

- Damaged tamper-resistant seals.
- Signs of spoilage (mold, off odor).
- Baby food past the expiration date.

FOODS STORED IN THE REFRIGERATOR

- Lukewarm food (above 40°F - refrigerator temperature).
- Signs of spoilage (unusual odor or appearance, molds).
- Unsuitable containers (and/or covers) that allow contamination.
- Uncertain handling “history” (questionable reputation of food source).
- Damaged tamper-resistant seals if commercially packaged.

FOODS STORED IN FREEZER

- Evidence of thawing (ice on the food or leaking)
- Unsuitable packaging that allows food to be contaminated.

IF IN DOUBT, THROW IT OUT!

Don’t rely on look or smell. Food that cause food poisoning may look fine and smell acceptable. Never taste suspicious food!
ACTIVITY NAME: COMFORTING HANDS

Subject Area(s): HOME ECONOMICS, SOCIAL STUDIES, SCIENCE, HEALTH OCCUPATIONS

Duration: Quarter/Semester/Year

PROJECT SUMMARY:
Hospitals and nursing homes can provide students with valuable service-learning and career exploration experiences.

DRIVING QUESTION(S):

- What kinds of jobs or careers are there in hospitals or nursing homes?
- How does what I learn in school relate to these jobs/careers?

Possible related courses: (Determination by teachers)

- Social Studies
- Directed Study:
  - To encourage in-depth research projects utilizing appropriate social science inquiry skills.
- Health Occupations
- Introduction to Health Occupations I
  - Identify health care needs and services in the community.
  - Investigate selected areas of health occupations.
  - Demonstrate basic skills related to entry-level employment applicable to several areas in the health field.
- Introduction to Health Occupations II
  - Use system approach to analyze a variety of common health conditions and treatment.
  - Demonstrate basic health care skills in the classroom and in a variety of health care settings.
- Health Education
  - Health: For Self, Home, and Society (Grades 11-12)
  - Identify physical, emotional and social factors which contribute to or influence the health of an individual, family or community.
• Demonstrate responsible behavior in promoting better health and preventing diseases, conditions or other factors which affect health.

• Home Economics Occupations
  • Food Service I
    • Identify the types of food service operations and career opportunities in the food service industry.
    • Demonstrate basic principles of food preparation, service, sanitation, and safe work habits.
    • Develop basic understanding of management systems used in food services.
    • Develop and demonstrate skills, knowledge, and attitudes related to job careers in food service.

CONTENT STANDARDS:

Science: Historical Perspectives
• Interdependence of Science, Technology, and Society: Students analyze and evaluate the interdependence of science, technology, and society.
  • Health Technologies: Describe and elaborate how scientific knowledge impact the monitoring of people’s health and the diagnosis and treatment of illness and diseases.*

Health Education
• Students comprehend concepts related to health promotion and disease prevention.
  • Implement ways to help others promote and protect their health.

Career and Life Skills: Individual, Family, and Community Development
• Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
  • Analyze the roles and responsibilities of communities in strengthening the well-being of individuals and families.

Life Skills: Collaboration/Cooperation
• General Learner Outcome: Students understand that it is essential for human beings to work together.
• Effectively performs a variety of roles within a group.

CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
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<tbody>
<tr>
<td>• There are many different types of jobs in a hospital or nursing home.</td>
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<table>
<thead>
<tr>
<th>Content Skills</th>
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<tbody>
<tr>
<td>• Interpersonal Skills</td>
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<table>
<thead>
<tr>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Working Together</td>
</tr>
</tbody>
</table>

COMPONENTS:

• Potential Service Sites:
  • Hospitals
  • Nursing Homes
  • Long-term Care Centers

• FJGI Activities Extensions:
  • Nutrition – WELLNESS
    • We Are What We Eat: The service-learning experience will validate many of the concerns that support the Food Guide Pyramid. Students see the value of preventive eating.
    • Fight Fat! Understanding some of the basic principles used by the institutional dieticians and nutritionists will, as noted above, validate the importance of a low-fat diet. Menus in these institutions are valuable sources of nutrition information.
  • “Keep It Clean” – SAFETY
    • Micro-Organisms Are Everywhere! The service sites and their cleaning procedures provide learning experiences beyond any in the classroom.
    • On The Job: Students observe the safety precautions, rules, and procedures practiced in the institutions.
ACTIVITY NAME:  **REACHING DOWN**

Subject Area(s):  HOME ECONOMICS, HEALTH

Duration:  Quarter/Semester/Year

**PROJECT SUMMARY:**

Students reach down and work with pre-school children. They have opportunities to share many of the things they have learned with the little children. This area is closely aligned with the Authorized Courses and Code Numbers of Home Economics Occupations, making service-learning a natural, integrated part of the curriculum.

**DRIVING QUESTION(S):**

- What are some key things little children should learn?
- Who are the "teachers" of children before they enter school?
- How do they learn and develop?

Possible related courses:  (Determination by teachers)

- **Home Economics Occupations**
  - **Child Care Service I and Laboratory I**
    - Identify and analyze career opportunities in child care, guidance, management, and public service fields.
    - Apply the basic concepts of child development.
    - Demonstrate skills, knowledge, and attitudes needed to meet the basic needs of children by providing proper care and guidance.
  - **Child Care Service II and Laboratory II**
    - Identify the qualifications necessary for employment in the child care and guidance occupations.
    - Perform tasks associated with entry-level employment in child care and guidance programs.
    - Use information effectively to describe systems of management in a variety of child care settings.
    - Qualify for entry-level employment in child care and guidance occupations or pursue post-secondary education.
CONTENT STANDARDS:

Science: Safety
• Doing Safety: Students demonstrate the importance of safety by applying safety skills in all activities.
  • Identify potentially unsafe conditions prior to the activity, and explain how accidents can be prevented.

Career and Life Skills:
• Career and Life Planning: Students develop self-knowledge, explore different educational, career, and life options available, and design and implement educational, career, and life plans.
  • Career Preparation: Select and complete activities and sequences of courses that develop essential skills and knowledge for a selected career area.
• Skills for Life and Work: Students develop skills and attributes that are critical to a person’s ability to navigate the world in and out of school, at work, and at home.
  • Interpersonal Skills: Teach others a process, strategy, or skill.

Health Education
• Students advocate for personal, family, and community health.
  • Demonstrate the ability to influence and support others in making healthful choices.*

Life Skills: Complex Thinking
• Decision Making: Selecting among apparently equal alternatives.
  • Makes a selection that adequately meets the decision criteria and answers the initial decision question.
CONTENT:

**Content Knowledge**
- Healthy development of children includes esteem building, emotional support, positive and creative learning experiences, and safe play.
- Attitudes and values are shaped early in a child’s development.

**Content Skills**
- Observation
- Teaching

**Process Outcomes**
- Decision Making

COMPONENTS:

- **Potential Service Sites:**
  - Head Start classes
  - Child care centers
  - Community pre-schools

- **FJGI Activities Extensions:**
  - “Rot for Your Plot” - INTERDEPENDENCE
    - Under-Cover Critters and Creatures: Students working with little children can share some of the information about “helpful critters.”
  - “It’s the Dirt:” Mental Health - WELLNESS
    - Up Side Down Side Up: This activity can be demonstrated by the students for the pre-school children.
    - I’m a Plant!: Students can replicate the campus walk-about with little children, limiting the identification process. The charades game can be played using simple plants.
    - Indoor Farmer: The little children can become little farmers with help and guidance.
  - “Keep It Clean” - SAFETY
    - On the Job: Students learn the safety rules, procedures, and precautions that are essential at these sites.
    - One-Two-Three Fire!: The students can work with the Fire Department in conducting a Fire Safety demonstration for the children.
<table>
<thead>
<tr>
<th>ACTIVITY NAME:</th>
<th>WALK THE TALK</th>
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</thead>
<tbody>
<tr>
<td>Subject Area(s):</td>
<td>AGRICULTURE, SCIENCE</td>
</tr>
<tr>
<td>Duration:</td>
<td>Quarter/Semester/Year</td>
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**PROJECT SUMMARY:**
Students have been studying and developing awareness about the fragile environment. The themes of FJGI are all supportive of sound decisions in caring for people and the environment: Interdependence, Unity and Diversity, Wellness, Safety, Stewardship, and Sustainability. Students walk the talk by serving as docents, members of work crews, and participating in community recycling or clean-up programs.

**DRIVING QUESTION(S):**

- What are the concerns or problems facing our environment?
- What's being done to address these?
- What can I do?

**Possible related courses:** (Determination by teachers)

- Social Studies
  - Environmental Studies:
    - To develop knowledge, skills, and attitudes crucial to problem solving and decision making regarding environmental issues/problems.
  - Marine Studies:
    - To develop knowledge, skills, and attitudes appropriate to the preservation, conservation, and restoration of the environment.

- Science
  - Environmental Studies, Science
    - Describe human interaction with the environment as an individual, as a social being, and as a species.
    - Use inquiry skills and processes, for problem solving and decision making in appropriate situations.
    - Participate in activities to investigate and resolve environmental issues.
  - Environmental Science
• Evaluate human interaction with and impact on Hawaii’s environment.
• Apply problem-solving and decision-making skills to address environmental issues and to promote wise use of the environment.

• Agriculture
  • Agricultural Arts
    • Develop safe and fundamental skills and techniques in growing and maintaining plants and/or other living organisms to enhance personal, home, and community living.
    • Acquire and apply concepts of conservation, ecology, and agricultural design.

CONTENT STANDARDS:

Social Studies: Geography
• Environment and Society: Students demonstrate stewardship of earth’s resources through the understanding of society and the physical environment.
  • Evaluate consequences of human activities on earth and implement a plan of action for the use and stewardship of local and global resources.

Science: Historical Perspectives
• Malama i ka ‘Aina: Sustainability. Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
  • Conservation of Resources: Analyze, evaluate and propose possible solutions in sustaining life on earth, considering the limited resources and fragile environmental conditions.

Health Education
• Students advocate for personal, family, and community health.
  • Design a health advocacy campaign.

Career and Life Skills: Individual, Family, and Community Development
• Students develop knowledge and understanding of how individuals grow and develop over the life span within the context of various family and community systems.
  • Analyze conditions in families, communities, and the global society that influence human growth and development.
Life Skills: Complex Thinking

- **General Learner Outcome:** Students have the ability to be involved in complex thinking and problem solving.
  - Decision making: Identifies important and appropriate alternatives to be considered.

### CONTENT:

<table>
<thead>
<tr>
<th>Content Knowledge</th>
<th>Content Skills</th>
<th>Process Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human decisions and actions affect the balance or imbalance in the natural systems.</td>
<td>Working Together</td>
<td>Decision making</td>
</tr>
<tr>
<td>If the fragile environment is to be preserved, alternatives must be found for many current practices of human beings.</td>
<td></td>
<td>Communicating</td>
</tr>
</tbody>
</table>

### COMPONENTS:

**Potential Service Sites:**
- Hawaii Nature Conservancy
- CTAHR
- Department of Land and Natural Resources
- U.S. Forestry
- County or Community Recycling Centers
- Soil Conservation, Department of Agriculture
- City and/or County Parks and Recreation Departments
- Community college agriculture/farm programs

**FJGI Activities Extensions:**
- "Rot for Your Plot" – INTERDEPENDENCE
• Porous or Poor-Us: Students can extend this activity through service-learning with projects that are addressing problems such as erosion, reforestation, etc.

• “Know Your Pests” – UNITY AND DIVERSITY
  • Transport/Import: This is a critical activity that has links with major problems such as miconia and fire ants. Worthwhile service-learning experiences will result from work with awareness campaigns, area clean-ups and removal efforts.

• “Why Organic Growing?” – SUSTAINABILITY
  • Victory Gardens: There are community gardens in certain areas that are provided by county or state agencies. Students may be able to participate in the maintenance and/monitoring of these areas as part of service-learning. This provides the students with an opportunity to help the community farmers understand alternatives to excessive use of chemical fertilizers or ...cides.
  • WOG IT!: Students seriously looking at agriculture as a future work area will benefit from service-learning at sites such as community college agricultural farms or CTAHR extension demonstration sites.
Appendix I:

HEALTH EDUCATION BENCHMARKS
Department of Education
Hawaii Content and Performance Standards II
<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Benchmarks</th>
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<tbody>
<tr>
<td>1.0 Students comprehend concepts related to health promotion and disease prevention:</td>
<td>• Justify actions to promote and protect one’s own health throughout life.</td>
</tr>
<tr>
<td>• Injury &amp; Violence Prevention</td>
<td>• Implement ways to help others promote and protect their health.</td>
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<tr>
<td>• Tobacco Use Prevention</td>
<td>• Evaluate the short and long term benefits and consequences.</td>
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<tr>
<td>• Alcohol &amp; other Drug Use Prevention</td>
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<tr>
<td>• Sexual Health</td>
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<tr>
<td>• Nutrition</td>
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<tr>
<td>• Mental Health</td>
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<tr>
<td>• Personal and Consumer Health</td>
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<tr>
<td>• Community and Environmental Health</td>
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<tr>
<td>2.0 Students access valid health information and health-promoting products and services.</td>
<td>• Evaluate the validity of different sources of health information.</td>
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<tr>
<td></td>
<td>• Compare health information provided from home, school and community resources.</td>
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<tr>
<td></td>
<td>• Demonstrate the ability to access health services (e.g., private insurance, managed care, HMOs).</td>
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<tr>
<td>3.0 Students practice health-enhancing behaviors and reduce health risks.</td>
<td>• Evaluate personal coping and stress management strategies (e.g., situation-taking a driver’s exam).</td>
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<tr>
<td></td>
<td>• Practice self-management skills to maintain and improve one’s own health.</td>
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<td></td>
<td>• Evaluate the effectiveness of positive health practices in overcoming setbacks in achieving health goals.</td>
</tr>
<tr>
<td></td>
<td>• Plan responses to appropriate and inappropriate risk.</td>
</tr>
<tr>
<td>4.0 Students analyze the influences of media, culture, technology, and other factors to enhance health.</td>
<td>• Evaluate the relationships and complexity of internal and external factors that influence health behaviors (e.g., personal, family, and community).</td>
</tr>
<tr>
<td></td>
<td>• Generalize the impact of internal and external factors on health outcomes.</td>
</tr>
<tr>
<td>Content Standard</td>
<td>Benchmarks</td>
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</tbody>
</table>
| **4.0** Students analyze the influences of media, culture, technology, and other factors to enhance health. | • Evaluate the relationships and complexity of internal and external factors that influence health behaviors (e.g., personal, family, and community).  
• Generalize the impact of internal and external factors on health outcomes. |
| **5.0** Students use interpersonal communication skills to enhance health. | • Practice maintaining one’s personal values while at the same time maintaining friendships.  
• Demonstrate negotiation and collaboration strategies to manage conflict through analyzing the causes of disputes.  
• Demonstrate communication skills necessary to avoid potentially harmful situations. |
| **6.0** Students use goal-setting and decision-making skills to enhance health. | • Evaluate processes towards achieving health goals.  
• Analyze immediate and long-term consequences, including personal, family, and community consequences.  
• Create a plan for enhancing life long health.  
• Implement strategies for achieving a personal long-term health goal. |
| **7.0** Students advocate for personal, family, and community health. | • Evaluate effectiveness of strategies in communicating health information and ideas.  
• Evaluate the effect that health information and opinions have on a particular audience.  
• Defend a position which encourages a health enhancing behavior.  
• Design a health advocacy campaign. |
Appendix II:

LIFE SKILLS STANDARDS
LIFE SKILLS STANDARDS from
ASSESSING STUDENT OUTCOMES: Performance Assessment Using
the Dimensions of Learning Model
By Robert J. Marzano, Debra Pickering, Jay McTighe
1993

COMPLEX THINKING
• Effectively uses a variety of complex reasoning strategies.
• Effectively translates issues and situations into manageable tasks that have a clear purpose.

INFORMATION PROCESSING
• Effectively uses a variety of information-gathering techniques and information resources.
• Effectively interprets and synthesizes information.
• Accurately assesses the value of information.
• Recognizes where and how projects would benefit from additional information.

EFFECTIVE COMMUNICATION
• Expresses ideas clearly.
• Effectively communicates with diverse audiences.
• Effectively communicates in a variety of ways.
• Effectively communicates for a variety of purposes.
• Creates quality products.

COLLABORATION/COOPERATION
• Works toward the achievement of group goals.
• Effectively uses interpersonal skills.
• Contributes to group maintenance.
• Effectively performs a variety of roles.

HABITS OF MIND
• Self-Regulation
  • Is aware of own thinking.
  • Makes effective plans.
  • Is aware of and uses necessary resources.
  • Is sensitive to feedback.
  • Evaluates the effectiveness of own actions.
• Critical Thinking
  • Is accurate and seeks accuracy.
  • Is clear and seeks clarity.
  • Is open-minded.
  • Restrains impulsivity.
  • Takes a position when the situation warrants it.
  • Is sensitive to the feelings and level of knowledge of others.

• Creative Thinking
  • Engages intensely in tasks even when answers or solutions are not immediately apparent.
  • Pushes the limits of own knowledge and abilities.
  • Generates, trusts, and maintains own standards of evaluation.
  • Generates new ways of viewing a situation outside the boundaries of standard conventions.
Appendix III:

FJGI: PARTIAL REFERENCE
**Beneficials:** See Organic Gardening’s Field Guide (May/June 1996, pp. 48-49)


**Chemical treatment:** Read seed labels!

Example: Rogers brand sweet corn and peas.

“Danger! Treated with Thiram or Thiram and one or more of the following: Benomyl (Beniate), Chlorpyrifos (Lorshan), Iprodione (Rovral), Apron as stated on product label. Do not use for food feed or oil. Thiram is an animal carcinogen, teratogen, and mutagen. Prolonged exposure is toxic to the nervous system, liver, and kidneys. Avoid contact with skin and eyes (may cause irritation or allergic reactions) and clothing. In case of contact, immediately flush skin and eyes with copious amounts of water and seek medical attention; change contaminated clothing immediately. Avoid alcohol before and after Thiram use. Handle in area with adequate ventilation; avoid breathing dust. Wear NIOSH-approved respirator, latex gloves, and goggles when handling.

**Compost:**

Composting tips:

- Nitrogen is essential. Try to keep a balance of one part nitrogen to thirty parts carbon. Most green plant materials contain this balance. Woody material is higher in carbon; manure & kitchen scraps higher in nitrogen.
- Turning the pile aerates the compost. Aeration is important as it opens air channels in the compost pile and speeds up the composition process.
- Maintain proper moisture conditions (about the consistency of a damp sponge).
- Compost pile should be at least three feet wide by three feet deep by three feet tall.
- Keep woody material small. Promotes faster decomposition.
• Cover the pile to retain moisture in dry areas or keep moisture out in wet areas.
• Kitchen scraps should be buried in the pile or they will attract flies or animals.
• Add soil or old compost to activate your pile.

Criteria: Disease-suppressing, plant nurturing, soil-improving, speedy preparation.

Critters and creatures:
• Bacteria – first decomposers; break down the plant waste. They double in number every 20 minutes, emitting heat as they respire, causes compost pile to heat rapidly in the first few days.
• Actinomycetes – higher form of bacteria. Their webbed, hair-like white colonies become visible in the compost pile a few days to weeks after. They add a pleasant, earthly smell as they take over the pile, stabilizing and helping to build humus, antibiotics and bacterial inhibitors.
• Fungi – are everywhere, help to break down decaying plant tissue, and make nutrients in these tissues available for reuse.
• Flies - bring bacteria to the pile to help begin the composting process, and die out as the pile heats up. Fly maggots do not survive hot temperatures.
• Sowbugs - feed on woody material and tough leaves.
• Springtails - easy to spot because they are tiny, white, and appear to jump when disturbed.
• They feed on decaying vegetation, pollen, fungi, and nematodes.
• Amphipods - little, pale, shrimp-like crustaceans that feed on organic matter.
• Flatworms - slimy, eel-like critters with hammer shaped heads; they eat decaying tissues.
• Earwigs - some feed on decaying vegetation, and some eat other insects.
• Millipedes - are often orange or black with “feet” on each segment. They coil up when handled and exude an irritating substance if squeezed. They feed on decaying plant tissue, dead insects, and excrement.
• Snails and slugs - eat living plant material, garbage and plant debris. Because they may carry rat lung worm, which causes disease, gloves should be worn when removing snails or slugs from the pile.
• Mites - are very tiny and fast; they eat decomposing plant material, nematodes, fly larvae, other mites and springtails. Mold mites feed on yeasts in fermenting materials.
• Termites - feed on woody plant branches.
• Centipedes - feed on spiders and insects, using claws below their head which contain poison glands. Small centipedes are numerous at one stage in the pile, but are generally rare in finished compost.
• Spiders - eat other insects, control garden pests.
Beetles – feed on fungi, other insects and snails and slugs

Cockroaches – most are small, shiny black burrowing roaches that prefer the compost pile because they eat decaying woody material. The roach is a preferred food source of the bufo-toad.

Ants – enter pile as it is cooling. They eat fungal spores, and make compost richer in phosphorus and potassium by moving minerals into their nests.

Nematodes – although some nematodes can be serious garden pests, the vast majority are beneficial. The most numerous critters in the compost pile, they thrive on decaying matter, and many feed on bacteria, protozoa, fungal spores, and on other nematodes. Adding finished compost to your garden aids in keeping pest nematodes under control.

Earthworms – they are the heroes of the compost pile; they till the soil, make nitrogen, phosphorus and potassium available, help glue together soil particles, aid in adding air and water to the pile, digest wastes.

How it works: A balance of five essential ingredients is the key to rapid, trouble-free compost production. Maintain the correct balances between water and air and between carbon and nitrogen, and decomposing organisms— insects, worms, bacteria, and fungi—do the rest.

Water is required by all living things, including decomposers. Pile should be moist, but not too wet. A bad odor may indicate that excess moisture is inhibiting decomposition.

Oxygen is essential to most decomposers. Oxygen cannot circulate well if the pile is too tight, too big, or too wet. Anaerobic decomposition—detected by swampy odor—is slow and inefficient.

Carbon is abundant in most organic materials and is broken down by decomposers to create food-energy. However, other nutrients are needed for carbon to be readily eaten. Wood and paper are examples of materials that are high in carbon but may be deficient in other nutrients and thus slow to decompose.

Nitrogen is required by decomposers in relatively large quantities. It is a major ingredient in protein, a basic building block of life. Without sufficient nitrogen to assist digestion of carbon-rich materials, decomposition goes very slowly. Green leaves and grass clippings are examples of nitrogen-rich materials.

Decomposing organisms produce heat by their activity. This heat in turn energizes them, and the whole process goes faster. Heat also helps kill disease organisms and weed seeds. The speed of composting varies, but at some point the center of the pile should feel hot or very warm to the touch. A well-managed pile can produce compost in about two or three months.
Troubleshooting: “Back Yard Composting Handbook” Recycle Hawaii and Cooperative Extension Service
(See also Compost Wheel: What if? Possible Causes: What you can do.)

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>LIKELY PROBLEMS</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offensive Odor</td>
<td>Insufficient aeration</td>
<td>Turn and loosen pile.</td>
</tr>
<tr>
<td>Ammonia Odor</td>
<td>Too much nitrogen</td>
<td>Add carbon-source materials.</td>
</tr>
<tr>
<td>Pile doesn’t heat up</td>
<td>Insufficient nitrogen</td>
<td>Add nitrogen-rich materials.</td>
</tr>
<tr>
<td>Pile too wet</td>
<td></td>
<td>Turn, add dry carbon-sources. Protect from rain.</td>
</tr>
<tr>
<td>Pile too dry</td>
<td></td>
<td>Turn, sprinkle with water</td>
</tr>
<tr>
<td>Pile attracts flies, animals</td>
<td>Inappropriate materials</td>
<td>Don’t use meats and oils. Remove attracting materials or rotate them to the center of pile and cover with carbon-source materials.</td>
</tr>
</tbody>
</table>

Uses: Do not use compost to germinate seeds. It may contain a fungus that could cause “damping off” of seedlings.
- Spread on flower and vegetable garden before turning the soil. Apply compost around flowers or between garden rows.
- Use as a mulch for bushes, trees, and plants to conserve moisture, control weeds, and insulate plant roots.
- Make a compost tea solution to feed your potted plants.
- Mix sifted compost into your potting soil mixture.

What is compost?
- Dark, crumbly, earthy-smelling form of decomposing organic matter.
- Essential part of healthy soil.

Why is composting important?
- Recycles yard wastes back into the soil. (Approx. 20% of trash is yard waste and 8% is food, which go to landfills)
- Returns nutrients back to the soil
- Enhances soil and plant health
- Improves soil’s ability to retain water
- Builds soil in rocky gardens
- Saves valuable landfill space

What can be composted?
• Grass clippings and leaves
• Tree and shrub trimmings
• Vegetable scraps and flowers
• Farm manure
• Coffee grounds and tea bags
• Seaweed (rinsed with fresh water)
• Egg and nut shells
• Shredded paper (avoid glossy)

What should not be composted?
• Meat and bones
• Dairy products
• Large woody material
• Diseased plants
• Dog feces
• Cat litter

What to put in:
• Grass clippings
• Leaves
• Kitchen and garden wastes (avoid meat or dairy scraps, never put pet manures)
• Other local organic “wastes” (produce scraps, coffee grounds, corn cobs, seaweed, crab shells, etc.)
• Chunky, unfinished compost or soil (helps keep moisture levels even and assures good supply of microorganisms)
• Straw (stiff, hollow stems allow air to flow so that microorganisms can thrive)

Use of compost:
• Fertilize crops (Half-inch layer)
• Build new beds (1 or 2 inches of mature compost into new beds, 4 to 6 inches deep)
• Mulch (suppresses weeds and conserves moisture while feeding crops and protecting from disease)
• Maintain a healthy lawn (half-inch to fertilize, prevent disease, and improve water retention)
• Start seeds and fill containers (as potting soil when well-aged, at least 6 months)

Controls:

Hot Peppers:
• Bacillus thuringiensis (Bt) and garlic found to lower insect feeding damage at level equal to or better than the chemical standard treatment. (Dr. Geoff Zehnder, Auburn University, Alabama)

Milk:
• found to be a powerful tool for fighting fungi and mildew on garden crops. (Berttiol, Wagner. Crop Protection vol. 18, 1999, pp. 489-92)

Products:
• floating row cover, diatomaceous earth, pheromone traps, sticky traps, insecticidal soap, oil sprays, Bacillus thuringiensis (Bt), parasitic nematodes, Nosema locustae,(OG May/June 1997, pp. 38 – 43)

Pests:
• Corn Earworm, cucumber Beetles, Colorado potato beetle, Bean beetles, Flea beetles, Root maggots, Cabbageworms, stink bugs, aphids, grasshoppers, cutworms, whiteflies, squash vine borer

(BG May/June 1997, p. 32-37)

Boric Acid: University of California at Riverside (Klotz and Greenberg) found that commercial boric acid products contain too much boric acid for good long-term control (contain 5% to 17% solution). They kill some ants quickly. But lower dose will have more ants eating the bait and will take some of the boric acid back to the nest to feed other ants and the queen.
• Make a 1% boric acid and 20% sugar solution (1 teaspoon of boric acid and 6 tablespoons of sugar in two cups of water. Soak cotton balls in bait solution.
• Make bait dispensers out of old plastic margarine tubs with lids. Punch holes in them so the ants can get inside, then put the cotton balls into the containers and cover with the lids so the bait will not dry out.
• Place bait containers where there are ants.
• Clean the containers and freshen up bait solution at least once a week.
• Be patient.
• After a few weeks, reduce the boric acid content even further for long, long term control.

Ducks and Geese:
• Geese make great weeders - have been used in strawberry, cotton, orchards, and potato fields. See OG July/Aug 1997, p. 26

Ladybug:
• Ladybugs are a gardener's best friend — feed on aphids, mites, eggs of cabbage moth, and other common garden pests. Utah State University found that ladybugs can be attracted to the garden with a simple sugar water solution. Study
confirms that common table sugar can be used to attract these pest-eaters. Also attracts other beneficial insects such as lacewings and picnic beetles.

Low-tech:
- Plant resistant varieties.
- Keep a clean garden.
- Turn, turn, turn (soil)
- Use water as a pesticide! A study at Texas A & M found that water sprays reduced spider mites and aphids by 70%.
- Ring your seedlings. Simple barriers are very effective (cardboard from toilet paper or handtowels or aluminum foil collars, etc.)
- Plant a trap. Plant a few sacrificial “trap” vegetables that can lure pests away from the crop.
- Mulch pests away.
- Invite beneficials in. Plant lots of flowers, allow herbs to flower in and around garden.
- Don't forget to rotate. Works against at least two pests - corn rootworm and root knot nematodes.

Pests: Integrated Pest Management (IPM): systems approach to reduce pest damage to tolerable levels through a variety of techniques, including natural predators and parasites, genetically resistant hosts, environmental modifications and, when necessary and appropriate, chemical pesticides, minimizing the use of toxic pesticides. Maximizes nonchemical control tactics include:
- Physical and Mechanical controls - make the environment unsuitable for the entrance or dispersal of the pest. To the extent that the environment can be controlled, pest outbreaks can be prevented (e.g., heat and cold).
- Chemical Control - use of a chemical biocide such as herbicides, insecticides, miticides, nematicides, bactericides, avicides, and fungicides, also disinfectants. Numerous drawbacks: cost, resistant pests, killing beneficials, hazard to human health, contamination to soil and groundwater.
- Biological control - use of natural enemies to control plant pests. Parasites such as tiny wasps on caterpillars, predators like ladybird beetles prey on aphids, and insect pathogens such as viruses, bacteria, fungi, or nematodes reduce plant pests.
- Cultural control - use of cultural practices that discourage or reduce pest populations. These include watering and fertilizing practices, fallowing beds, rotating crops, selecting resistant varieties, sanitation, pruning.
- Other controls - autocidal control (releasing sterilized male insects), pheromones (sex attractants to disturb the natural mating process or to trap), and growth regulators (inhibit insects' development).

Slugs: OG May/June 1997 pp. 46 -48

Food: Just Grow It! REFERENCES
Mulches that control weeds may also harbor slugs when consistently wet.
Extra sunlight dries soil and makes environment less habitable by slugs and snails.
Raised beds drain faster after rainstorms and reduce slugs.
Manual eradication—pick slugs up at night with surgical gloves and flashlight
Eggshells, dried and crushed, when spread in a circle around plants seem to keep soft-bodied slugs from crossing the line.
Diatomaceous earth (fossilized remains of ancient sea dwelling diatoms) is composed of sharp particles that deter slugs.
Lay wooden planks in garden pathways. Slugs will tend to hide under them when the sun rises. Merely scrape off and dispose.
Strong and acidic coffee grounds found to repel slugs.
A trap made of a shallow container (tuna can, margarine tub), buried in the ground up to the lip of the container, and filled with cheap beer will attract slugs. (And they drown—get drunk?)
Quack grass (Agropyron repens) contains slugicidal properties—as a repellent and a toxin.
Edge beds with copper (chemical reaction). Pre-made products are available.
Commercial traps and slug-repelling products are available.
Some plants are avoided by slugs (unless they are ravenous).
Get ducks!

Attracting beneficials:
Don’t use pesticides—even botanical ones (exception Bacillus thuringiensis (Bt)).
Grow some grass. Turfgrass is home to ravenous predators like ground beetles, rove beetles, tiger beetles
Keep down the dust. Dust-raising activities will kill more beneficials than pests.
Create a garden that celebrates diversity (annual & perennial ground covers, shrubs, trees, some permanent arrangements like stone paths or decorative rocks, native grasses)
Plant lots of flowers.
Plan for a full season of blooms.
Provide water – birdbaths
Go wild – native beneficials love native vegetation.

Certain flowers attract a beneficial insect that controls Japanese beetle grubs. Especially the spring tiphia wasp, which attacks the beetles during their white grub stage, when they often damage lawns. Best so far have been peonies, forsythias, and firethorns.
Chrysanthemum cinerarifolium commonly called pyrethrum daisy is one of the world’s oldest botanical insecticides. Pyrethrum is the oldest form of this botanical insecticide, containing pyrethrins—neurological toxins that poison on
contact. Insects affected: Japanese beetles, mosquitoes, tent caterpillars, ants, yellowjackets. Warnings: keep away from cats, cold-blooded animals like fish and frogs, toads; kills beneficial insects too; dangerous when inhaled by humans. It is a contact insecticide, so must be touched to be effective.

**Pest Patrol:** Beneficial insects eliminate pest insects by playing one of two main roles: 1) parasite or 2) predator. Parasitic beneficial insects depend on pest insects for survival because they must lay their eggs on or in them. The immature stages of the beneficial develop in or on the “host” pest insect, feeding on its body and, in most cases, killing it. Predators are beneficial insects that eat pest insects. So they depend on other insects for survival in a much more direct manner.

- **Parasitic wasps:** paper wasp – true hunters, female paper wasps pick up whole caterpillars (tobacco hornworms, imported cabbageworms, and gypsy moth caterpillars) bite them into little pieces to feed their young.

**Pests:**
- Feathered patrol stops pests. Every bird in yard is valuable. Feeding stations.

**Crops:**

**Feeding growing populations:** (OG Sept/Oct. 2000, pp. 53-59)

- Dennis Avery, Hudson Institute: “Widespread organic farming is simply not a viable option at this time. The first consequence of a global shift to organic farming would be the plowdown of at least 6 million square miles of wildlife habitat to make up for the lower yields of organic production.”
- Assumptions: 1) It will take a lot more food to feed the world; 2) More intensive industrial agriculture can produce a lot more food. 3) Organic farming cannot...

**Culture:** Cultural links to plants. “The mana of the plants is in their mo’olelo (stories). Like lama (a hardwood tree) means ‘the light.’ I find that the plants are a direct link to our kupuna (ancestors).” Attachment to native plants brings grower into the realm of the sacred and profound, that the link to the kupuna is a mystical tie to ancient truth and wisdom. Part of the continuum that connects past to present and present to future. Noyes, Martha

**Drugs:** “Using Spider-Web Patterns to Determine Toxicity” NASA Tech Briefs MFS-28921. “We have taken the webs of spiders which have been affected by caffeine, chloral hydrate, marijuana, and benzedrine. ... A caffeine web appears as a loose, ragged array of crooked, unfinished spokes. A benzedrine web displays more organization but less symmetrical
balance. A marijuana web lacks outer spokes. A web spun under chloral hydrate is barely begun before the spider loses motor control."

**Fast Foods:** CTAHR, July 1999

**Fertilizer- Organic:** Sometimes need to take extra steps to improve soil.

1) Have soil tested
2) NPK ratio refer to the percentage of total nitrogen in a product, while the numbers for phosphate and potash only tell the amount of those nutrients that will be available the first year — not the total amount available in the bag.
3) Organic fertilizers generally are slow-to-release, so the P and K numbers are lower than the ones on synthetic fertilizers. Low numbers can be a plus in any fertilizer. “…the soluble nutrients in synthetic fertilizers never even reach the plant and the nutrients that escape can pollute the soil surface and groundwater. With organic fertilizers, plants capture more of the nutrients because they’re delivered more slowly.” (Bill Wolf)
4) Nitrogen Fertilizers: most soil test reports do not tell the level of nitrogen so could use “organic matter” level as a good indicator of how much nitrogen will become available to plants as soil microbes break down that organic matter. If soil tests low in organic matter or if nitrogen-hungry crop (lettuce, spinach, corn, cabbage or broccoli) being grown show signs of nitrogen deficiency (yellow leaves, stunted growths), probably need to add nitrogen. Blood meal - (12-2-0); Fish meal (9-7-0); Cottonseed meal (6-2-2)
5) Phosphorus Fertilizers: Like nitrogen, phosphorus is released when organic matter breaks down in the soil. To get the phosphorus into the soil if and when it needs it — a. Dig it in where plant roots can reach it (broadcasting over surface does not work); b. Bonemeal (1-11-0) breaks down faster than other sources; c. Rock phosphate (0-3-0) releases very slowly and needs lots of microbial life in the soil with pH at 6.4 or less. d. Colloidal rock phosphate (0-2-0) good for sandy soil since it contains clay which helps bind the sandy soil particles and holds in nutrients. Wear respirator.
6) Potassium Fertilizers: Helps plants function smoothly by promoting flow of nutrients throughout the entire plant and improving quality of fruits and seeds, and helping plants withstand stress (disease, drought, temperature extremes, etc.). Soil test indicates needs - a. Greensand (0-0-1) aka glauconite. Slow release, very rich in trace minerals; excellent soil conditioner — binds particles in sandy soils and loosens clay soil. Only occurs in New Jersey, made from old marine deposits. b. Sul-po-mag (0-0-22) is commercial name for the mined mineral known as sulfate of potash-magnesia.
7) Calcium Fertilizers: Known as the queen of nutrients—needed in greater quantity than any other soil nutrient, not just for raising pH. Calcium deficiency is most common soil problem when rainwater acts to leach it out. Can cause dieback of growing tips of plants (including their roots) and lead to blossom end rot in tomatoes. Remedy depends on pH. If soil is acidy (6.5 pH or less), use limestone. If pH is 6.6 or above (neutral to alkaline) use gypsum. Potassium is released very quickly; can interfere with plants’ absorption of other nutrients if used too often. Also has a high level of magnesium which can become a problem when it build up too much in relation to calcium.

8) Sulfur Fertilizers: Sulfur works together with nitrogen. Without sulfur, plant growth slows and leaves can turn yellow. Soils low in organic matter and acid pH are most like low in sulfur. Two sources are Sul-po-mag and gypsum. Also manure. Elemental sulfur may be added to soil with sulfur deficiency but alkaline pH. Elemental sulfur is a naturally occurring mined mineral; works very quickly and lowers soil pH faster. Too much may create a hard black layer on the soil surface, stopping the percolation of moisture and air through soil. Also can kill some beneficial microbes in the soil.

Food Guide:

Pyramid - Bottom up
- Energy Foods - bread, cereal, rice, and pasta group (Grain foods) and starchy vegetables (6 - 11 servings)
- Protective Foods - vegetable group (3 - 5 servings)
- Protective Foods - fruit group (2 - 4 servings)
- Body Building Foods - milk, yogurt, cheese, and calcium food group (2 - 3 servings)
- Body Building Foods - Meat, poultry, fish, dry beans, eggs, and nuts group (2 - 3 servings)
- Caution Foods - Fats, oils, salt, sweets, and sugar

Foods for Wellness: Choices for Healthy Eating
- Variety - eating many different kinds of foods; also, drinking water, the liquid needed by the body.
- Proportion - eating more foods from the bottom two levels of the pyramid—grains, fruits and vegetables—and fewer foods from the top level (fats, sugars and salt).
- Moderation - limiting the amounts of foods that are high in fats, sugars and salt.
- Whole foods - choosing natural, unprocessed forms of food when possible.

Food Labels: See “How to Read the New Food Label” by American Heart Association and FDA
Genetic Engineering:

- 1988, a genetically engineered food supplement (the amino acid L-tryptophan) caused the death of 37 Americans and permanently disabled at least 1,500 others. The supplement had previously been produced safely by culturing bacteria, but the Japanese company that produced the deadly supplement genetically engineered the bacteria in an attempt to produce the tryptophan faster. In testimony at a Food and Drug Administration hearing on genetic engineering regulation, attorney Steven M. Druker, executive director of the Alliance for Bio-Integrity, said “the genetically altered tryptophan was later found to contain unusual and highly toxic contaminants, and many experts now believe the presence of the toxins was an unexpected side effect of the bioengineering procedure. Although a definitive answer on this disturbing incident has not been reached (much of the relevant evidence in the manufacturer's laboratory has been destroyed), biotech critics believe it demonstrates the serious hazards of genetic engineering techniques. [www.bio-integrity.org/fdaPMP.html](http://www.bio-integrity.org/fdaPMP.html)

- Free GE Report, Organic Gardening, 33 E Minor St., Emmaus, PA 18098 SASE

- Powerful and rapidly developing new technology that gives scientists the power to literally create new life forms by moving genes across Nature's species barriers. Carries positive potential theoretically. It is also very imprecise and unpredictable. Studies have already shown:
  - Genetic manipulation can transfer new toxins and allergens to food plants.
  - Allow genes to escape into wild plants.
  - Produce totally unexpected and difficult to detect side effects (e.g., pollen that kills beneficials).

- Other issues like irradiation, biosolids - see OG March 1998, p. 24

- Soybeans genetically engineered are yielding an average of 6.7% less than the leading conventional varieties (Benbrook, Charles. 8,200 trials)

- U of I study found one type of genetically modified corn variety is toxic to swallowtail-butterfly caterpillars. Another type was not toxic.


- Genetically engineered superweeds resistant to three herbicides in Canada.

- Roots of corn plants genetically engineered to produce the Bt pesticide will release the pesticide into the soil, where it will remain toxic to soil life for up to 8 months.
Most genetically engineered foods should be withdrawn from the market because they contain CaMV (cauliflower mosaic virus) promoter gene, which has the potential to reactivate dormant viruses or create new viruses in the crops to which it has been added (Microbial Ecology in Health and Disease). We have no way of knowing what the downstream effects will be or how [genetic engineering] might affect the environment. We don’t get one rude shock after another.” (Richard Lewontin, Harvard U. geneticist, New York Times Magazine) (AGBioTech InfoNet Web site at www.biotech-info.net)

Greens: Often thought of as pesky weeds, Mediterranean wild greens can brighten a salad or meal. The names of domesticated cultivars are in bold. Asterisk indicates a plant that can become invasive.

Common Arugula or Italian cress (Eruca vesicaria) – peppery, nutty
Wild Arugula (Dipteris erucoides, or D. tenellifolia) – peppery, nutty
Borage (Borago officinalis) – mild cucumber taste
Burnet (Potentilla sanguisorba) – mild flavor
Chicories* (Dentaria, ‘Spadona’ (Chicorium spp.) – Bitter
Borage (Borago officinalis) – mild cucumber taste
Dryland Cress or Land cress* (Barbarea verna) – peppery
Water cress* (Nasturtium officinale) – sharp
Dandelion* (Taraxacum officinale) – bitter
Chickweed* (Stellaria media) – mild grassy flavor
Dryland Cress or Land cress* (Barbarea verna) – peppery
Nasturtium officinale – sharp
Miners Lettuce* (Claytonia perfoliata) – mildly sour
Plantain* (Plantago lanceolata) – sour
Garden Sorrel (Rumex acetosa) – sour citrus tang
• Violet Leaves* (*Viola odorata*) - nice grassy flavor  

**Greens - Spicy:** Mibuna and Mizuna, mustard spinach, arugula cress, nasturtium, mustard greens.

**Hawaiian Culture:** The Hawaiian farmer, mahi'ai, recognized the value of what today is known as “organic farming”: incorporating into their cultivated areas such plant materials as weeds that green during fallow periods and unused leafy portions of food plants, a type of green-manuring. No other type of fertilization was practiced. In the grading and building of terraces for growing taro and the construction of a system of aqueducts, flumes and ditches to bring water from dammed streams or springs to the terraces, the Hawaiians showed greater engineering and building skill, ingenuity, industry, and planning and organizing ability than any other Polynesian people.  
(Beatrice H. Krauss. *Plants in Hawaiian Culture*. 1993)

**Herbs:**

**Basil (Ocimum basilicum):**
• intense flavor, wonderful aroma and nice garden plant. Medicinal - contains many anti-viral compounds. Used as insect repellent in India and Africa. In the kitchen used in pesto, cooked, garnish.

**Coriander/cilantro (Corandrum sativum):**
• has been used in cooking since ancient times.  
• It is a member of the Umbelliferae family (carrots, fennel and dill).  
• The pale mauve flowers form lacy umbels much loved by bees and other beneficial insects including lacewings, ladybugs, hoverflies, and parasitic wasps. Flower form seed pods that are harvested for the spice known as coriander. For centuries the seeds were used to flavor Indian curries, cakes, chutneys, breads, and other baked goods.  
• The leaves known as cilantro or Chinese parsley are a staple ingredient in many Indian, Asian, and Mexican dishes. Roots are sometimes used in Thai curries.  
• Medicinal uses include soothing an upset stomach or to promote good digestion.

Create herbal centerpiece
Culinary-
• Mauve Oriental Garlic Chives (*Allium tuberosum*)—mild garlic-flavored leaves in salads, dips, soups. Flowers as edible garnish.
• Vietnamese Coriander (*Polygonum adoratum*)—Cilantro-and-lemon flavored herb chopped for Asian dishes, salsa or other Mexican dishes.
• Lovage (*Levisticum officinale*)—substitute for celery in soups or stuffing for chicken.
• Golden Crinkled Oregano (*Origanum vulgare AUREUM*)—Spice up a salad

Dye-
• Woad (*Isatis tinctoria*)—produces blue and purple dye. Seed pods are used in dried arrangements. Considered a noxious weed in some places.
• Golden Marguerite or Dyer's Chamomile (*Anthemis tinctoria*)—excellent yellow dye from flowers and leaves.
• Hopi Red Dye Amaranth (*Amaranthus cruentus X A. powellii*)—beautiful red dye from flowers.

Echinacea:
• herb with ability to stimulate the immune system.
• Three species,—*E. purpurea, E. pallida, E. angustifolia*—are used to make medicinal products. Not meant to treat chronic illnesses or those that are deeply ingrained. Taken internally, echinacea is an excellent treatment for upper respiratory infections and can thwart the onset of colds or flues. Can be used externally as an antiseptic to treat wounds and skin conditions by saturating a cotton ball with echinacea tea. (Tea made from flowers) Should not be used continuously. Should not be used by people with chronic immune or autoimmune diseases such as AIDS, multiple sclerosis, or lupus, or those allergic to members of the aster family (*Asteraceae*).

Healing-
• Calendula—cures cuts and scrapes
• Ginseng—fights aging, boosts energy
• Basil—repels insects, wastes warts
• Parsley—beats bad breath, treats kidney stones
• Aloe—relieves burns, soothes sunburn
• Fennel—eases asthma
• Garlic—fights fungal infections, relieves insect bites and stings, stops sinusitis
• Chamomile—battles gingivitis, remedies insomnia, heals sties
- Lemon Balm - tames cold sores, battles insomnia, alleviates headaches
- Peppermint - settles indigestion, sinusitis.

“Herbs for Growing and Enjoying” CT AHR, Urban Garden Center, May 1996
Landscaping (OG March/April 1999, pp 40)

Lemon Balm (Melissa officinalis)
- is a perennial herb, member of the mint family.
- Medicinal - hot tea promotes sweating and is used to treat colds accompanied with fevers. Research in Europe indicates effectiveness against Herpes simplex, mumps and other viruses. Lemon balm oil has antibacterial properties.
- Also useful in fruit salads, summer punches, iced teas, or garnish on lemon sorbet.
- Ingredient in potpourri, soothing bath.

Medicinal (OG, Sept./Oct. 98)-
- Echinacea (Echinacea purpurea) - to stimulate the immune system and treat colds. Roots used.
- Mad-dog Skullcap (Scutellaria lateriflora) - tea works well as a mild sedative. Leaves dried and used.
- Common Valerian (Valeriana officinalis) - sedative tea. Dried roots used.
- St. John's Wort (Hypericum perforatum) - antidepressant; salves. Leaves for tea and flowers and leaves for oil.

Rosemary-Aromatherapy
- Eucalptol - used in some cough drops and as cineole -in chest rubs. Found in rosemary, cardamom, eucalyptus, sage, and teatree.
- See pp. 52-54 (OG Nov/Dec 1997)
- Rosemary (Rosmarinus officinalis) - medicinal - for Alzheimer’s. Contains cineole, which stimulates the central nervous system. Recommended for use as a hair rinse in bath water, for fragrant soap, or in tea. Cooking with rosemary complements variety of foods like lamb, beef or chicken, eggs, cheese or tomato dishes.

St. John’s Wort (Hypericum perforatum)-
- is one of the most highly publicized medicinal herbs on the market today.
- Written about as treatment for depression since 1866. Widely touted as a therapy for depression.
- Also has antianxiety, pain-reducing, antiviral, astringent, and anti-inflammatory properties.
- Taken internally from tea made of dried flowering stems or from tincture. Externally, rubbing of oil will penetrate skin quickly to soothe and heal nerve pain, bruises, wounds, and burns. A rare side effect is an increased sensitivity to sunlight, resulting in skin inflammation.
- To be safe, avoid extensive sun exposure while taking the herb.
• May also interact badly with certain medications such as antidepressants, diabetes medication, stimulants, and L-tryptophan.

**Thyme (Thymus vulgaris)**
• Has been scientifically proven as a cough remedy.
• Lemon thyme releases mosquito repellent oils when crushed.
• Used in cooking fresh or dried, in soups, stews, poultry stuffing, roasted meats, and vegetable, cheese or egg dishes.
• Important part of French and Cajun cuisine.

**High-intensity Agriculture:**

**Successes:**
• Meeting of the food needs of most of the world’s population, even when the population doubled during the past 40 years.

**Short-comings:**
• Contamination of groundwaters
• Release of greenhouse gases
• Loss of crop genetic diversity
• Eutrophication of rivers, streams, lakes, and coastal marine ecosystems (contamination by organic and inorganic nutrients that cause oxygen depletion, spread of toxic species and changes in the structure of aquatic food webs).
• Non-sustainability due to loss of soil fertility, erosion of soil, increased incidence of crop and livestock diseases, and the high energy and chemical inputs.

Search for practices that can provide sustainable yields, preferably comparable to those of high-intensity agriculture but with fewer environmental costs.


**Meal Planning:**

• Plan meals and snacks for your family for one day.
• Be sure to include the recommended number of servings from each food group,
• Include at least 5 servings from the vegetable and fruit groups.
• Go easy on the sugar, fat, and salt.
• Think of a snack as a mini-meal.

**Mulch:**

**Bark:**
• Tree bark mulch lasts longer than wood chip, although both contain mostly the same components and have similar properties. The bark sheds water rather than holds water. It keeps the soil cool. Use in flower beds and around blueberries, but not in tomato patch. Bark sometimes releases toxic volatiles that can harm tomato plants.

**Compost:**
• soil builder, improves earth structure as it supplies valuable nutrients. Used as a mulch, home compost can inhibit plant diseases, because the living microbes suppress the negative microbes that cause plant diseases. Will work as weed prevention and disease protection.

**Hazardous mulches:**
• Pesticide residues on grass clippings lethal to tomatoes, beans, and petunias. Herbicides used on the grasses included 2, 4-D combined with triclopyr, triclopyr with clopyralid, and isoxaben found in Demise, Dormone, Formula 40, Navigate, Weedar, Weedone, Solution, Orchardmaster, Plant Gard, Savage, Envy, Weedestroy, Barrage, Salvo, Statesman, Tributor, Reclaim, Shield, Stinger, Garlon, Baseline, Remedy, Redeem, Pathfinder, Release, Grandstand, Cent-7, Flexidor, X-pand, Ratio and Gallery.
• Also, grass clippings with flurprimidol (Cutless) inhibited the growth of garden crops, as its purpose is to inhibit grass growth.

**Newspaper:**
• Remove and recycle the slick-papered color supplements and the rest of the newspaper is exceptionally effective at suppressing weeds. (6 inch layer of shredded newspaper lasted for two summers).
• Other forms like kraft paper (brown bags) and cardboard also provide physical barrier against weeds. Also found to increase yields in some cases.

One of the best things for the garden: block weed growth, keep soil cool and moist, feed both the soil and the plants growing in it as the mulch decays.

**Grass:**
freshly cut grass clippings are rich in nitrogen and other nutrients. Should not contain grass or weeds that have gone to seed; not from herbicide treated lawn; not from Bermuda grass or zoysia lawn (they root in moist soil and can take over garden). Warm-loving crops like peppers, tomatoes and eggplant do well when grass clipping mulch is applied in areas that are not too hot. For these areas, the grass clippings should be turned into the soil before the planting to build up the organic matter content in sandy soils. Mulch in these areas should help keep growing plants cool.

Pine Needles:
Eggplants mulched with pine needles produced 20% more fruit than plants without mulch. Concern that the mulch will acidify the soil was disproved at Fort Valley State College in GA.

Straw:
Boon to tomatoes, preventing diseases like anthracnose, leaf spot, and early blight from leaving marks on fruit. The straw provides a physical barrier between the fruit and those soil-borne diseases. In the potato patch, a layer (3 to 5 "") of straw cut down the larvae and eggs and adult potato beetle. Also works well as insulator.

Wood chips:
Of hardwood branches make a durable mulch that keeps the soil moderately cool and does a fair job of suppressing weeds. Chips remain in place after heavy rains and high winds. Should not include pressure-treated wood, chemical-soaked pallets, or other undesireable wood. Should be from treetrimmings. If they have a sour or vinegar like smell, do not put around plants right away. Smell comes from acetic acid and other compounds produced when the chips decompose without enough oxygen, and it can kill plants. When wood chips are piled up high, the pile can go anaerobic and the acetic acid builds up. Use on the surface, in perennial beds or on garden paths.


Native Plants: Law made it illegal to have an endangered plant. In 1997 the law was changed that allows native and endangered Hawaiian plants to be sold and to be grown in home gardens. "Cultivated stock and not raiding the forest." So people will stay out of the mountains (preservation) by cultivating the plants they need for cultural practices. Growing pressure on native plants in the wild: areas of undeveloped land decreasing; continued growth and introduction of non-native species increasing. The increase in demand for native and endangered Hawaiian plants is result of two social phenomena:
1) Renaissance of the Hawaiian culture, beginning in 1970’s (learning about Hawaiian plants serves as satisfying way to express interest in Hawaiian culture)
2) Nationwide trend to go "back to nature" and to care for the environment, and trend toward home gardening across the country. Noyes, Martha

**Nutrition:**

- Good nutrition + exercise = optimal learning. Several dietary components support brain function and neurotransmitter activity —protein, fat, B vitamins, iron, choline, and antioxidants. Five food groups and serving suggestions through variety, balance, and moderation.
- Breakfast: children who eat a school breakfast perform better on standardized tests, especially language-ability tests; have improved attention in late-morning task performance; retrieve information more quickly and accurately;
- Make fewer errors in problem-solving activities; and concentrate better and perform more complex tasks.
- Social aspect of meals: nurtures and strengthens relationships, promotes positive communication, and offers a time to celebrate cultural and family traditions; higher scholastic scores of seniors; happier high-achieving teens.
- Movement: Physical activity connected to alertness, mental function, and learning. Exercise increases blood flow to the brain, allowing more oxygen and glucose to flow through and releases endorphins which have a positive impact on moods.

**Organic:** Organic food is produced using only methods that protect and enhance the health of consumers, the health of the soil, and the health of the planet.

- Land fertilized with compost and cover crops, which contribute slow-release nutrients when they are incorporated into the soil.
- Extra soil fertility from natural materials (composted animal manure, fish or blood meal) and natural supplements (limestone, gypsum, rock phosphate and greensand) to help balance the soil.
- Pests are managed through prevention (proper soil management, cleanliness, timed plantings, mixed plantings, row covers and beneficial insects.)
• Hard to control pests are combated using substances such as insecticidal soap and bacterial preparation like *Bacillus thuringiensis* (*Bt*)

**Organic Certification:** Certification is an assurance to consumers, retailers and brokers of organic produce that the produce marketed as “certified organic” has been grown under pre-approved standards set by the certifying agency. In Hawaii, the Department of Agriculture does not have an organic program. HOFA and the Organic Crop Improvement Association (OCIA) are two of the organizations that certify organic farmers. **HOFA process:**

- Completion of application/questionnaire with list of products to be certified, three-year field history, farm maps from 3rd party source, sources of seeds, fertility management plan, pest/weed management, and record-keeping system.
- Inspection of farm for validation of information, onsite observation of crop condition, soil tilth, weeds, pests, conservation, rotations, adjoining use and buffer strips, equipment used and condition, chemical containers, storage and processing areas, livestock housing, animal health records, manure management, and water sources.
- Certification review committee convened to determine certification: conditional, denial, approval.

**Organic Farming:**

**Advantages in Hawaii:**
- Already have a rich indigenous knowledge about organic or nature farming practices.
- Potential to develop a strong organic industry that becomes internationally recognized.
- May provide additional lure for tourists that arrive from regions where a high environmental consciousness exists (Europe, Canada, Japan, and Western U.S.).
- Competitive awareness of local food security issues, appreciation for the need to preserve natural resources, and knowledgeable about the relationships that exist between the food distribution system, human health, and the environment.

**Principles as stated by the International Federation of Organic Agriculture Movements (IFOAM), 1990:**
- To produce food of high nutritional quality in sufficient quantity;
- To work within natural systems rather than seeking to dominate them;
- To encourage and enhance biological cycles within the farming system, involving microorganisms, soil flora and fauna, plants and animals;
To increase and maintain the long-term fertility of soils;
To use as far as possible renewable resources in locally organized agricultural systems;
To work as much as possible within a closed system with regard to organic matter and nutrient elements;
To give all livestock conditions of life that allow them to perform all aspects of their innate behavior;
To avoid all forms of pollution that may result from agricultural operations;
To maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plant and wildlife habitats;
To allow agricultural producers an adequate return and satisfaction from their work including a safe working environment;
To consider the wider social and ecological impact of the farming system.

**Organic Growing:**

**What is it?**

- Form of agriculture that does not use synthetic inputs such as pesticides and fertilizers because of the disruptive effects that the synthetic chemicals can cause on the ecological balance considered essential to maintain a sustainable system indefinitely.

- Organic farming is not just farming without chemicals. Organic growers focus on using techniques such as crop rotation, proper spacing between plants, incorporation of organic matter into the soil and use of biological controls to promote optimum plant growth and minimize pest problems.

- Application of organic pesticides are considered as a last resort and used sparingly.

**Why?**

- To follow Nature's wise and beautiful ways.
- To support the balance of all life. (work with Nature)
- To work with the soil with understanding. (Soil is a living thing and cannot be reduced to a formula. Chemical-based agriculture regards soil as merely a root anchor and reservoir for soil drugs.)
- To avoid interference with the soil's natural function of regulating available plant food. (Soil is basically made up of weathered rock particles and organic matter, closely associated and mixed together. Improving the soil, then is a matter of increasing its content of finely ground-up rock and organic matter. “Feed the soil, not the plant.” The plant will then use the nutrients available regulated by natural processes.)
• To cultivate the beneficial micro-life of the soil. (1. Nitrogen-fixing microbes that receive nitrogen from the air and make it available to the roots; 2. Other microbes that work together with tiny plant roots in a dissolving action to gradually release most soil's abundant storehouse of phosphorus, potassium, and trace minerals.; 3. Earthworms and other tiny creatures that digest, aerate, and enrich healthy soil; 4. Mycorrhizal fungi, plants best friends that form a living sheath around the host plants' roots, living off the sap that exudes from the roots. It is a mutual dependency. The fungus spread its underground threads out into the soil, pumping water, nutrients, growth hormones, and other beneficial substances back to the plant, acting like an extension of its roots into areas where the plant couldn't otherwise reach, and dissolving nutrients from soil in a way that plant roots can't reach. The fungi also detoxify soils, encourage root branching and absorption, protect the plant against soil-borne diseases.
• To unlock the minerals and nutrients already in the soil and air. (1976 showdown between organic and chemical fertilizing found “higher amounts of mineral nutrients in organic plot, and the pH and organic matter were higher in this plot. Even though less total potassium was added to the organic plot, higher soil test values for potassium were measured.”
• To grow the healthiest plants, which are the ones least attractive to pests and diseases.
• Best nutrition. (There is no higher quality food than that eaten just minutes out of your own organic garden or farm.)
• Best taste.
• More sensible economically.
• To reconnect with our own roots in Nature and our ancestors.
• To contribute to ending death by starvation among humanity.

**Organic Market:**

• Rapid growth of organic food market began in early 1990 because of increased health and environmental awareness by general public.
• Europe is one of most progressive.
• U.S. had slower start, but is beginning to take off. Organic produce sales reached $809 million in 1995 (35% increase from the previous year), and sales have been steadily increasing by 20% annually. Increase in demand for organic packaged foods. Where sales used to be in natural food stores and community-based open markets, the consumer
interest and competition resulted in supermarkets becoming the fastest growing outlet for organic food, including fresh produce.

- Organic farms increasing in numbers and size to keep up with the demand.
- Hawaii organic industry estimated between $6-8 million in 1997. Premium prices for certain crops, including commercial fruits and herbs grown organically in Hawaii (white pineapple, avocado, other tropical fruits, salad greens, tomatoes, beans, ginger, taro, medicinals like noni, awa, neem). Increased interest in fresh organic produce on the mainland and in other countries (Japan, Europe).

**Organic Standards:**

**Prohibited substances:**

- Any chemically synthesized material.
- Natural poisons that are extremely toxic and/or take a long time to degrade in the environment.
- Ionizing radiation.
- Others like uncomposted manure applied less than 4 months before harvest or prior to planting crops that accumulate nitrates; uncomposted agricultural residues and by-products from off-farm sources that are not documented to be free of restricted materials.

**Record-keeping:**

- all materials added to the soil or crop, date, location and amount of substance applied; source of all materials brought in from off-farm; chemical treatments of any seeds and seedlings used that were not produced on the farm.

**Management Plan:**

- Addition of composted organic matter; crop rotation for fertility management and reduction for insect and disease pest build-ups; use of green manures and cover crops to improve soil fertility, promote beneficial organism populations, and to reduce erosion; reduced tillage to improve soil structure and reduce soil erosion; use of trap crops, biological control agents, and other habitat manipulation techniques to enhance natural biocontrol mechanisms; buffer zones and boundaries used to mark the organic production areas and to help protect them from contamination by prohibited substances.
Partners:

Earthworms
1) Tunnel and breakup compacted earth so that air and water can circulate more freely
2) Eat dead leaves, bits of soil, rotting plants, and other nourishing debris
3) “CASTINGS” are the richest food for plant roots
4) Action creates great texture in soil, moisture, looseness and ideal loam. Each worm has both male and female reproductive parts - each half of a hermaphroditic couple lays eggs. May live as long as 15 years.

Pesticide: 1998 French farmers reported that a new insecticide, imidacloprid, was killing millions of honeybees, important pollinators in sunflower fields. Called “mad bee disease” because the bees become disoriented and unable to find their way back to their hives after feeding on the treated sunflowers. The insecticide was introduced in 1994 and sold in 70 countries.

Pesticide & Produce: Shop smarter when buying non-organic produce.

Choose produce least contaminated with pesticides:
- Cauliflower, onions, sweet potatoes, corn, brussel sprouts, US grown grapes, bananas, plums, watermelon, broccoli, avocados.

Produce with the most pesticides include:
- Strawberries, bell peppers, spinach, cherries, peaches, cantaloupe from Mexico, celery, apples, apricots, green beans, grapes from Chile, cucumbers.

Pests or Partners:

Ants-
- There are more than 12,000 species worldwide in every type of habitat. Usually neutral. Sometimes bad - ants nesting in the garden can sometimes cause plants to wilt and die. Fire ants are vicious stingers and can cause severe crop damage by eating plant seeds and seedlings. Argentine ants protect aphids, scale and whiteflies and so increase the damage that is done by these pests. On the beneficial side, ants prey on many kinds of pest insects, including termites,
ticks, grubs, billbugs, black cutworms and many other caterpillars, and the eggs of sod webworms and cabbage pests. Like earthworms, they improve the soil by adding organic matter and aerating.

**Asiatic garden beetle (Maladera castanea)**
- Related to the Japanese beetle. Larvae feed on young roots and decaying plant material in the soil. Adults feed on boxelder, butterfly bush, Japanese barberry, garden roses, sumac, viburnum, asters, chrysanthemums, dahlias, goldenrod, strawflowers and the foliage of strawberries, carrots, beets, eggplants, peppers, turnips and peach and cherry trees.

**Black Vine Weevil (Otiorhynchus sulcatus)**
- Larvae feed on plant roots. Adults cannot fly, chew scalloped notches in leaf edges. In the larval stage the root damage caused may stunt or kill plants.

**Chiggers**
- Parasitic larvae of several species of velvet mites (also called red bugs) in the genus *Eutrombicula*. Common in the south, adult mites eat eggs of other insects. Nymphs eat insect eggs and small insects. They bite humans, secreting enzymes into the skin and then suck up dissolved tissues. The enzymes cause itching. The nearly microscopic chigger is the parasitic larva of a very tiny soil-dwelling mite.

**Click Beetles/Wireworms (Limonius agonus)**
- On the nasty side, the wireworm types may be a serious problem to corn, vegetables and tubers. But the adults rarely damage plants and both adults and larvae (wireworm) often eat insect pests.

**Codling Moth (Cydia pomonella)**
- is the worst single pest of apples.

**Daddy-longlegs: (about 200 species).**
- Often called spiders, they are not. They aren't insects either. They are more closely related to ticks and mites. Hunters and scavengers of small, soft bodied creatures (leafhoppers, aphids, snails, earthworms, flies, true spiders and other daddy-longlegs and insect eggs).

**Earwigs**
- These are potentially bad. Earwigs consume a lot of pest insects and their feeding contributes to the breakdown of dead organic material, but they can also overrun a garden and make mincemeat out of vegetable and flowers, especially young and fragile transplants.

**Flea Beetles (Epitrix, Phyllotreta and other species)**
• Tiny, shiny beetles that chew small pits and holes in young seedlings. Each species prefers certain plant family: Brassica crops (cabbage, broccoli, radish, mustard, cauliflower), tomatoes, potatoes, peppers, corn and especially eggplants are beetle targets. High soil nitrogen levels can make crops more attractive to pests.

**Harlequin Bug (Murgantia histrionica):**
• Member of the stink bug family. Harlequin bugs (both adults and nymphs) use their piercing mouth parts to suck the juices from veins of leaves of many plants in the cabbage family and occasionally in squash, corn, beans or okra. Can be serious garden pests. Feeding causes the leaves of plants to droop and wilt, and severe feeding can kill plants.

**Hornworms, tomato (Manduca quinquemaculata) and tobacco (M. sexta):**
• These are very similar and they feed on the same crops including tomatoes, potatoes, peppers, and eggplants. In most cases, natural enemies (spiders, stinkbugs, and damsel bugs) prevent serious damage, and hornworm feeding usually does not reduce crop yields.

**Japanese ladybugs- aka multicolored Asian ladybeetle (Harmonia axyridis):**
• Completely beneficial: larvae eat aphids; adults feed on pollen and nectar but need aphids to reproduce. Sometimes infests homes.

**Luna Moth (Actias luna):**
• Neutral to nice, Very pretty, but they fly at night. Adults do not feed. Larvae (caterpillars) eat the leaves of trees like birch, persimmon and members of the walnut family. Rarely damages the host trees.

**May Beetles/June Beetles (Phyllophaga spp.):**
• Beetle larvae feed on the roots and tubers of many plants, and can be serious pests of turfgrass, especially on golf courses. Related to the nasty Japanese beetle.

**Oriental Fruit Moth (Grapholitha molesta):**
• The larvae feed on tips of young twigs and ripening fruit at the tops of trees. There are four to six generations per year, depending on the climate. The first larvae of the season tunnel into tender shoots, causing them to wilt, turn brown and die. Later in the season, the larvae usually tunnel into the fruit near the stem. Often there is no entry hole visible, but when the fruit is cut open, the larvae and their sawdust-like frass can be found around the pit.

**Pollinators:**
• Plants like tomatoes, melons, squash, beans, peppers, berries, apples, etc., benefit from wild insect pollinators. Some plants like pumpkins and other cucurbits cannot form fruits at all unless their pollen is spread from flower to flower by insects. That's because the male (pollen) and female (the ovary that eventually becomes a fruit) parts are located in separate flowers, and their pollen is too heavy and sticky to be carried from male flower to female flower by the wind.
Also, research has shown that the more bee visits to cucumber flowers, the more fruits set and bigger the cucumbers get.

- Some plants like tomatoes, peppers and eggplants can form some fruit without the help of insects, but with the help of insects (especially bumblebees) these crops yield even more. Hummingbirds and butterflies also pollinate plants such as scarlet runner bean.

Robber Flies (Asilidae) and Tachinid Flies (Tachinidae)
- These insects have large heads and thoraxes, slender abdomens and long bristly legs, and can measure an inch or more. Tachinid flies are usually black, brown or gray, can be up to half an inch long and many look like houseflies. Both are extremely beneficial. The robber fly is omnivorous and a voracious predator of many insect pests (occasionally eating beneficial or benign insects). The tachinid larvae are some of the most effective beneficial parasites, preying on a wide range of insect pests. The adults lay eggs or maggot-like larvae in or on host insects, or in some cases on leaves where hosts ingest them. When the larvae bore out of the host to pupate in the soil, the host dies.

Silverfish (Lepisma and Ctenolepisma species)
- Can be particularly troublesome for libraries and museums. They need humidity.

Symphyllans (Scutigerella immaculata)
- Tiny, centipede-like with 12 pairs of legs, 15 body segments and long, bead-like antennae. (not insects) PEST - chew on germinating seeds, plant roots and tubers. Can stunt plant growth, cause wilting and invite infection via disease organisms entering the plant through injured areas.

Pollinators: Bees pollinate about 75% of the world's crop plants. Flies (not houseflies) do 19%, bats do 7%, wasps and beetles do 5% each, birds 4%, moths 3%, butterflies 2%, and thrips 1%. Honeybees (Apis mellifera) do only about 15% of the bee pollination. Most are solitary bees. Many species:

1) stick almost exclusively to one crop
2) some can work even when it's cool, cloudy and damp
3) they don't require a hive
4) are more docile than honeybees.

Bees:

Food: Just Grow It! REFERENCES
Many individual species of solitary bees are known collectively as mason bees (*Osmia* species) because they use both mud and pebbles to construct their nests.

Other solitary bees are known as leafcutting bees.

Another group of bees are the bumblebees (*Bombus* species), the biggest of all the bees that are black and yellow in color.

**Flies:**

Blowflies (*Phormia terranovae*) are one of the biggest - metallic blue-green, half-inch long.

**Moths:**

- Hawk moths, sphinx moths, moths of the pestiferous tobacco hornworm help to pollinate.

**Butterflies:**

Swallowtails, painted ladies, monarch, brush footed butterflies.

**Wasp:**

Fig wasp is the only insect that pollinates fig trees.

**Bird:**

Hummingbird. (Any Hawaiian birds of same ilk?)

**Guides for pollinators:** converging stripes or contrasting colors, rows of dots, brilliant circle of color in the center of a flower, star-like patterns; some colors even reflect ultraviolet light in wave lengths that are visible to pollinating insects, but invisible to human eyes.

**Shape:** Shallow blossoms to allow ants/small insets with short "proboscis" to reach nectar; deep, cup or trumpet shaped for creatures with long proboscides (honeybees, bumblebees, butterflies, moths, hummingbirds); shape deliberately requiring creature to do some acrobatics like hang upside down; spring mechanism in flower which is tripped when creature enters - pollen sprays out; anthers that stick out with pollen to get on bird as they look for nectar.

**Safety - Food Handling:**

- Buy cold food last, get it home fast.
- Keep food safe—refrigerate.
- Keep everything clean.
- Thaw frozen foods in the refrigerator.
- Cook foods thoroughly.
• Keep hot foods hot, cold foods cold.
• Don’t wait—refrigerate leftovers quickly

**Consumer Guidelines**

• Ground meat and ground poultry:
  • Uncooked - refrigerate at 40 degrees or below for 1-2 days; freeze at 0 degrees or below for 3-4 months
  • Cooked - refrigerate at 40 degrees or below for 3-4 days; freeze at 0 degrees or below for 2-3 months

• Internal temperature for safe cooking:
  • Ground meat  160 degrees F
  • Ground poultry  165 degrees F
  • All cooked leftovers  165 degrees F

• Food Handling:
  • Wash hands
  • Keep hot foods hot and cold foods cold
  • When in doubt, throw it out
**Safety - Food Poisoning:** Food safety means more than being chemical-free. Safe food also must be free from dangerous levels of bacteria such as *E. coli*, which can cause severe food poisoning. From U of Minnesota:

**Food preparation:** *FDA Consumer* report (September/October 1998) from survey of 106 households in 81 cities throughout US and Canada found 1) cross-contamination occurred in 76% of kitchens; 2) neglected hand-washing in 57%; 3) improper cooling of leftovers in 29%. (All these practices can lead to food-borne illnesses.)

**DO:**
- Wash your hands with hot, soapy water before you begin preparing food and after you’ve handled raw meat, poultry or fish.
- Wash utensils and work surfaces with hot soapy water after using them to prepare raw meat, poultry, or fish.
- Thaw frozen meat, poultry, and fish in the refrigerator. *(Microwave if the food will be cooked immediately after defrosting.)*
- Cook meat and poultry to appropriate temperatures; make sure the juices run clear; use meat thermometer.
- Cool leftovers slightly; then cover them before refrigerating.

**DON’T**
- Thaw frozen meat, poultry, or fish on a counter top.
- Smoke when preparing food.
- Undercook food. That pink hamburger may contain harmful *E. coli* bacteria.
- Leave perishable leftovers unrefrigerated for more than an hour after cooking.

- Cook hamburger until the juices run clear, not pink (about 155 degrees F).
- Store raw meat, poultry and fish separately from other food in the refrigerator.
- Wash your hands, utensils and work areas with hot, soapy water after contact with raw meat, poultry or fish.
- Thoroughly wash fruits and vegetables, even those you've picked from your own garden, before eating them. (You don't need to use soap.)
• Avoid drinking unpasteurized milk or juice.
• When eating out, always send back any meat, poultry or fish that's not thoroughly cooked.

**Safety - Kitchen**

**GENERAL KITCHEN SAFETY**
• Wipe up spills immediately.
• Dry hands after washing them. Wet hands are slippery.
• Remove dangling jewelry, roll up sleeves, and pull back hair, if necessary.
• Store all knives in a separate place and out of the reach of children.
• Use a cutting board and always cut away from you.
• When drying knives, turn blade away from your hand and dish towel.
• Use a wooden spoon when stirring foods during cooking.
• Clean up broken glass right away with a wet paper towel.
• Be careful with opened cans. Edges are sharp and could cut you.
• Wrap sharp objects in newspaper before throwing into garbage.

**Service Learning:**

**Benefits to Participants:**
• Personal Development (self esteem, confidence, empathy for others, worthwhile feelings, competence, creativity, belief in self and ability to make a difference).
• Social Development (interaction with people of all ages, intergenerational contact, bonding with team and recipients, exposure to wider range of issues and places, working in a group).
• Value Development (sense of community, responsibility to the community, sense of service for others less fortunate, work ethic, service-oriented values, teamwork, stewardship).
• Academic Development (basic skills, subject matter knowledge, critical thinking skills, life skills, engagement in learning).
• Career Development (exploration of careers/jobs, job-related skills).

**Cycle:** (James and Pamela Toole, 1993)
• Identifying project
Service-Learning is blending what is being learned with a service component. Service-learning projects emphasize both the service and the learning; they have a strong reflective component (before, during, and after) the project. It is a form of experiential learning where youth apply KNOWLEDGE, SKILLS, CRITICAL THINKING & WISE JUDGMENT to address a genuine community need.

**Five core elements:**
- Community collaboration - voice and needs of the community included in development of the project.
- Youth involvement - partnership between youth and adults who work together to plan, manage, serve, and evaluate a project based on a common goal.
- Orientation and training - providing the necessary tools to youth so they can accomplish goals; preparation for experience.
- Meaningful action - connection to real world problems and applying students' special knowledge and skills; youths feel like they made a difference.
- Reflection and celebration - reflection helps youth see their academic, personal and social growth; celebrate the impact made.

**Shopper's Guide:**
- Weekly shopping plan
- Check newspaper ads
- Check home inventory
- Plan meals around specials
• Be sure to check
• Be aware of marketing techniques
• Resist buying extras
• Limit convenience foods
• Use unit pricing
• Try store brands
• Purchase breads at thrift stores
• Read the labels
• Study the list of ingredients
• Check dates for freshness
• Buy fruits and vegetables in season
• Know grades of meat
• Try ground turkey or ground chicken
• Eat meat less often
• Best buys in milk
• Choose brown or enriched rice
• Make a shopping list
• Know your prices
• Eat before shopping
• Use store or brand coupons
• Know store layout
• Stock up on sale items
• Compare prices
• Start a home garden

Soil Fertility: (OG July/Aug. 2000 p. 47)

Soil fertility cycle:
• All life on earth is sustained by the energy of the sun. Fertilizing with compost or organic mulches completes a crucial link in the soil fertility cycle that sustains all living organisms.
• Only green plants, which contain chlorophyll, can use solar energy to combine water with carbon dioxide from the air to produce carbohydrates (sugar and starches). In addition, plants use nitrogen and other mineral nutrients (released from
the soil by fungi, bacteria, earthworms, etc.) to produce essential amino acids and proteins. The by-product of plant photosynthesis is oxygen. Without plants, there would be no oxygen in Earth’s atmosphere.

- The carbohydrates and proteins from plants provide food for all other organisms. Insects eat the plants, birds eat the insects, “higher” predators eat the birds. Cows and chickens eat the plants, some humans eat the cows and chickens, others eat milk and eggs, and so on.
- Whenever plants or animals die, their bodies must be returned to the soil to be decomposed by the soil food web, releasing carbon dioxide, nitrogen, and essential minerals back into the soil so the cycle can continue and more food can be produced. Organic farmers and gardeners sustain this essential natural cycle by making and using compost to fertilize their soils.

Organic gardening feeds the soil so the soil can continue to feed the world. Reliance on synthetic chemical fertilizers disrupts this essential fertility cycle, kills soil life, and threatens the long-term health of the planet.

### Soil Testing

**Locations, details.** Depending on the lab, some or all of the following are tested: pH is simply a measure of soil’s acidity or alkalinity (7.0 is neutral). Most crops perform well in soil with pH between 6.2 and 7.0 because this is the range at which nutrients are most easily available to the plants.

<table>
<thead>
<tr>
<th>Element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phosphorus</strong></td>
<td>- crucial to health and growth of plants, especially in seedling stage.</td>
</tr>
<tr>
<td><strong>Potassium</strong></td>
<td>- helps plants resist disease, strengthens stalks and improves fruit and seed quality. Called the antifreeze of plants because it circulates throughout the plant’s entire system, keeping all the 'parts' healthy and running.</td>
</tr>
<tr>
<td><strong>Calcium</strong></td>
<td>- major component of a plant cell’s walls. Lack can show up as blossom end rot on tomatoes, spindly plant growth, cause leaves to stick together and not open up.</td>
</tr>
<tr>
<td><strong>Sulfur</strong></td>
<td>- major component of all living organic matter. Needed for the formation of amino acids and proteins in growing plants. Helps nitrogen do its job of feeding young plants.</td>
</tr>
<tr>
<td><strong>Magnesium</strong></td>
<td>- essential component of chlorophyll, which gives plants their green color and allows them to turn sunlight into energy via photosynthesis; lack will have older leaves showing interveinal yellowing, often mistaken for foliar disease.</td>
</tr>
</tbody>
</table>
Nitrogen -
- very important to plants; can change dramatically from day to day or season to season; organic matter test is a good long-term indicator of how much nitrogen will eventually be available to plants as that organic matter continually breaks down and releases its nitrogen in a “plant edible” form.

Salts (Na) -
- excess salts can be a problem when not enough rain to wash naturally occurring salts away. Those salts are absorbing the water in the soil that your plant roots are trying to take up. Also, the salts can injure or destroy those plant roots directly. Use gypsum.

Sustainable Agriculture:

Four types of farming philosophies considered in Hawaii:

Organic Agriculture -
- produce grown without chemical fertilizers or pesticides with emphasis on enriching the soil using organic matter, crop rotation, and use of natural insect repellents. Farmers believe that the food quality, the price, and the flavor or organic produce will compete easily over chemically-grown produce.

Nature Farming -
- In 1930 Mokichi Okada created a holistic philosophy integrating art, agriculture, education, and other disciplines. The health of the soil is fundamental to nature farming. Large following in Japan.

Permaculture -
- agricultural system is a way of working in cooperation with nature and of supporting a diversity of species which allows economic profit while being environmentally benign. It emphasizes the efficient use of onsite resources to enable self-contained, self-sustainability. Recognizable by its “alley cropping,” the planting of fast growing, nitrogen-fixing trees with crops planted between the rows.

Bio-dynamic Farming -
- Founded by Austrian philosopher Rudolf Steiner. Adaptation to the environment, becoming an actual organism, a complete unit within itself.

Many farmers use sustainable practices for the benefit of ecosystem maintenance, resource conservation, and reduction of human health hazards, without becoming certified as “organic.”
Several common practices are found on sustainable farms:

- Interplanting crop and non-crop plants, such as trees for fodder and timber (agroforestry) to increase the biodiversity of the farm site;
- Use of on-farm inputs, such as animal manures, compost, and green manures (cover crops) as soil amendments;
- Use of crop residues to improve soil fertility, organic matter, tilth;
- Use of crop rotations to enhance soil quality and break insect, disease, and weed cycles;
- Use of livestock systems which mitigate soil and water pollution by integrating the livestock waste in a composting system for use on farm crops;
- Use of biological insect controls, or least-toxic pest management controls when biological agents are inadequate;
- Use of non-toxic weed controls, such as cultivation and flame-burning;
- Narrowing the gap between farmer and consumer through direct marketing (farmers markets, farmer-chef connections, and community-supported agriculture).

Sustainable agriculture is a strategic goal, not a specific practice or set of practices. It is an approach to agricultural production, designed within the context of a social, business and bio-physical environment. It is dynamic, open to change as one’s perception of the environment changes. From an individual’s perspective, it is the on-going process of bringing his/her particular farm business into alignment with the contextual environment.

As such, sustainable agriculture encompasses a wide range of possible production practices ranging from strictly “organic” to conventional farming using lower inputs.

Sustainable agriculture is distinguished by four characteristics:

- A longer planning time-horizon;
- A balance between economic and ecological concerns
- A balance between social (consumer) and production economic concerns, and
- Acceptance that maintaining these balances is inherently dynamic.

(Fleming, Kent D. “What is ‘Sustainable Agriculture’?” Sustainable Agriculture Strategies for Hawaii. Nol 1, January 1992)

**Therapeutic Horticulture:** Goal: improved physical and mental health of the individual. Benefits seen in four areas: intellectual, social, emotional, and physical development. Learning Activities include: Arts and Crafts (indoor and outdoor); Group Activities; Excursions; Indoor plants (flower arranging, dish gardens, houseplants, hydroponic cultures, experiments, flower forcing).
**Therapy:**

**Home gardening**
- Growing native plants. Statement of a grower, “I learned to use native and endangered native plants in my lei. I make lei and a lot of times when I know that the plant I'm using is native, it gives more meaning to me. When I look at the plants, there's something that happens, there's that synergy, something that was here a long, long time ago, and it's here now, and that helps me to live in the future.” Noyes, Martha

**Stretching**
- Gardening is good for the body and soul. Preparing for strenuous tasks such as digging and hauling. *March/April, pp. 42-43*

**Water:**

**US Geological Survey:**
- Pesticides currently contaminate almost every stream and half of all wells sampled in urban and agricultural areas of the U.S.
- At any particular time, an average of seven to eight different pesticides have been found in each stream.
- In most agricultural areas, the highest levels of pesticides, often above safe drinking water standards, occur as seasonal pulses lasting from a few days to several months.
- The most commonly detected pesticides in streams and groundwater are weedkillers including atrazine, metachlor, prometon and simazine. Insecticides frequently detected in streams were diazinon, chlorpyrifos, carbofuran and carbaryl.

**Resource:** Tim Miller, Chief of National Water Quality Assessment (703 648-5716)
See hydrological system display in OG Apr 1998, p. 14

**Web:** Gardening on the Web. Computer is indispensable gardening tool - the Internet is a valuable, virtually limitless, resource.

**Weeds - Control:**
• Cultivate the beds or seed rows about 2 weeks before planting garden. Water to get weed seeds to sprout.
• Hoe the bed shallowly immediately before planting crops. Just deeply enough to kill the newly sprouted weed seedlings without stirring up any buried weed seeds.
• Spread a 1” layer of weed-smothering fresh grass clippings around newly planted seeds. Add second layer.
• Hoe or pull any weeds that come up through the mulch during the growing season, before they set seeds.
• Timing is everything.
• Hot water works.
• A little sodium will do the trick. Also baking soda.
• Sprout weeds out and till under before seeding.
• Crowd weeds out with cover crops like buckwheat, vetch, clover.
• When in doubt, mulch.
• Action must follow planning.

**Weeds—Eating:** Wild and weedy greens to eat. Often regarded as farm and garden pests, they may be both nutritionally and medicinally superior to the crops with which they compete. These include:

**Chickweed (Stellaria media)**—
• contains genistein (touted to prevent blood vessels from feeding developing tumors and prevent cancers from growing); and saponin which makes other phytamins (vitamins found in plants) easier for the stomach to absorb.

**Dandelion (Taraxacum officinale)**—
• has a white latex that can be concentrated into a bitter chewing gum for preventing cavities.

**Mexican bamboo (Polygonum cuspidatum)**—
• contains resveratrol (found in red wine and peanuts) that supposedly reduces the biological process that are risk factors for cardiovascular disease. Contains also phytamins loke tocopherol (vitamin E), ascorbic acid (vitamin C), beta-carotene, selenium and others.

**Stinging nettle (Urtica dioica)**—
• contains acetylcholine and choline, both found deficient in brains of people with Alzheimer’s. To prepare, boil or steam. Also contains serotonin, boron and calcium.

**Wild garlic (Allium vineale)**—
• rich in antibacterial and antiviral compounds, probably contains quercetin that has many health benefits.
**Garlic mustard** (*Alliaria petiolata*)—
- reported to contain allicin (important part of garlic) and isothiocyanates for cancer prevention.

**Violets**
- 12/96, p. 39+

**Wild mustards** (*Barbarea, Brassica, Lepidium species*)—
- contains isothiocyanates and sulforaphane