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College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa

Financial Calculating

for Home and Business

A Demonstration Guide to Understanding the Basic Concept, Elements, and Applications of Financial Calculating as an Essential Means to Figuring and Assessing Financial Outcomes

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Financial Connections Library
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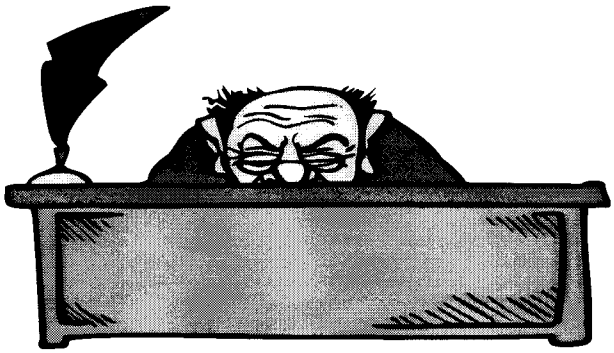
What Can Financial Calculating Do for You?



In order to make wise and informed financial decisions, one must be able to both determine and assess financial outcomes. A financial calculator is an invaluable tool for figuring, estimating, comparing, and assessing financial outcomes. It is also easy to use, inexpensive, and portable. Used at the morning breakfast table, in the marketplace, or at the office, this tool can provide information that will foster better decision-making and planning, while preventing serious errors based on faulty estimates or assumptions. It can help anyone do the following:

1. Determine the profit margin and mark-up on various business products and services.
2. Determine the payment for installment loans with various interest rates and time periods.
3. Determine how much one can borrow with various payments, interest rates, and time periods.
4. Determine how much interest would be paid with any one payment during the life of a loan.
5. Determine the principal balance remaining after any given payment on an installment loan.
6. Determine the best deal for financing something when choosing among various interest rates, time periods, and other terms such as discounts, rebates, and interest-free periods.
7. Determine the impact of different down payments on the monthly payment and total interest.
8. Determine the impact of increasing one's monthly payment on the time it would take to pay off a debt and free the income that had been going towards that payment for other uses.
9. Determine the impact of consolidating debts under a consolidation loan or home equity loan on the size of the monthly payment, the period of repayment, and the total interest paid.
10. Determine how long it would take to pay off or pay down a set of revolving charge accounts.
11. Determine the rate of appreciation any asset has experienced over a given period of time.
12. Estimate cost and price increases associated with various inflation rates and time periods.
13. Compare the return on capital expected from one type of investment with that from another.
14. Determine the contributions to savings that would be needed to replace a piece of equipment.
15. Determine how large a monthly or annual payment invested at certain rates and periods of time would be required to achieve a particular savings, investment, or retirement goal.
16. Determine how much income could be received monthly or annually from a savings fund, retirement account, annuity, or asset conversion for given interest rates and time periods.

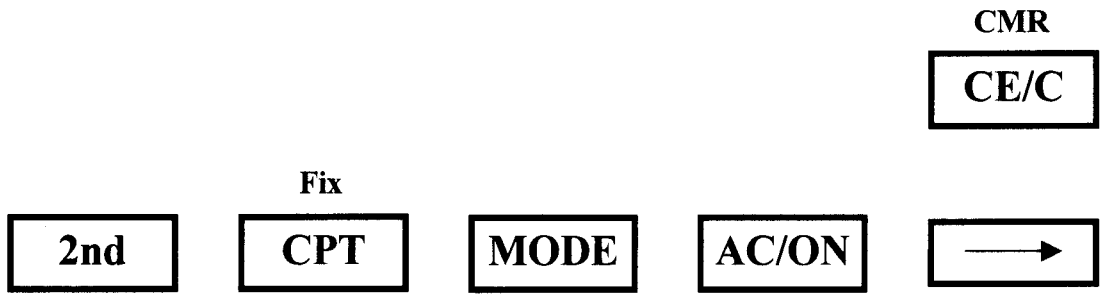
These and many other financial problems, comparisons and outcomes can be figured, compared, explored, assessed, and evaluated with the aid of a financial calculator. Fortunately, there are only four patterns of financial calculating encompassing the majority of situations that need to be learned. Thus, it is easy to learn, master, and apply the methods and results of financial calculating in your life.

Getting Started

The financial world of today is far more complex than ever before. Entrepreneurs and consumer would be at a grave disadvantage without an easy and effective way to figure and assess the many financial outcomes and opportunities facing them. This disadvantage, however, can be overcome with the aid of a financial calculator. Below are the keys used in financial calculating using the Texas Instruments BA-35 Solar Calculator for demonstration purposes.

Learning the Operational Keys

The operational keys assist in using the other keys. They control turning the calculator on, setting the mode, fixing the decimal point, computing values, and clearing the display and memory.



AC/ON Turns calculator on. Clears calculator completely, including memory, mode, and decimal setting. Calculator shuts off when no longer exposed to light.

MODE Rotates mode from Financial (FIN) to Statistical (STAT) to Business (blank). Check display window to see in which mode the calculator is operating.

2nd Activates second or alternate functions printed above some keys. Press 2nd key then key with desired function printed above it. Repeat sequence to turn it off.

Fix **CPT** Fix is activated as alternate function of CPT key. It puts decimal at desired place. To set decimal at 2 places, press 2nd key, then Fix key, then number 2.

→ Clears last numerical entry or decimal without clearing entire display. But to change values entered at financial keys, enter desired value over previous one.

CMR **CE/C** CE/C key clears incorrect entries, error conditions, or pending operations. CMR key clears memory. Press 2nd, CMR, CMR to clear memory and display.

CPT Computes answer to problem by revealing value of next key pressed. For example, pressing CPT key then PV key computes the value at the PV key.

Getting Down to Business

Learning the Profit-Margin Keys

The profit-margin keys become operational when the mode displayed is blank with neither the FIN of the financial mode or the STAT of the statistical mode appearing on the display. To change to the profit-margin mode, press the MODE key until the mode display is blank.

CST Refers to the cost of goods. To enter a specific cost, use the numeric keys to display the amount of the cost, then press the CST key.

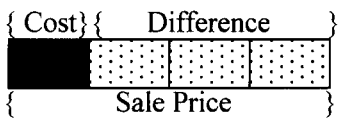
SEL Refers to the selling price of goods. To enter a specific selling price, use the numeric keys to display the amount of the selling price, then press the SEL key.

MAR Refers to the gross profit margin, which is the difference between the selling price and cost expressed as a percentage of the selling price. To compute the margin for a given cost and selling price, press the CPT key then the MAR key.

MU MAR Refers to the markup, which is the difference between the selling price and cost of goods expressed as a percentage of the cost. To compute the markup for a given cost and selling price, press the CPT key, the 2nd key, then the MU key.

Markup versus Profit Margin

What is the difference between a markup and a profit margin? Both involve the difference between cost and selling price and both are expressed as percentages. However, when the difference between cost and selling price is figured as a *percentage of the cost*, it is a markup. When the difference between cost and selling price is figured as a *percentage of the selling price*, it is a profit margin. Consider a product that costs $1 to make and sells for $4. The difference is $3.



Markup = Difference/Cost x 100 = 3/1 x 100 = 300%

Margin = Difference/Sale Price x 100 = 3/4 x 100 = 75%

Calculating Markups and Profit Margins

Michael and Martha produce stained glass ornaments for sale through art fairs and consignment stores. The typical ornament costs $10 to make and sells for $25. What is the markup on their typical ornament? What is the profit margin on their typical ornament?

Mathematical Method

1. The difference between the selling price and cost equals selling price (25) minus cost (10), or 15.
2. The markup equals the difference (15) divided by the cost (10) times 100, or 150%
3. The profit margin equals the difference (15) divided by the selling price (25) times 100, or 60%

Calculator Method

1. Make sure the calculator has been cleared and placed in the profit-margin mode (blank mode).
2. To find markup, enter cost (10, CST), enter selling price (25, SEL), then press CPT, 2nd, MU.
3. To find profit margin, enter cost and selling price as above and then press CPT, MAR.

Note: Answers are the same as those for above computations. Also note: Once the cost and selling price have been entered, they need not be re-entered for a second computation involving the same cost and selling price.

Additional problems:

1. Tracy has a product that costs $4.57 to produce. How much should she sell it for if she wants a markup of 300%? Hint: To enter the markup press 300, 2nd, MU. Ans. $18.28.
2. Gordon's product sells for $15. His profit margin is 75%. What is his cost? Ans. $3.75.

Calculating Percentage Discounts and Add-ons

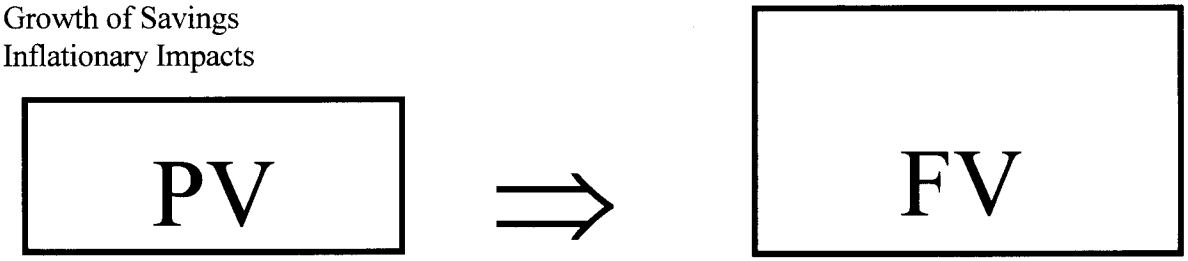
Percentage discounts and add-ons can be calculated easily using the % key. To calculate the price of a product after an X% discount, enter the price of the product, then press the minus (-) key, X, the % key, and equals (=) key. For example, Jake is selling a product through Amazon.com, which requires a 55% discount from Jake. If Jake's product sells for $19.95 at Amazon.com, how much will he receive from Amazon.com for each product sold? To find, the discounted price, press $19.95, then the minus (-) key, 55, the % key, and the equals (=) key. Ans.: $8.98.

Percentage add-ons are figured similarly except the plus (+) key is used instead of the (-) key. If Megan wanted to sell a product that cost her $5.00 to buy at wholesale with a 250% add-on at retail, she would press 5, (+) key, 250, % key, and equals (=) key. Ans.: $17.50.

Four Basic Patterns of Financial Calculating

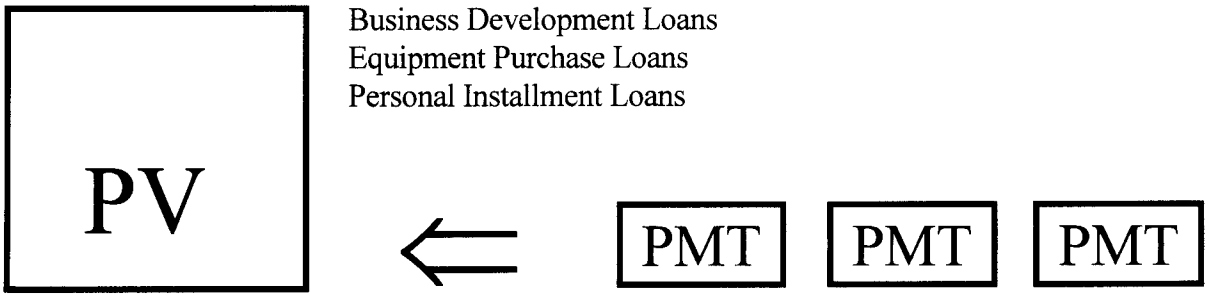
Growth: Present Value Grows to Future Value

Capital Appreciation
Growth of Savings
Inflationary Impacts



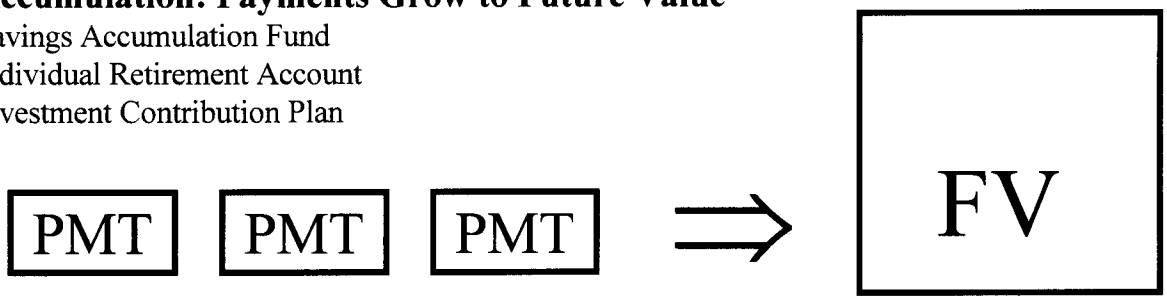
Borrowing: Payments Repay a Present Value

Business Development Loans
Equipment Purchase Loans
Personal Installment Loans



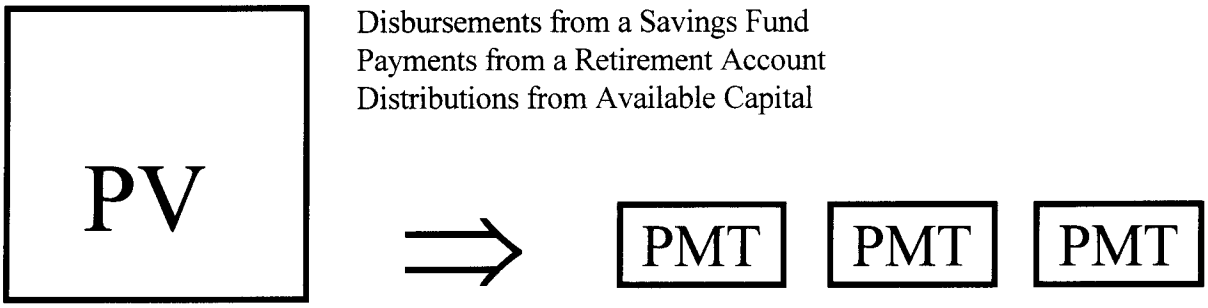
Accumulation: Payments Grow to Future Value

Savings Accumulation Fund
Individual Retirement Account
Investment Contribution Plan



Disbursement: Present Value Generates Payments

Disbursements from a Savings Fund
Payments from a Retirement Account
Distributions from Available Capital



Learning the Financial Keys

N	%i	PV	PMT	FV

N

Refers to the total **number** of financial periods in the calculation.
For instance, pressing 12, then N enters 12 as the value of N.
Examples: Number of compounding periods.
Number of installment payments or loan periods.
Number of payments to or from an account.

%i

Refers to the **interest rate** applied each financial period in the calculation.
For instance, pressing 6 then %i enters a 6% annual percentage rate.
Examples: Interest rate per year for annual payments or compounding.
Interest rate per day for accounts compounded daily.
Interest rate per month for loans or distributions paid monthly.

PV

Refers to the **present value**, which is the initial or starting value of a sum.
For instance, pressing 10,000 then PV enters a prevent value of $10,000.
Examples: Lump sum amount deposited in savings or investment account.
Principal amount borrowed as business, auto, or personal loan.
Accumulated amount generating disbursement of payments.
Initial value of goods, stocks, a home, or other capital asset.

PMT

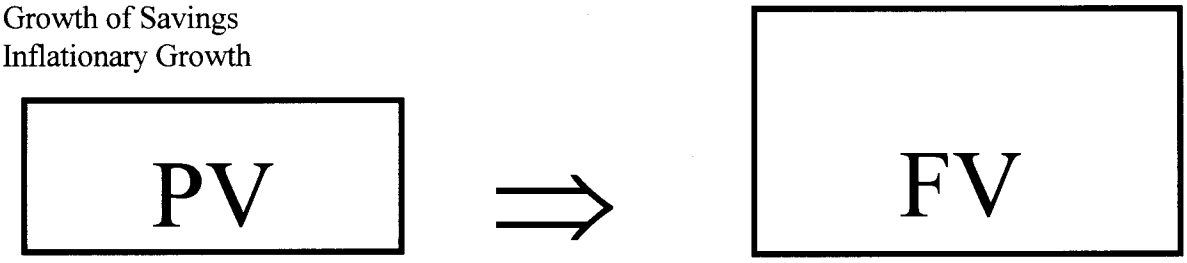
Refers to the periodic **payments** made to or from an account.
For instance, pressing 200 then PMT enters a payment value of $200.
Examples: Payments made to repay an installment loan or mortgage.
Payments made to accumulate savings or capital for investing.
Payments disbursed regularly from savings or retirement funds.

FV

Refers to **future value**, which is the end or appreciated value of a sum.
For instance, pressing 500,000 then FV enters a future value of $500,000.
Examples: Appreciated value of a savings deposit or amount invested.
Accumulated value of set aside or retirement fund contributions.
Appreciated value of goods, stocks, a home, or other capital asset.

Calculating Growth

Capital Appreciation
Growth of Savings
Inflationary Growth



Jackie invests $10,000 in a Certificate of Deposit that offers 6% APR for a two-year term.
1. How much will she receive at the end of two years if interest is compounded annually?
2. How much will she receive at the end of two years if interest is compounded quarterly?

Steps to solve:
Write down the known values under keys where they are to be entered.
Put a question mark under key to be computed and a dash under the key that will not be used.
Enter each value by pressing the number to be entered, then the key where it is to be entered.
Compute the unknown value by pressing the compute (CPT) key and then key of unknown value.

Problem 1. Annual compounding.

N	%i	PV	PMT	FV
2	6	10,000	--	?

Press CPT, FV
FV = $11,236.00

Problem 2. Quarterly compounding.

N	%i	PV	PMT	FV
2 X 4 =	6 ÷ 4 =	10,000	--	?

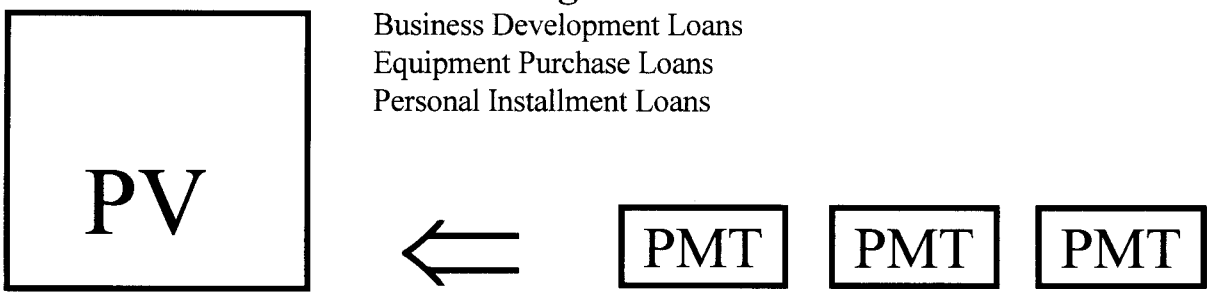
Press CPT, FV
FV = $11,264.93

If you did not get the answers to these problems do the following: (1) check to make sure FIN is displayed; (2) clear calculator by pressing 2nd,CMR, CMR; (3) stroke keys evenly and try again.

Additional problems:
1. What interest rate compounded annually would triple $10,000 in 15 years? Ans.: 7.60%.
2. What was the average rate of annual appreciation on a business now worth $500,000 that was started 10 years ago for $45,000? Hint: $45,000 is the PV, $500,000 is the FV. Ans.: 27.23%.

Calculating Loans

Business Development Loans
Equipment Purchase Loans
Personal Installment Loans



Ralph wants to purchase a new piece of machinery but he needs a loan of $8,000 to do so.

1. What will be Ralph's monthly payment if he takes a loan for 5 years at 8% APR?
2. What will be Ralph's monthly payment if he takes a loan for 4 years at 7% APR?

Steps to solve:
Write down the known values under keys where they are to be entered.
Put a question mark under key to be computed and a dash under the key that will not be used.
Enter each value by pressing the number to be entered, then the key where it is to be entered.
Compute the unknown value by pressing the compute (CPT) key and then key of unknown value.

Problem 1. A 5-year loan at 8% APR

N	%i	PV	PMT	FV
5 X 12 =	8 ÷ 12 =	8,000	? Press CPT, PMT PMT = $162.21	--

Problem 2. A 4-year loan at 7% APR

N	%i	PV	PMT	FV
4 X 12	7 ÷ 12	8,000	? Press CPT, PMT PMT = $191.57	--

Additional problems:

1. How much could Ralph borrow for 5 years at 12% if his monthly payment was $170?
   Ans.: $7,642.36.
2. How much could Ralph borrow for 5 years at 18% if his monthly payment was $200?
   Ans.: $7,876.05.

Calculating Loan Balances

First enter the data regarding your loan and solve for any one value. Then enter the number of the last payment you made and press the BAL key to find the remaining loan balance. John has just made the 18th payment on a 5-year car loan for $20,000 financed at 9% APR. He wants to know what his remaining balance is after the 18th payment?

N	%i	PV	PMT	FV
5 X 12 =	9 ÷ 12 =	20,000	?	--
			Press CPT, PMT PMT = $415.17	

x <> y	I/P	BAL	P_1/P_2	
		18 BAL BAL = $14,910.19		

Calculating Interest and Principal

First enter the facts regarding the loan and compute any one of the values. To find the interest and principal paid over a series of payments, enter the number of the 1st payment in the series and press P_1/P_2 key. Then enter the number of last payment in the series and press I/P key to reveal interest paid. Then press the x<>y key to reveal the principal paid. With respect to John's car loan above, the interest and principal paid with payments 13-24 would be found as follows:

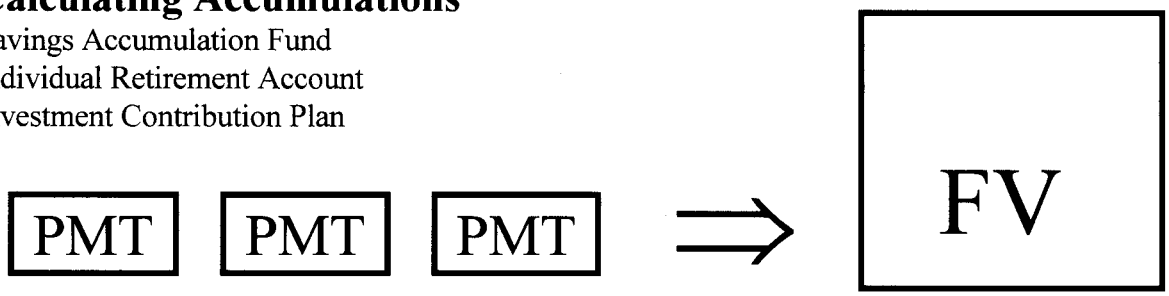
N	%i	PV	PMT	FV
5 X 12 =	9 ÷ 12 =	20,000	?	--
			Press CPT, PMT PMT = $415.17	

x <> y	I/P	BAL	P_1/P_2

Step 1. ..... 13, P_1/P_2
Step 2. ..... 24, I/P
I =$1,354.28
Step 3. ..... x<>y
P =$3,627.72

Calculating Accumulations

Savings Accumulation Fund
Individual Retirement Account
Investment Contribution Plan



Rachel just began saving $400 every month in an account paying 7% APR.

1. How much will she have in the account at the end of 5 years?
2. How much will she have in 40 years if she saves $2000 per year at 9% APR?

Steps to solve:

Write down the known values under keys where they are to be entered.
Put a question mark under key to be computed and a dash under the key that will not be used.
Enter each value by pressing the number to be entered, then the key where it is to be entered.
Compute the unknown value by pressing the compute (CPT) key and then key of unknown value.
Special Note: Press +/- key after displaying payment amount and before pressing PMT key for calculations involving payments into a savings or annuity type fund. Only payments into these funds are marked minus.

Problem 1. $400 per month for 5-years at 7% APR. **Press +/- key before entering payment.**

N	%i	PV	PMT	FV
5 X 12 =	7 ÷ 12 =	--	(-) 400	?

Press CPT, FV
FV = $28,637.16

Problem 2. $2000 per year for 40 years at 9% APR. **Press +/- key before entering payment.**

N	%i	PV	PMT	FV
40	9	--	(-) 2000	?

Press CPT, FV
FV = $675,764.89

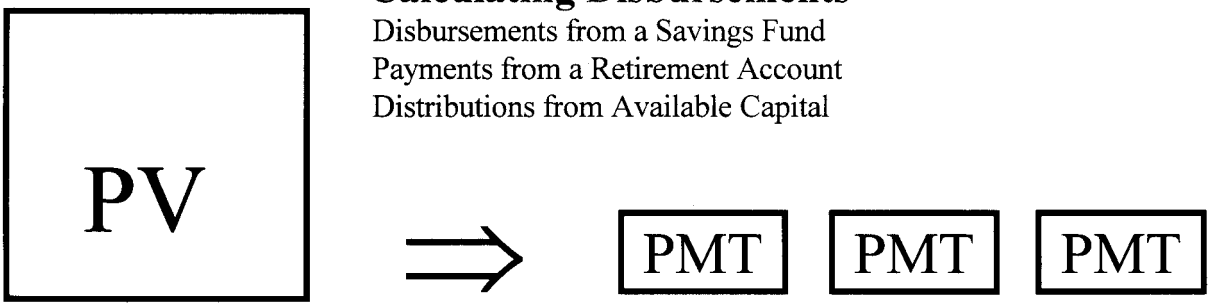
Additional problems:

1. To accumulate $100,000 in 20 years at 8% APR, the annual payment would be _____.
2. To accumulate $1 million in 40 years at 9%, the monthly payment would be _____.

Note: Assume like payment and compounding frequencies (e.g., yearly/yearly, monthly/monthly).
Answers on page 13. Payments are assumed to be positive amounts as the answers to problems.

Calculating Disbursements

Disbursements from a Savings Fund
Payments from a Retirement Account
Distributions from Available Capital



After paying her business startup costs, Lynette has $60,000 left to pay her monthly expenses.

1. How much can she withdraw monthly for one year if her bank pays 2% on savings?
2. How much can she withdraw monthly for two years if her bank pays 3% on savings?

Steps to solve:

Write down the known values under keys where they are to be entered.
Put a question mark under key to be computed and a dash under the key that will not be used.
Enter each value by pressing the number to be entered, then the key where it is to be entered.
Compute the unknown value by pressing the compute (CPT) key and then key of unknown value.
Special Note: 2nd and BGN keys are pressed before starting problem in order to compute beginning of period payments. Payments made <u>from</u> an account are usually considered to be made at the beginning of the period. When "Begin" is displayed, beginning of period payments will be computed. To turn off, repeat 2nd, BGN.

Problem 1. Monthly payments for 1 year, account paying 2% APR. **Press 2nd, BGN keys at the start.**

N	%i	PV	PMT	FV
1 X 12 =	2 ÷ 12 =	$60,000	?	--
			Press CPT, PMT PMT = $5,045.92	

Problem 2. Monthly payments for 2 years, account paying 3% APR. **Check display for "Begin."**

N	%i	PV	PMT	FV
2 X 12 =	3 ÷ 12 =	$60,000	?	--
			Press CPT, PMT PMT = $2,572.44	

Additional problems:

1. How much money would Marilyn need to have in retirement funds invested at 6% APR in order to be able to receive payments of $2,600 per month for 25 years?
2. How much money would Marilyn need for payments of $3,000 per month?

Note: If payments are monthly, years and interest rate must reflect monthly frequency. Answers on page 13.

Calculating Tips and Notes

Calculating tips.

- Set up any problem on paper before making your entries. It is easy to forget what specific numbers were entered in arriving at an answer.
- To make an entry, press the numerical amount first and then the key where it is to be entered. Press the number 7 and then N to enter 7N.
- Press the keys firmly and directly with the pad of one finger, not with a pencil tip or fingernail, to ensure good contact and proper entry.
- To clear your calculator memory and display, press the 2nd key, CMR, CMR before starting a new type of problem. CMR is above CE/C key.
- Do not clear the calculator if you want to solve variations of the same type of problem. Enter new values over old and re-compute the answer.
- Interest rates entered under the %i key are automatically converted to decimal equivalents. Enter 7 not .07 at %i key to enter a 7% APR.
- Press the equals key (=) to complete mathematical operations before entering the result. Pressing the equals key completes the operation.
- Accounting practice regards regular payments <u>into</u> a fund as negative. Before entering a payment sum press the +/- key to show a minus sum.
- Accounting practice regards regular payments <u>from</u> a fund as positive. You do not need to change these amounts to minus with the +/- key.
- Note that when computing interest rates for monthly payments, the answer displayed is the monthly rate. Multiply by 12 for annual rate.
- Realize that "error" can appear on the screen for a variety of reasons, such as the problem has no answer as entered, you did not properly clear the calculator, or you used an incorrect combination of keys.
- When confused, in doubt, or "error" appears, clear your calculator and start over. Set up any problem on paper before making entries.
- If you can't get the answer to a particular problem, clear your calculator fully and start again. Use a similar practice problem to guide you.

Other calculators. These instructions can be adapted for using other financial calculators. Just be sure to read the instruction booklet that comes with the make and model selected. Take special note of any differences regarding clearing the calculator and making entries. The primary keys and functions should be the same even if there are slight differences in order or placement.

Dissimilar periods. To solve problems having different compounding and payment periods (e.g., one is daily and the other monthly) do as follows: Enter the compounding period under N key, the interest rate per payment period under %i key, and number 1 under PV key. Solve for FV. Without clearing, enter the number of payments per year under N key and solve for %i. Without clearing, make the entries for your two known values and solve for the unknown value. For all but the most exacting requirements, use identical compounding and payment periods.

Answers to additional problems.

Page 11: (1) $2,185.22 and (2) $213.61.

Page 12: (1) $405,555.54 and (2) $467,948.69.

Personal Notes and Computations

				CMR CE/C
	Fix	BGN		
2nd	CPT	MODE	AC/ON	→
N	%i	PV	PMT	FV
			MU	
%	CST	SEL	MAR	
x <> y	I/P	BAL	P_1/P_2	

Financial Calculating for Home & Business

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Innovative Solutions
C/T/A/H/R Cooperative Extension
University of Hawaii at Manoa

Financial Calculating Solutions

- Markups & Margins
- Discounts & Add-ons
- Capital Appreciation
- Inflationary Impacts
- Loans and Mortgages
- Accumulation Funds
- Disbursement Funds

Learning the Operational Keys

	CPT	mode	ac/on	

AC/ON turns calculator on and clears calculator functions

MODE switches to financial, statistical & business modes

CPT computes value of the next key that is pressed

Learning the Operational Keys

2nd	Fix CPT	mode	ac/on	

2nd operates second function above keys

Press **2nd**, **Fix**, and number **2** to set decimal at two places.

Learning the Operational Keys

2nd	Fix CPT	mode	ac/on	→

Arrow clears last number entered without clearing display

Enter the number **4789**, then press **arrow** to remove 9, 8, etc.

Learning the Operational Keys

				CMR CE/C
2nd	Fix CPT	mode	ac/on	→

CE/C clears last entry, pending operation, and display

CMR clears all mode registers. Press **2nd**, **CMR** to clear.

Press **2nd**, **CMR**, **CMR** to fully clear & start new problem.

Operational Keys in Review

				CMR CE/C
2nd	Fix CPT	mode	ac/on	→

Fully clear-- 2nd, CMR, CMR

Set decimal--2nd, Fix, 2

Compute--CPT, key of unknown

Change mode--MODE (FIN, STAT, Business / blank)

Getting Down to Business

2nd	CPT	mode	MU	
	CST	SEL	MAR	

mode	**Business (blank)**
CST	**Cost**
SEL	**Selling Price**
MAR	**Profit Margin**
MU	**Markup**

Markup versus Profit Margin

[……..SALE PRICE……]

COST	DIFFERENCE

MARKUP = difference/cost x 100

MARGIN = difference/price x 100

Markup versus Profit Margin

[……..SALE PRICE……..]

COST	DIFFERENCE

MARKUP = 3/1 x 100 = 300%

MARGIN = 3/4 x 100 = 75%

Calculating Markups

(Sale Price $25 and Cost $10)

2nd	CPT			
	CST	SEL	MU	
	10	25	?	
		CPT	2nd	MU

Markup = 150%

Calculating Profit Margins

(Sale Price $25 and Cost $10)

2nd	CPT			
	CST	SEL	MAR	
	10	25	?	
			CPT	MAR

Profit Margin = 60%

Calculating Price from Markup

(Cost $4.57 and Markup 300%)

2nd	CPT			
			MU	
	CST	SEL		
	4.57	?	300	

CPT	SEL

Sale Price = $18.28

Calculating Cost from Margin

(Sale Price $15 and Margin 75%)

2nd	CPT			
	CST	SEL	MAR	
	?	15	75	

CPT	CST

Cost = $3.75

Calculating Percentages

(Price Discounts and Add-ons)

%	CST	SEL	MAR	

Price after 55% discount. List $19.95

19.95 (-) 55 % = ?	$8.98	-

Price after 250% add-on. Cost $5.00 +

5 (+) 250 % = ?	$17.50	=

Patterns of Financial Calculating

- Present Value grows to Future Value
- Payments repay a Present Value
- Payments grow to Future Value
- Present Value generates Payments

Present Value to Future Value

- Capital Appreciation
- Growth of Savings
- Inflationary Impacts

PV → FV

$60,000 grows to 200,000

Payments Repay Present Value

- Business Development Loans
- Equipment Purchase Loans
- Personal Installment loans

PV ← PMT PMT PMT

$46,000 repaid by $540 + $540 + $540

Payments Grow to Future Value

- Savings Accumulation Fund
- Individual Retirement Account
- Investment Contribution Plan

PMT | PMT | PMT → **FV**

$3,000 + $3,000 + $3,000 grows to $350,000

Present Value Provides Payments

- Saving Fund Disbursements
- Retirement Account Payments
- Distributions from Capital

PV → PMT | PMT | PMT

$60,000 generates $2,500 + $2,500 + $2,500

Five Basic Financial Keys

N	%i	PV	PMT	FV

- N is total number of the periods involved
- %i is the interest rate per year or per period
- PV is the present value of the asset or account
- PMT are the payments made to or from account
- FV is the future value of the asset or account

All 4 Financial Calculations

CPT

	N	%i	PV	PMT	FV
Grow a Sum	2	6	10,000	---	CPT
Borrow	5x12=	8÷12=	20,000	CPT	---
Accumulate	30x12=	10÷12=	---	$250	CPT
Disburse	25x12=	6÷12=	$500,000	CPT	---

Calculating Refinements

2nd | CPT | BGN mode

	N	%i	PV	PMT	FV
Compounding	2x4=	6÷4=	10,000	---	CPT

Multiply N years by periods per year and divide %i by periods per year

Payments Left	CPT	18÷12=	5,000	100	---

Loan payments left is found by entering known values and computing N

- Payments	30x12=	10÷12=	---	(-) $250	CPT

Press payment value then +/- key to make (-) payments into an annuity

2nd BGN	25x12=	6÷12=	$500,000	CPT	---

Press 2nd, BGN before calculating beginning of period disbursements

Additional Loan Calculations

CPT

	N	%i	PV	PMT	FV
Calculate	30x12=	6÷12=	200,000	CPT	---

	x↔y	I/P	BAL	P_1/P_2
180th Pmt Bal			180	
240th Pmt I & P	x↔y	240	(go right to left here & below)	
13-24 Pmts I & P	x↔y	24	13	

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