MASTERING THE HP-12C

ONE

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MASTERING THE HP-12C

BOOK I, BOOK II, or BOOK III

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PREFACE

This book is the product of several years of standing in the front of a classroom presenting seminars to patient students. Throughout the many hours of discussing today's business technology with them never once have they publicly expressed their unwillingness to learn more about the fantastic devices readily available to make their work easier. This book and the others in the series are dedicated to them.

But in addition to the students I must also thank the groups or individuals among whom have allowed me to even attempt this effort. At the top of the list is Ralph Hillier. Without his expertise and creativity and professionalism in presenting seminars I doubt I would find this business such a rewarding career. Let me also thank the people of Hewlett-Packard for their unselfish encouragement and support including my teacher Mike Curran of Hewlett-Packard, Wilsonville, Oregon and Marcia Paxton of Hewlett-Packard, Corvallis, Oregon.

Finally, without the support, humor and patience of Debbie and Megan; and the understanding of the MacGilvary Clan none of this would have meaning.

R.F.
Portland, Oregon
1984

CONTENTS

MASTERING THE HP-12C

BOOK I

BASIC CALCULATOR FEATURES

I. A CLOSE LOOK AT THE DESIGN OF THE HP-12C

A. Functions of the Calculator

1. Arithmetic
2. Mathematic
3. Percentage
4. Statistical
5. Calender
6. Programming
7. Memory
8. Financial

B. The Keys

1. The Keys as Prompts

a. Mnemonics - A mnemonic is nothing more than a reminder of what the particular key will do for you.

b. EXAMPLE:

(EEX) Enter Exponent (CHS) Change Sign (CLx) Clear x

2. Key tour

a. OPERATIONS

ON - Power ON/OFF f - Shift key g - Shift key

b. DIGIT ENTRY

ENTER - Enter CHS - Change Sign

EEX - Enter Exponent 0 - 9 - Digits

. - Decimal point

c. ARITHMETIC

+ - X ÷

d. STORAGE REGISTERS

STO - Store RCL - Recall

e. PERCENTAGE

% - Standard percent Δ% - Difference in percent

%T - Percent of the total

f. CALENDER

D.MY - Day.MonthYear M.DY - Month.DayYear

ΔDYS - Difference in Days DATE - Calculate DATE

g. FINANCIAL

BEG - Begin END - End n - Number of Compounding Periods

12X - n Multiplier AMORT - Amortization i- Interest per period

12÷ - i Divider INT - Simple interest PV - Present value

FV - Future value PMT - Payment per period Cfo - Cash flow zero

Cfj - Subsequent cash flows Nj - Groups of cash flows

NPV - Calculate Net Present Value IRR - Internal Rate of Return

(12C ONLY)

PRICE - Calculate Price YTM - Calculate Yield to Maturity

SL - Straight line SOYD - Sum of the years digits

DB - Declining balance

h. STATISTICS

E+ - Data point entry E- - Data point removal $\bar{X}$ - Mean

$\bar{X}W$ - Weighted mean s - Sample standard $\hat{y}$,r - Compute y

$\hat{x}$,r - Compute x

i. MATHEMATICS

$\sqrt{X}$ - Square root Y^x - Powers and Roots 1/x - Reciprocal

n! - Factorial e^x - Natural antilogarithm LN - Natural log

j. NUMBER ALTERATION

RND - Round FRAC - Fractional INTG - Integer

k. STACK REARRANGEMENT

X ⇄ Y R↓ - Roll down LstX - Last X

l. PROGRAMMING

P/R - Program or Run R/S - Run or Stop MEM - Memory map

GTO - Go to BST - Back Step SST - Single step

X≤Y - X is less than or equal to Y X=0 - X is equal to zero

m. CLEAR FEATURES

CLx - Clear x-register REG - Clear registers* E - Clear Sigma

PRGM - Clear Program# PREFIX - Clear Prefix FIN-Clear Financial

II. ERROR CODES

A. When you see an ERROR code in the display you can be certain of two things:

1. You cannot continue with your calculation until you clear the ERROR code, and;

2. The calculator will stop at precisely the point where it encountered the ERROR enabling you to correct it.

EXAMPLE:

K (KEYSTROKE)	D (DISPLAY)
4	4.
(ENTER)	4.00
0	0.
(÷)	ERROR 0

---

* ALL - Clear ALL on the HP-38 # CLP - Clear Program on the HP-38

B. <u>ERROR codes</u>

ERROR 0 - Improper operation involving zero

ERROR 1 - Storage register overflow

ERROR 2 - Improper data in statistical registers

ERROR 3 - Amortization, wrong input to x-register or;
IRR, input best guess

ERROR 4 - Improper memory address

ERROR 5 - Compound interest, bad input

ERROR 6 - Discounted cash flow analysis, improper input

ERROR 7 - IRR, no solution exists

ERROR 8 - Calender, improper input

ERROR 9 - Failed self check

PR ERROR - Continuous memory cleared by power failure

C. <u>Continuous memory</u>

1. When the calculator is off only the display is off.

D. <u>Low power</u>

HP-38	HP-12C
·19.87	*19.87

E. <u>Removing an ERROR code</u>

1. Press any key

2. Correct the ERROR situation

III. <u>THE DISPLAY AND DISPLAY ALTERATION</u>

A. Internal hold and fixed point

K	D
(f) 2	0.00
19.87345600	19.87345600
(ENTER)	19.87

1. The HP financial calculator has a 10 digit display. You choose the number of digits you wish to see in the display and the calculator holds the entire number in its memory.

2. You choose the number of digits you wish displayed by pressing (f) and any number between 0 and 9 representing the number of digits which will follow the decimal point.

K	D
(f) 4	19.8735
(f) 6	19.873456
(f) 0	20.

3. The calculator rounds the number in the display following the 5-up, 4 down method. If you choose to display no digits to the right of the decimal point, the calculator will round accordingly.

K	D
(f PREFIX)	1987345600
(f) 9	19.87345600
(f) 2	19.87

B. Digit Seperators and Keying in Numbers

1. Keying in Numbers

K	D
123456789	123,456,789.

2. Digit Seperators

a. The commas and decimal points in the display

b. To change the decimal point to a comma, and the comma to a decimal point:

K	D
OFF . ON .	123.456.789,
OFF . ON .	123,456,789.

3. <u>CHANGE SIGN (CHS)</u>

a. (CHS) is one of the most important financial keys on the face of the HP-12C

K	D
(CHS)	-123,456,789.
(CHS)	123,456,789.
(ENTER)	123,456,789.0
987654321	987,654,321.
(X)	1.219326 17

4. <u>Scientific Notation</u>

K	D
2.7565	2.7565
(EEX)	2.7565 00
22	2.7565 22
(X)	3.361072 39

NOTE: Scientific notation is most useful at times when you want to represent numbers which are larger than the ten digit display will accommodate. This new number represents the following:

$$3.361072 \times 10^{39}$$

or

3,361,072,000,000,000,000,000,
000,000,000,000,000,000.

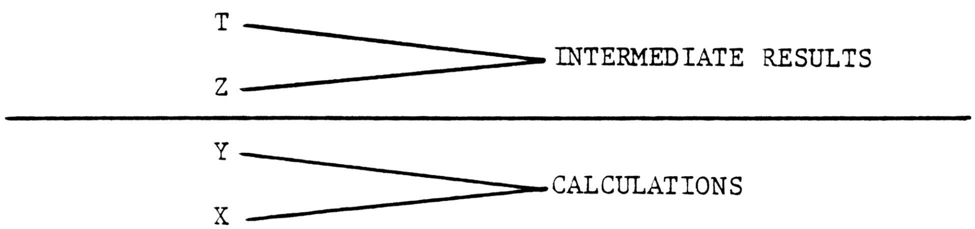
5. Setting the Display to Scientific Notation

K	D
(CLx)	0.00
(f) (.)	0.000000 00
1000 (ENTER)	1.000000 03

K	D	
25 (ENTER)	2.500000	01
(f) 2	25.00	
(CLx)	0.00	

IV. THE AUTOMATIC MEMORY STACK AND RPN LOGIC

A. Representing the Automatic Memory Stack



B. Examples of X and Y written in script

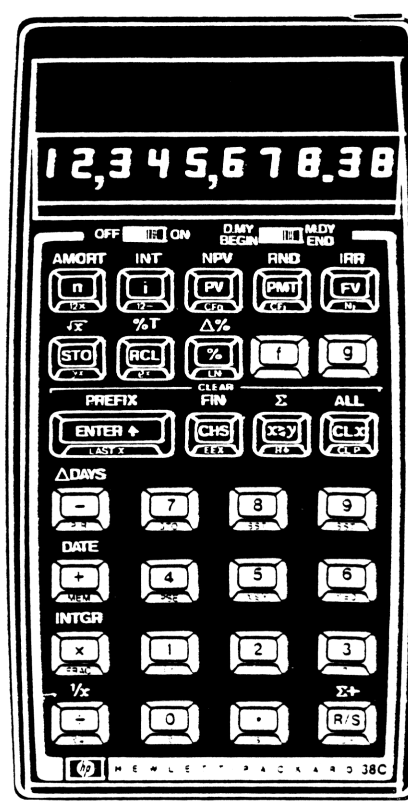
CLx   1/x $x \lessgtr y$ e^x $x \leq y$ x=0 $\sqrt{x}$

C. RPN Logic

R________ P________ N__________

D. ENTER and the upward pointing arrow

1. Whenever you press the ENTER key numbers move up through the automatic memory stack.



E. Algebraic Logic versus RPN Logic

1. Algebraic: x + y = z

2. RPN Logic: x ENTER y +

F. Stack Arrangement

1. Simple arrangement

$$\begin{array}{r} 5 \\ -\ 2 \\ \hline \end{array}$$

STACK	T				
	Z				
	Y		5	5	
	X	5	5	2	3
KEYSTROKE		5	ENTER	2	-

2. Complex arrangement

$$\frac{(3 \text{ X } 4) + (5 \text{ X } 6)}{7}$$

STACK	T											
	Z						12	12				
	Y		3	3		12	5	5	12		42	
	X	3	3	4	12	5	5	6	30	42	7	6
KEYSTROKE		3	ENTER	4	X	5	ENTER	6	X	+	7	-

K	D
3 (ENTER)	3.00
4 (X)	12.00
5 (ENTER)	5.00
6 (X)	30.00
(+)	42.00
7	7.
(÷)	6.00

G. Rearranging numbers in the stack

1. $x \lessgtr y$

K	D
1	1.
(ENTER)	1.00
2	2.
(ENTER)	2.00
3	3.
(ENTER)	3.00
4	4

K	D
$x \lessgtr y$	3.00
$x \lessgtr y$	4.00
$x \lessgtr y$	3.00
$x \lessgtr y$	4.00

2. $x \lessgtr y$ in the stack

T	T
Z	Z
Y	Y
X	X

3. R↓ *

K	D
R↓	3.00
R↓	2.00
R↓	1.00
R↓	4.00

4. R↓ in the stack

T	T
Z	Z
Y	Y
X	X

V. SIMPLE ARITHMETIC

A. (ENTER) - Acts like the space bar on a typewriter. Without it the HP financial calculator would not be capable of separating the numbers for arithmetic or other calculations.

$$\begin{array}{r} 1 \\ +1 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ \times\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 10 \\ \div\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ -3 \\ \hline \end{array}$$

---

g R↓ on the HP-38

EXAMPLES:

1.

K	D
1	1.
(SPACE)	1.00
1	1.
(+)	2.00

2.

K	D
12	12.
(SPACE)	12.00
2	2.
(X)	24.00

3.

K	D
10	10.
(SPACE)	10.00
2	2.
(÷)	5.00

4.

K	D
5	5.
(SPACE)	5.00
3	3.
(-)	2.00

B. Simple Arithmetic Examples

Try these simple arithmetic examples before proceeding to the next section. Complete one problem at a time, then turn the page to review your answer.

1. 42.737 + 125

2. .11532 - .73775

3. -22 X 47352

4. 525 ÷ 1001.1001

C. Answers

	K	D
1.	42.737	42.737
	(ENTER)	42.74
	125	125.
	(+)	167.74
	(f) 4	167.7370
	(f) 2	167.74
2.	.11532	.11532
	(ENTER)	0.12
	.73775	0.73775
	(-)	-0.62
	(f) 6	-0.6224300
	(f) 2	-0.62
3.	22	22.
	(CHS)	-22.
	(ENTER)	-22.00
	47352	47352.
	(X)	-1,041,744.00
4.	525	525.
	(ENTER)	525.00
	1001.1001	1001.1001
	(÷)	0.52
	(f) 9	.524423082
	(f) 2	0.52

K	D
(f) PREFIX	5244230822
(f) 2	0.52

D. Arithmetic Rules

1. Use ENTER only after the first number

2 + 2 =

K	D
2	2.
(ENTER)	2.00
2	2.
(+)	4.00

2. Use ENTER only after the first number in chain calculations

58.33 - 22.95 - 13.70 - 10.14 + 1053 =

K	D
58.33	58.33
(ENTER)	58.33
22.95	22.95
(-)	35.38
13.7	13.7
(-)	21.68
10.14	10.14
(-)	11.54
1053	1053.
(+)	1064.54

3. Use ENTER only after the first number in each group of numbers

(3 X 4) + (5 X 6) =

K	D
3	3.
(ENTER)	3.00
4	4.
(X)	12.00
5	5.
(ENTER)	5.00
6	6.
(X)	30.00
(+)	42.00

E. LASTx

There are two operations you can perform by using the LASTx (LSTx) key:

1. Calculations with constants

K	D
25	25.
(ENTER)	25.00
2.5	2.5
(X)	62.50
100	100.
(g LSTx)	2.50
(X)	250.00

K	D	
250	250.	
(g LSTx)	2.50	
(X)	625.00	
R↓	250.00	
R↓	62.50	

2. Recovering from errors

22 + 43 + 66 - 25 + 200 ÷ 10 X 66 + 43 - 22 = 2040.60

K	D	
22 (ENTER)	22.00	
43 (+)	65.00	
66 (+)	131.00	
25 (-)	106.00	
200 (+)	306.00	
10 (÷)	30.60	
66 (X)	2019.60	
43 (+)	2062.60	
22 (-)	2040.60	
(g LSTx)	22.00	Last number in x-register
(+)	2062.60	Reverse operation
2200 (-)	-137.40	
(g LSTx)	2,200.00	
(+)	2,062.60	

K	D
2000 (-)	62.60
(g LSTx)	2000.00
(X≶Y)	62.60

VI. MEMORY - THE STORAGE REGISTERS

A. Memory Composition

Automatic Memory Stack

T		
Z		LSTx
Y		
X		

Financial Registers

n		n_0
i		
PV		
PMT		
FV		n_{20}

General Purpose Registers

1. Data Storage
2. Cash Flows
3. Statistical Calcs.
4. Programming

R_0	$R_{.0}$
R_9	$R_{.9}$

GENERAL PURPOSE REGISTER ALLOCATION

#	NAME
1	R_0
2	R_1
3	R_2
4	R_3
5	R_4
6	R_5
7	R_6
8	R_7
9	R_8
10	R_9
11	$R_{.0}$
12	$R_{.1}$
13	$R_{.2}$
14	$R_{.3}$
15	$R_{.4}$
16	$R_{.5}$
17	$R_{.6}$
18	$R_{.7}$
19	$R_{.8}$
20	$R_{.9}$

R_0-R_4
STORAGE REGISTER
ARITHMETIC

STATISTICAL
CALCULATIONS
R_1-R_6

PRGM
$R_{.9}$-R_7

DATA
STORAGE
& CASH
FLOWS

R_0-$R_{.9}$

B. Clear Features

1.

ALL	REG
CLx	CLx
HP-38	HP-12C

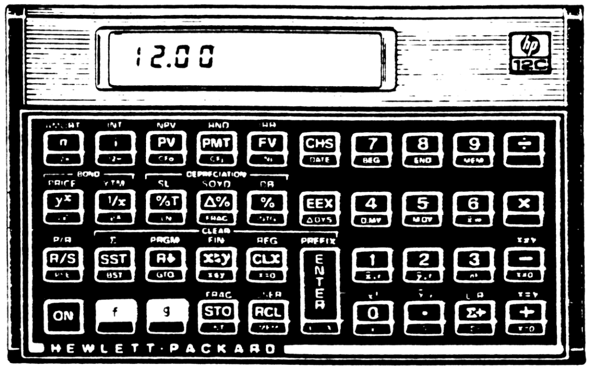
Every memory in a computer or calculator must have something in it. Even though zero has no mathematical value it is something. And it is this something that occupies a memory when you clear.

2. The Clear Bracket

HP-12C (f) CLEAR
- E
- PRGM
- FIN
- REG
- PREFIX

HP-38 (f) CLEAR
- PREFIX
- FIN
- E
- ALL

(g) —— CLP



3. Clear Keystrokes

a. CLEAR PREFIX - (1) Clears prefix errors

(2) If held down displays mantissa

b. CLEAR PROGRAM - Clears program memory of all instructions however the calculator must be in program mode before performing the clear feature.

c. CLEAR FINANCIAL - Clears n, i, PV, PMT & FV; n_0 - n_{20}, does not clear the display

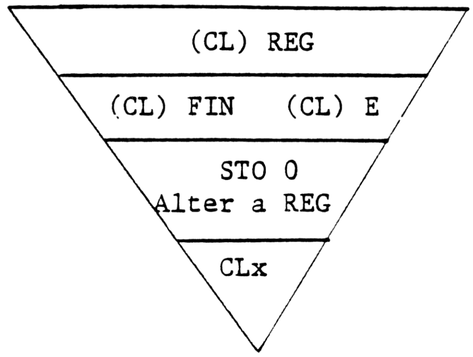
d. CLEAR STATISTICS - Clears R_1 - R_6 and the display only.

e. CLEAR REGISTERS*- Clears everything except program memory

f. CLEAR X-REGISTER - Clears only the display

*CLEAR ALL on the HP-38

4. Volume of Data Cleared



C. Storing and Recalling

1.	K	D
	CLx	0.00
	(f) 4	0.0000
STORING	555.1212	555.1212
	(STO) 0	555.1212

2.	K	D
RECALLING	CLx	0.0000
	(RCL) 0	555.1212

3.	K	D
STORING IN LAST 10 REGs.	300	300.
	(STO) .0	300.0000

4.	K	D
	CLx	0.0000
	(RCL) 0	555.1212
	(RCL) .0	300.0000

LOCATION OF STORED DATA

#	NAME	DATA
1	R_0	555.1212
2	R_1	0
3	R_2	0
4	R_3	0
5	R_4	0
6	R_5	0
7	R_6	0
8	R_7	0
9	R_8	0
10	R_9	0
11	$R_{.0}$	300.0000
12	$R_{.1}$	0
13	$R_{.2}$	0
14	$R_{.3}$	0
15	$R_{.4}$	0
16	$R_{.5}$	0
17	$R_{.6}$	0
18	$R_{.7}$	0
19	$R_{.8}$	0
20	$R_{.9}$	0

5.

STORING ZERO

K	D
0 (STO) 0	0.0000
(RCL) 0	0.0000
(RCL) .0	300.0000

6.

CLEARING REGISTERS

K	D
(f) REG	0.0000
(f) 2	0.00

D. Recalling the Copy

K	D
3250 (STO) 1	3250.00
2500 (STO) 2	2500.00
(RCL) 1	3250.00
6 (X)	19,500.00
(RCL) 2	2500.00
(+)	22,000.00

1. When recalling you only call up a copy of the number in memory. The number in memory is the "master" the number in the display the "copy".

K	D
(RCL) 1	3250.00
(RCL) 2	2500.00

E. Storage Register Arithmetic

1. One register

K	D
100 (STO) 0	100.00
25 (STO) - 0	25.00
(RCL) 0	75.00

K	D
15 (STO) - 0	15.00
10 (STO) - 0	10.00
500 (STO) + 0	500.00
(RCL) 0	550.00

The following restrictions are placed upon your use of storage register arithmetic in the HP-38 and HP-12C.

HP-12C	$R_0 - R_4$
HP-38	$R_0 - R_6$

2. Several Registers

a. Calculator ledger

R1	R2	R3	R4	
CARL	PATTY	MARCIA	SAM	(IN THOUSANDS)
14	20	16	2	JAN
22	18	9	6	FEB
12	40	10	10	MAR

You wish to determine the total sales of each individual in your workforce. Supposing the information presented hadn't already been collated, storage register arithmetic allows you to store data arithmetically collating as you go along.

K	D
14 (STO) 1	14.00
20 (STO) 2	20.00
16 (STO) 3	16.00
2 (STO) 4	2.00
22 (STO) + 1	22.00
18 (STO) + 2	18.00
9 (STO) + 3	9.00
6 (STO) + 4	6.00
12 (STO) + 1	12.00
40 (STO) + 2	40.00
10 (STO) + 3	10.00
10 (STO) + 4	10.00
(RCL) 1	48.00
(STO) 0	48.00
(RCL) 2	78.00
(STO) + 0	78.00
(RCL) 3	35.00
(STO) + 0	35.00
(RCL) 4	18.00
(STO) + 0	18.00
(RCL) 0	179.00

VII. UNDERSTANDING THE COMPOUND INTEREST KEYS

A. Functions of the Compound Interest Keys

1. Storing Informations

K	D
22	22.
(n)	22.00
(CLx)	0.00
(RCL) (n)	22.00

2. Calculating New Data

a. New value automatically stored

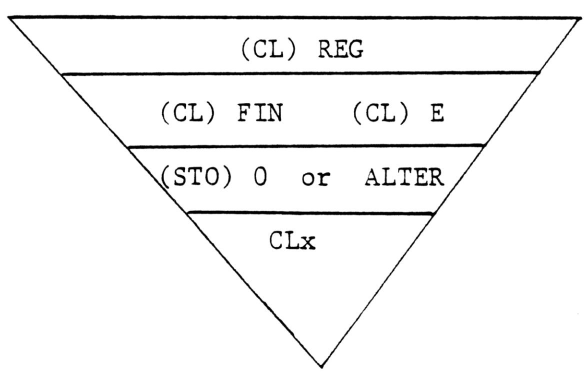
n	i	PV	PMT	FV
X	X	X	?	0

3. Displaying New Data

a. Continuous memory

K	D
(RCL n)	22.00

B. Clearing the Financial Registers



1. Clear Keystrokes

   a. (f CLEAR REG)*

   b. (f CLEAR FIN)

   c. (CLx) - Clears only the display

2. Clear Techniques

   a. (STO) 0

   b. Alter a Register

C. How the Calculator Interprets Financial Information

1. The 4 Rights

   a. The Right information...

   b. In the Right place...

   c. Press the Right key...

   d. To obtain the Right answer.

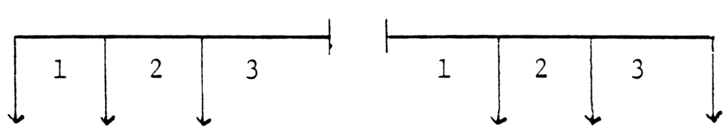
2. 3 to 4, n or i

   a. You must input at least 3 values in the compound interest registers to obtain a 4th.

   b. One of these 3 must be (n) or (i).

3. BEGIN and END Payment Mode

BEGIN	END
Insurance Premiums Leases	Real Estate Mortgages Most Financial Contracts



* (f CLEAR ALL) on the HP-38

D. Defining the Compound Interest Keys

(n) - Number of Compounding Periods

Years

Months

Quarters — Any period of time may be represented

Weeks

(12X) - Twelve Times

a. Performs two functions

(1) Multiplies the number in the display times 12

(2) Stores the newly calculated value in (n)

n

K	D
25	25.
(n)	25.00
(RCL n)	25.00
30	30.
(g 12X)	360.00
(RCL n)	360.00
(RCL g 12X)	30.00
(RCL n)	360.00

(AMORT) - Amortization Calculation

a. Returns 5 different values

(1) Interest portion of a payment

(2) Principal portion of a payment

(3) Number of payments just calculated

(4) Total number of payments amortized

(5) Remaining balance

(i) - Interest Rate Per Compounding Period

Years

Months

Quarters

Weeks

Any period of time may be represented however time must be consistent throughout the registers

(12÷) - Twelve Divide

a. Performs two functions

(1) Divides the number in the display by 12

(2) Automatically stores the newly calculated value in (i)

K	D
17	17.
(i)	17.00
(RCL i)	17.00
13	13.
(g 12÷)	1.08
(RCL i)	1.08
(RCL g 12÷)	13.00
(RCL i)	1.08

(INT) - Simple Interest Calculation

a. This keystroke returns three values

(1) Interest on 360 day calender

(2) Principal amount

(3) Interest on an actual days calender

(PV) - Present Value

a. Defined: The initial cash flow or the present value of a series of cash flows.

PV

Borrower	Lender
+ PV	- PV

(NPV) - Calculate Net Present Value

(Cfo) - Input, first cash flow, initial investment

(PMT) - Payment per Compounding Period

Years

Months

Weeks

Quarters

Any time period may be represented however the chosen time period must be consistent throughout the registers

PMT

Borrower	Lender
+ PV	- PV
- PMT	+ PMT

a. Sign convention

(1) Money in = + cash flow

(2) Money out = - cash flow

(RND) - Round

a. Rounds the x-register to match the chosen number of decimal places in the display.

K	D
17	17.
(g 12÷)	1.42

K	D
(f) 9	1.416666667
(f) 2	1.42
(f RND)	1.42
(f) 9	1.42000000
(f) 2	1.42

(Cfj) - Cash Flow j, Subsequent Cash Flows

(FV) - Future Value

FV

a. Defined: The final cash flow. Or, the future value of a series of prior cash flows.

Borrower	Lender
- PMT	+ PMT
+ PV	- PV
- FV	+ FV
n	n
i	i

(IRR) - Calculate Internal Rate of Return

(Nj) - Input Number of Groups of Cash Flows

PLEASE NOTE: ALWAYS CLEAR YOUR CALCULATOR BEFORE BEGINNING A NEW FINANCIAL PROBLEM. DUE TO CONTINUOUS MEMORY, IF THE CALCULATOR IS NOT PROPERLY CLEARED YOU RUN THE RISK OF CARRYING OVER OLD DATA INTO YOUR NEW CALCULATION.

K	D
(f CLEAR REG)	0.00
or	
(f CLEAR FIN)	0.00

A. Solving for (PMT)

Find the monthly payment for a 25 year, $80,000 mortgage loan with a 15.75% annual interest rate.

(n)	(i)	(PV)	(PMT)	(FV)
25 (g 12X)	15.75 (g 12÷)	80000 (PV)	?	0

K	D
25 (g 12X)	300.00
15.75 (g 12÷)	1.31
80000 (PV)	80,000.00
(PMT)	-1,071.43
(g BEG)	BEGIN
(PMT)	-1,057.55
(STO) 0	-1,057.55
(g END)	-1,057.55
(PMT) (PMT)	-1,071.43
(STO - 0) (RCL 0)	13.88
300 (X)	4,164.11

B. Solving for (n)

Find the monthly term of a $75,000 mortgage loan at 14.50% annual interest rate if the monthly payments are $975 per month.

(n) (i) (PV) (PMT) (FV)

(ANSWER ON NEXT PAGE)

B. Solving for (n) ANSWER

Find the monthly term of a $75,000 mortgage loan at 14.50% annual interest rate if the monthly payments are $975 per month.

(n)	(i)	(PV)	(PMT)	(FV)
?	14.5 (g 12÷)	75000 (PV)	975 (CHS PMT)	0

K	D
14.5 (g 12÷)	1.21
75000 (PV)	75,000.00
975 (CHS PMT)	-975.00
(n)	221.00 (HP-12C) 220.80 (HP-38)

K		D	
HP-38	HP-12C		
221 (n)	----	221.00	Rounded-up term
(FV)	(FV)	198.01	Overpayment
(RCL PMT)	(RCL PMT)	-975.00	Level payment
(+)	(+)	-776.99	Final fractional payment

FRACTIONAL PAYMENTS

FACT: The HP-12C displays only rounded-up values whenever calculating (n). The HP-38, on the other hand, displays the actual mathematical value required to fully amortize the loan.

Method for calculating the final fractional payment

HP-38

1. Store the number of full payments in (n)
2. Press (FV), the display will show the overpayment
3. Press (RCL PMT +), display shows final payment

HP-12C

1. Calculate the overpayment by pressing (FV)
2. Press (RCL PMT +), display shows final payment

C. Solving for (FV)

What will property presently valued at $29,500 be worth in 10 years if property values in the area are declining at the rate of 3% per year?

(n)	(i)	(PV)	(PMT)	(FV)

(ANSWER ON NEXT PAGE)

C. <u>Solving for (FV) ANSWER</u>

What will property presently valued at $29,500 be worth in 10 years if property values in the area are declining at the rate of 3% per year?

(n)	(i)	(PV)	(PMT)	(FV)
10	3	29500	0	?
(n)	(CHS i)	(PV)		

	K	D
1.	10 (n)	10.00
	3 (CHS i)	-3.00
	29500 (PV)	29,500.00
	(FV)	-21,754.01
2.	(CHS PV)	21,754.01
	5 (i)	5.00
	(FV)	-35,434.99
3.	(CHS PV)	35,434.99
	2 (i)	2.00
	(FV)	-43,195.06

D. Solving for (i)

What would the annual interest rate be on a 30 year, $62,750 mortgage loan with payments of $620 per month?

(n)	(i)	(PV)	(PMT)	(FV)

(ANSWER ON NEXT PAGE)

D. Solving for (i) ANSWER

What would the annual interest rate be on a 30 year, $62,750 mortgage loan with payments of $620 per month?

(n)	(i)	(PV)	(PMT)	(FV)
30 (g 12X)	?	62750 (PV)	620 (CHS PMT)	0

K	D	
30 (g 12X)	360.00	
62750 (PV)	62750.00	
620 (CHS PMT)	-620.00	
(i) *	0.96	Rate per period
12 (X)	11.47	Annual rate

Please note: If you have a choice between converting a variable or a constant, always choose the constant.

In the example above the variable was the level monthly payment since it contains interest and principal. The constant was term. No matter how you convert time it still remains thirty years. Converting term was a better choice since money compounds differently on a monthly schedule than it does on an annual schedule.

* Whenever the calculator requires more than an instant to complete the calculation it will flash running in the display. Although it looks like only half the the word, the calculator is using as much of the display it can to write the word.

E. Solving for (PV)

If a land sale contract has a remaining term of 15 years, a remaining balance of $30,000 payable in monthly payments of $450 per month including 13% interest, what could a private paper investor afford to pay for the contract if he desires a 20% effective yield?

(n) (i) (PV) (PMT) (FV)

(ANSWER ON NEXT PAGE)

E. Solving for (PV) ANSWER

If a land sale contract has a remaining term of 15 years, a remaining balance of $30,000 payable in monthly payments of $450 per month including 13% interest, what could a private paper investor afford to pay for the contract if he desires a 20% effective yield?

(n)	(i)	(PV)	(PMT)	(FV)
15 (g 12X)	20 (g 12÷)	?	450 (PMT)	0

K	D
15 (g 12X)	180.00
20 (g 12÷)	1.67
450 (PMT)	450.00
(PV)	-25,622.10

K	D
18 (g 12÷)	1.50
(PV)	-27,943.00
28000 (CHS PV)	-28,000.00
(i)	1.50
(f) 9	1.496201825
12 (X)	17.95442190
27,000 (CHS PV)	-27,000.00
(i)	1.564789272
12 (X)	18.77747126
(f) 2	18.78

IX. AMORTIZATION

A. Creating Amortization Tables

INPUT	RESULT
INTEREST (i)	1st Display: INTEREST PORTION
PRINCIPAL (PV)	X ≷ Y : PRINCIPAL PORTION
PAYMENT (PMT)	R↓ R↓ : NUMBER OF PERIODS JUST AMORTIZED
0 (n)	RCL n : TOTAL NUMBER OF PAYMENTS AMORTIZED
KEY IN THE NUMBER OF PERIODS TO BE AMORTIZED	RCL PV : REMAINING BALANCE
PRESS (f AMORT)	

B.

You may amortize for YEARS, MONTHS, WEEKS, DAYS or any other time period so long as you remember to keep time consistent throughout the compound interest registers.

C. Amortization Example

K	D	
25 (g 12x)	300.00	
13.25 (g 12÷)	1.10	
50000 (PV)	50,000.00	
(PMT)	-573.35	
0 (N)	0.00	
1 (f AMORT)	-552.08	INTEREST PORTION
(X ≶ Y)	-21.27	PRINCIPAL PORTION
(R↓ R↓)	1.00	PRIODS JUST AMORTIZED
(RCL n)	1.00	TOTAL PERIODS AMORTIZED
(RCL PV)	49,978.73	REMAINING BALANCE

K	D	
11 (f AMORT)	-6.056.81	INTEREST PORTION
(X ≶ Y)	-250.04	PRINCIPAL PORTION
(R↓ R↓)	11.00	PERIODS JUST AMORTIZED
(RCL n)	12.00	TOTAL PERIODS AMORTIZED
(RCL PV)	49,728.69	REMAINING BALANCE

1. Repeating the Amortization, Same Terms

K	D
0 (n)	0.00
50000 (PV)	50,000.00
6 (f AMORT)	-3,308.92
(X ≶ Y)	-131.18
(RCL PV)	49,868.82
1 (f AMORT)	-550.63
(X ≷ Y)	-22.72
(RCL PV)	49,846.10
(RCL n)	7.00
1 (f AMORT)	-550.38
(X ≶ Y)	-22.97
(RCL PV)	49,823.13
(RCL n)	8.00

AMORTIZATION TABLE

KEYSTROKE	PERIOD	INTEREST	PRIN.	RB
1 (f AMORT)	9	-550.13	-23.22	49,799.91
1 (f AMORT)	10	-549.87	-23.48	49,776.43
1 (f AMORT)	11	-549.61	-23.74	49,752.69
1 (f AMORT)	12	-549.35	-24.00	49,728.69
	K	D		
	(RCL n)	12.00		
12 (f AMORT)	24	-6,570.72	-309.48	49,419.21
12 (f AMORT)	36	-6,527.13	-353.07	49,066.14
12 (f AMORT)	48	-6,477.37	-402.83	48,663.31
12 (f AMORT)	60	-6,420.65	-459.55	48,203.76
	K	D		
	(RCL n)	60.00		
60 (f AMORT)	120	-30,929.61	-3,471.39	44,732.37
60 (f AMORT)	180	-27,692.17	-6,708.83	38,023.54
60 (f AMORT)	240	-21,435.47	-12,965.53	25,058.01
	K	D		
	(RCL n)	240.00		
60 (f AMORT)	300	-9,343.73	-25,057.27	0.74
	K	D		
	(RCL n)	300.00		

D. AMORTIZATION PROBLEMS

1. Amortization, Six Months*

What amount of interest and principal would have been paid after the first six months of a 30 year, $72,500 mortgage at 16.5% annual interest rate with monthly payments of $1004.23? In addition, calculate the unpaid balance at the end of six months.

INTEREST $________________

PRINCIPAL $________________

REMAINING BALANCE $____________

(ANSWER ON NEXT PAGE)

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* PLEASE NOTE: The next three problems rely upon your having data from the previous problem continually stored in the financial memory. Do not clear for Problems 2 & 3.

1. Amortization, Six Months

What amount of interest and principal would have been paid after the first six months of a 30 year, $72,500 mortgage at 16.50% annual interest rate with monthly payments of $1004.23? In addition, calculate the unpaid balance at the end of six months.

INTEREST $ -5,979.71

PRINCIPAL $ -45.67

REMAINING BALANCE $ 72,454.33

K	D
(f CLEAR REG)	0.00
1004.23 (CHS PMT)	-1004.23
72500 (PV)	72,500.00
16.5 (g 12÷)	1.38
6 (f AMORT)	-5,979.71
(X ≶ Y)	-45.67
(RCL PV)	72,454.33

DO NOT CLEAR YOUR CALCULATOR

2. <u>Amortization, Same Terms, 10 Years</u>

What would be the unpaid principal balance of the loan above if payments were current at the end of 10 years?

REMAINING BALANCE $____________________

(ANSWER ON NEXT PAGE)

2. Amortization, Same Terms 10 Years

What would be the unpaid principal balance of the loan above if payments were current at the end of 10 years?

REMAINING BALANCE $ 70,280.88

K	D
114 (f AMORT)	-112,308.77
(RCL PV)	70,280.88

3. <u>Calculating Balloon Payments</u>

Assuming we would like to calculate a balloon payment after 10 years, 6 months using #2. above as an example, what would be the steps?

STEP ONE ____________________

STEP TWO____________________

(ANSWER ON NEXT PAGE)

3. Calculating Balloon Payments

Assuming we would like to calculate a balloon payment after 10 years, 6 months using #2. above as an example, what would be the steps?

STEP ONE 6 (f AMORT)

STEP TWO (RCL PV)

K	D
6 (f AMORT)	-5,790.22
(RCL PV)	70,045.72

4. Simple Balloon Payment Calculation

A buyer wishes to purchase a home with the condition written into the contract that after five years the principal balance will be due and payable to the lender. The buyer and lender have arranged the terms of the loan so that it is a 15.25% interest rate figured on a 30 year mortgage. What would be the amount of the balloon after five years if the loan amount is $48,500.

K	D	
48500 (PV)	48,500.00	
15.25 (g 12÷)	1.27	
30 (g 12x)	360.00	
(PMT)	-622.96	
60 (n)	60.00	
(FV)	-47,910.67	BALLOON PAYMENT

5. <u>Simple Balloon Payment Calculation Problem</u>

During the negotiation of the sale of a parcel of land you suggest to the seller that a balloon payment may be one way to attract qualified buyers while guaranteeing that the term of the financing will be relatively short.

The parcel is listed at $27,500 and the seller is willing to accept 10% annual interest rate with the payment calculated over 25 years. The balloon will be due and payable as the 60 monthly payment, that is in five years. If the seller of the land will accept no less than 20% down, what is the monthly payment to the seller, and what is the balloon at the end of five years?

(n) (i) (PV) (PMT) (FV)

(ANSWER ON NEXT PAGE)

5. Simple Balloon Payment Calculation Problem

During the negotiation of the sale of a parcel of land you suggest to the seller that a balloon payment may be one way to attract qualified buyers while guaranteeing that the term of the financing will be relatively short.

The parcel is listed at $27,500 and the seller is willing to accept no less that 10% annual interest rate with the payment calculated over 25 years. The balloon will be due and payable as the 60th monthly payment, that is in five years. If the seller of the land will accept no less than 20% down, what is the monthly payment to the seller, and what is the is balloon payment at the end of five years?

(n)	(i)	(PV)	(PMT)	(FV)
25 (g 12x)	10 (g 12÷)	27500 (ENTER) 20 (%) (-) (PV)	?	0

K	D	
25 (g 12x)	300.00	
10 (g 12÷)	0.83	
27500 (ENTER)	27,500.00	
20 (%)(-)(PV)	22,000.00	
(PMT)	-199.91	Buyer's Monthly Payment
59 (n)	59.00	
(FV)	-20,743.08	Balloon Payment as the 60th Payment