"Because we continually strive to improve our products, we may change the specification without prior notice."

Dixons

MADE IN TAIWAN

PRINZTRONIC

PROGRAM

PROGRAMMABLE SCIENTIFIC CALCULATOR

CONTENTS

SPECIFICATIONS

Display:
9-digits LED display
Keyboard:
36 keys with domed keyboard
Capacity:
*8-digits for data entry and results.
*102 steps for storing program.
Operation Mode:
Stack Algorithm
Decimal Point
Full floating
Switches:
▶ON: Power on-off switch.
N/STEP: Normal and STEP operation selecting switch.
LOAD/RUN: LOAD and RUN mode selection switch.
Negative Indicator
"-" symbol in the leftmost digit indicating negative mantissa.
Overflow/Error Indication
All zeros and decimal points light up indicating overflow or error condition.
Busy Indication
All""□" light up indicating program register has stored 102 steps..
OPERATION:
*Four basic functions
*Programmable
*Memory operations (Memory store, Positive accumulation, Negative accumulation, Squares summation)
*Trigonometric functions (sin, cos, tan).
*Inverse-trigonometric functions ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$).
*π-constant
*Radian, degree exchangeable
*Power function(Y^X)
*Square root ($\sqrt{x}$)
*Logarithm (log, ln)

*Anti-logarithm (e^x)
*Square root ($\sqrt{x}$)
*Logarithm (log, ln)
*Reciprocal (1/X)
*Square (X^2)
*Change sign (+/-)
*Display and Y-register exchangeable (X↔Y)

POWER SOURCE OPERATIONS

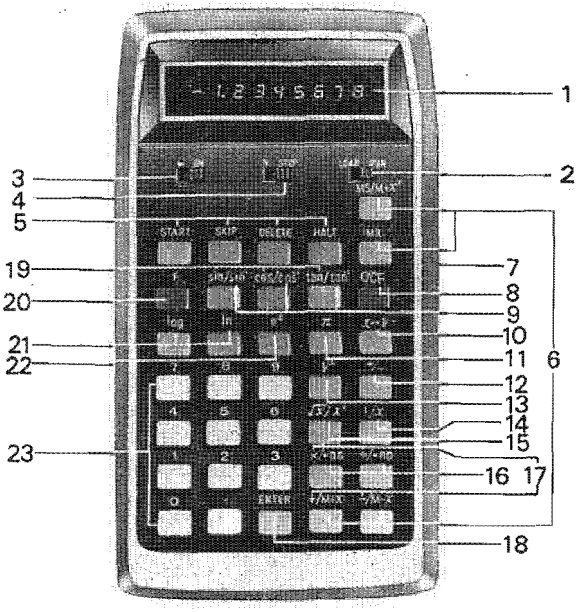
Battery Operation:

*This calculator operates on 4 pcs of UM-3 1.5V throw-away batteries.
*When installing batteries, power switch should be in the off position.
*If the calculator is not used for a long time be sure to remove the batteries.
*When not in use always keep on-off switch in off position to conserve battery strength.

AC OPERATION

*To use this calculator on AC power, you must attach an AC adaptor (optional equipment) to DC input socket of this unit.
*Be sure to remove throw-away batteries when AC/DC adaptor is in used.
*Be sure to use the correct adaptor and plug, using wrong adaptor may damage your calculator.
*When using an AC/DC adaptor, first attach the conneting cord to DC socket, then insert the mains plug in the AC power outlet and AC/DC adaptor with output DC 6V 100ma must be used.
*Plug Specification:
LengthL 11.5m/m
Diameter: inner 2.0m/m, outer 5.5m/m
Polarity: center plus

FUNCTION of KEYS



1) Display
2) LOAD/RUN Switch
3) ON/OFF Switch
4) N/STEP Switch
5) Program Control Keys
6) Memory Operation Keys
7) DC Socket
8) Clear/Clear Function Key
9) Inverse-trigonometric functions
10) Display and Y-register exchange Key
11) π-constant Key
12) Change Sign Key
13) Power Function Key
14) Reciprocal Key
15) Square Root / Square Key
16) Radian / Degree exchange Key
17) Arithmetic Operation Keys (+ - x ÷)
18) Data Enter Key
19) Trigonometric functions
20) Function (Second label) Command Key.
21) Logarithm Function Keys
22) Anti-Logarithm Key
23) Numerical Keys

PART ONE: Stack and Memory Register

This model uses RPN (Reverse Polish Notation) operation with three registers called X, Y and Z.

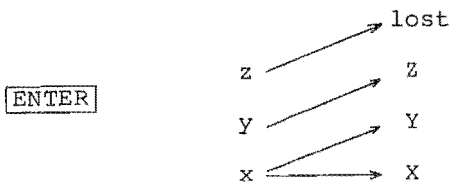
These registers are arranged in a stack with X at the bottom, Y in the middle, and Z on the top. The contents of the X register are always displayed.

In addition to 3 stack register, there is another memory register (M) used for storing constant, intermediate results or for accumulation(M).

To avoid confusion between the name of a register and its contents, the register is designated by a capital (X,Y,Z,M) and the contents by a small letter (x,y,z,m).

When a number is keyed in, it goes into the display (register X). When you press [ENTER] the number is duplicated into register Y. At the same time, the contents of register Y are transferred to register Z, and the contents of register Z are transferred out of the stack, as follows:

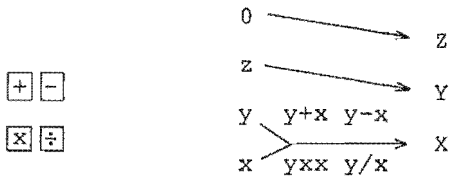
Operation Contents Register



When you press [+], x is added to y, and the entire stack drop, the result display in X. The process for [−], [X], or [÷] is likewise.

The process is as follows:

Press Contents Register

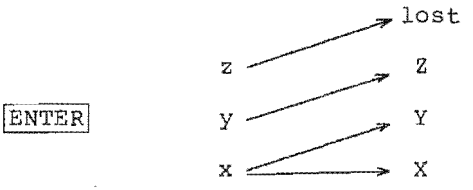


Example: (2 x 3) + (4 x 5) = 26

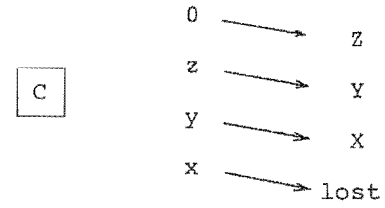
Operation	2	ENT	3	X	4	ENT	5	X	+
Z						6	6		
Y		2	2		6	4	4	6	
X	2	2	3	6	4	4	5	20	26

Summary of Stack Operations

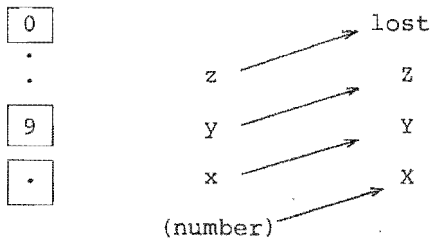
Operation Contents Registers



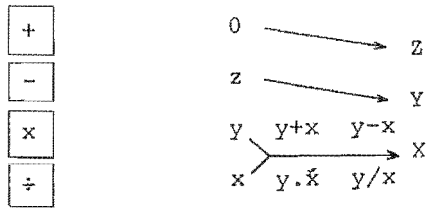
Operation Contents Registers



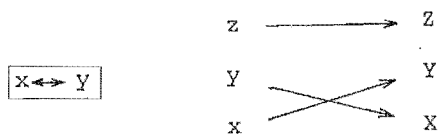
Operation Contents Registers



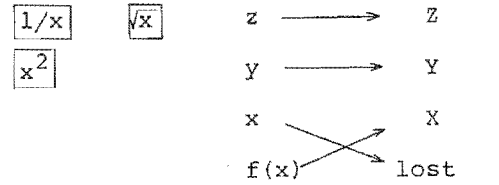
Operation Contents Registers



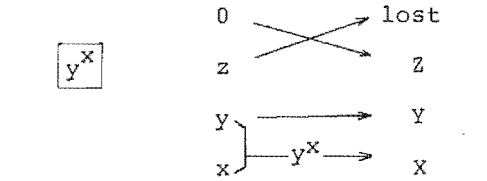
Operation Contents Registers



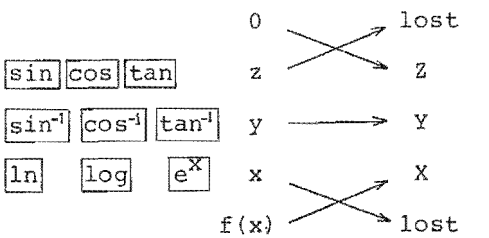
Operation Contents Registers



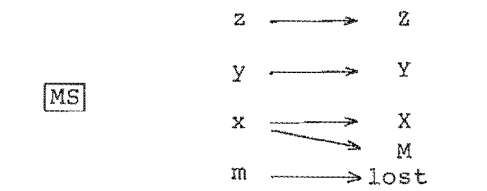
Operation Contents Registers



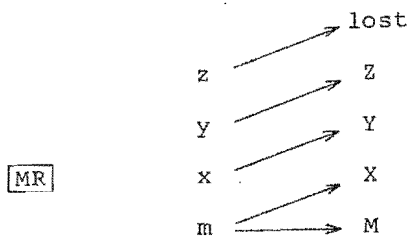
Operation Contents Registers



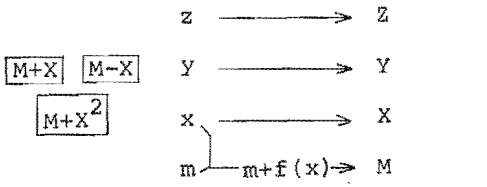
Operation Contents Registers



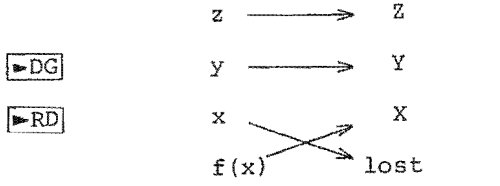
Operation Contents Registers



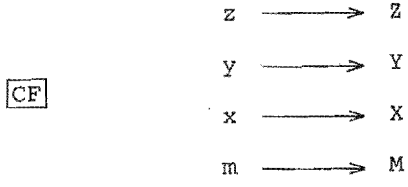
Operation Contents Registers



Operation Contents Registers

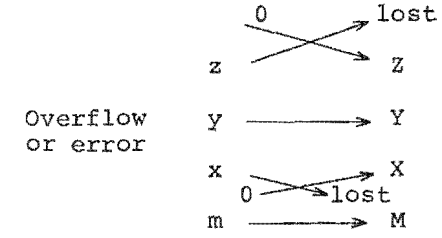


Operation Contents Registers



* CF Key reset F mode.

Operation Contents Registers



PART TWO

In order to conserve the batteries, after 20 seconds (Appr.) the contents of display disappear and are replaced by a row of 9 decimal points. To recall the previously displayed figure depress the +/- key twice.

I) Four Basic Functions

Example: [(1 + 2) x 3 - 4] ÷ 5

Operation	Display	Description
1	1	
ENTER	1.	
2	2	
+	3.	1+2
3	3	
x	9.	(1+2)x3
4	4	
-	5.	(1+2)x3-4
5	5	
÷	1.	

II) Reciprocals
Example: $\frac{1}{3-1/2}$

Operation	Display	Description
3	3	
[ENTER]	3.	
2	2	
[1/x]	.5	1/2
[-]	2.5	3-0.5
[1/x]	.4	

III) Square Roots
Example: $81^{1/4}$

Operation	Display	Description
81	81	
[√X]	9.	
[√X]	3.	

IV) Squares
Example: 2.5^2

Operation	Display	Description
2.5	2.5	
[F]	2.5	
[X^2]	6.25	

V) Power Functions
Example 1) $_2{}^{10}$

Operation	Display	Description
2	2	
[ENTER]	2.	
10	10	
[y^x]	1023.998	≒1024

Example 2) $10^{1/2.5}$

Operation	Display	Description
10	10	
[ENTER]	10.	
2.5	2.5	
[1/X]	.4	
[y^x]	2.511885	

VI) Logarithms
Example 1) ln5

Operation	Display	Description
5	5	
[ln]	1.609438	

Example 2) log 0.03

Operation	Display	Description
.03	.03	
[log]	-1.522879	

VII) Anti-logarithm
Example: $e^{2.3}$

Operation	Display	Description
2.3	2.3	
[e^x]	9.974177	

VIII) π Constant

Operation	Display	Description
π	3.1415926	

IX) Radian / Degree exchange
Example 1) $\pi \rightarrow ?^\circ$

Operation	Display	Description
[π]	3.1415926	
[F]	3.1415926	
[►DG]	179.99999	≒180°

Example 2) $45^\circ \rightarrow ?$ rad

Operation	Display	Description
45	45	
[F]	45	
[►RD]	.78539815	

X) Trigonometric Function
Example 1) sin30°

Operation	Display	Description
30	30	
[sin]	.5	

Note: This model accepts Degree as "argument" only, if argument is radian you must change to degree first and then go on the problem.

Example 2) $\cos \frac{\pi}{6}$

Operation	Display	Description
6	6	
[1/x]	.16666666	
[π]	3.1415926	
[x]	.52359874	
[F]	.52359874	

Operation	Display	Description
►DG	29.999998	
cos	.8660254	

Example 3) tan15°

Operation	Display	Description
15	15	
tan	.2679492	

XI) Inverse-trigonometric

Example 1) $\sin^{-1}$ .3

Operation	Display	Description
.3	.3	
F	.3	
$\sin^{-1}$	17.4576	Degree

XII) X-register and Y-register exchange

Example 6 ÷ (1 + 2) = 2

Operation	Display	Description
1	1	
ENTER	1.	
2	2	

Operation	Display	Description
+	3.	1+2=3
6	6	
X←→Y	3.	
÷	2.	

XIII) Memory Operation

A) Store constant or intermediate result

Operation	Display	Memory
10	10	?
MS	10.	10.
C	0.	10.
MR	10.	10.

Note: Depressing MS key will overwrite the contents of the Memory register. Depressing MR key recall the contents of the Memory register into X-register transfer x into y, y into z leaving Memory unaffected.

B) Clear Memory

Operation	Display	Memory
10	10	?
MS	10.	10
0	0	10

Operation	Display	Memory
MS	0.	0
MR	0.	0.

Note: Entering zero into memory overwrite the contents of Memory register.

C) Accumulation
Example: $4 + 5 \times 6 + 7^2 - 12$

Operation	Display	Memory
0	0	?
MS	0.	0
4	4	0
F	4	0
M+X	4.	4.
5	5	4.
ENTER	5.	4.
6	6	4.
X	30.	4.
F	30.	4.
M+X	30.	34.
7	7	34.

Operation	Display	Memory
F	7	34.
$M+X^2$	7.	83.
12	12	83.
F	12	83.
M-X	12.	71.
MR	71.	71

PART THREE: PROGRAMMING

(I) General Description
When programming, this model has two working modes, i.e. LOAD and RUN and four control keys, i.e. START, SKIP, HALT and DELETE.

A. Working Modes:
LOAD: Load the program with commands
RUN: Runs the program.

B. Control Keys:

Key	LOAD	RUN
[START]	Clears and initializes program storage area.	Starts first program. Starts program when stopped in HALT step.
[SKIP]	Terminates current program and initializes a new one.	Skips remainder of current program and begins excution of next one.
[HALT]	Programs an operator data entry or check point in RUN mode.	
[DELETE]	Erases the last key entered. Back one step for each depression.	

(II) Rule for programming your calculator

1) Set N STEP switch to"N" (Normal Operation)

2) Set LOAD RUN switch to "LOAD" position

3) Depress [START] key

Note:
When depressing the [START] key, in the LOAD mode, all the programs being previously loaded will be cleared and the [START] command will be loaded as the first step in the program register.

4) Key in the number or function command as you desire.
5) If a variable to be used, depress [HALT] key first, set mode switch to "RUN" position key in a number as dummy name then reset mode switch to "LOAD" position and continue your problem
6) If you want to designate the program, use following key sequence.
[NUMBER] [Halt] [C] at the beginning of each program.
7) Use a [HALT] step at the end of each program to terminate each program or to halt at any step to check the intermediate results at will.
8) If there are more than one program to be loaded into the calculator, use a [SKIP] step at the very beginning of each following program for entering each program.

9) If there is any wrong key sequence, depress [DELETE] key successively back to the correct ones and reload the program.

(III) Rule to execute your program

1) Set mode switch in "RUN" position.
2) Depress [START] key to execute first program
3) When halting at a variable entry, key in the variable according to the program you have entered.
4) When halting at a checking point, depressing [START] key will continue the execution of the program.
5) When at a [HALT] step, depressing [SKIP] key will cause the remaining steps of the current program to be skipped. Execution automatically begin at the start of the next program and continue to the first [HALT] step; in absence of a [HALT] step, execution will continue to the end of the program.
6) Set the N STEP switch to "STEP" position and depress [START] key to check the program step by step.

Example 1) $X^2 + X + 1$

a) Programming

Mode	Operation	Display	Description
N, LOAD	[START]		
N, LOAD	[HALT]		
N, RUN	2	2	Enter 2 as Dummy name
N, LOAD	[ENTER]	2.	

Mode	Operation	Display	Description
N, LOAD	[ENTER]	2.	
N, LOAD	[X]	4.	X^2
N, LOAD	[+]	6.	X^2+X
N, LOAD	1	1	
N, LOAD	[+]	7.	X^2+X+1
N, LOAD	[HALT]	7.	

b) Execution

Mode	Operation	Display	Description
N, RUN	[START]		
N, RUN	3	3	
N, RUN	[START]	13.	$f(3)=3^2+3+1$ $= 13$

c) Repeat Execution using "STEP" operation

Mode	Operation	Display	Description
STEP, RUN	[START]		
STEP, RUN	3	3	
STEP, RUN	[START]	3.	
STEP, RUN	[START]	3.	
STEP, RUN	[START]	9.	X^2
STEP, RUN	[START]	12.	X^2+X
STEP, RUN	[START]	1.	
STEP, RUN	[START]	13.	X^2+X+1

Example 2) Find sinθ

$(\theta = \frac{\pi}{3}, \frac{\pi}{6}, \frac{\pi}{2})$

a) Programming

Mode	Operation	Display	Description
N, LOAD	START		
N, RUN	1	1	
N, LOAD	START	1.	
N, LOAD	F	1.	
N, LOAD	►RD	57.29578	Change radian to degree
N, LOAD	sin	.8414711	
N, LOAD	HALT	.8414711	

b) Execution

Mode	Operation	Display	Description
N, RUN	π	3.1415926	
N, RUN	3	3	
N, RUN	÷	1.0471975	
N, RUN	START	.8660254	$\sin\frac{\pi}{3}$
N, RUN	π	3.1415926	
N, RUN	6	6	
N, RUN	÷	.52359876	
N, RUN	START	.5	$\sin\frac{\pi}{6}$

Mode	Operation	Display	Description
N, RUN	π	3.1415926	
N, RUN	2	2	
N, RUN	÷	1.5707963	
N, RUN	START	1.	$\sin\frac{\pi}{2}$

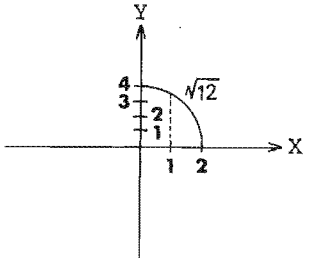
Example 3) Plot $y = \sqrt{16 - 4X^2}$

a) Programming

Mode	Operation	Display	Description
N,LOAD	START		
N,LOAD	HALT	1	
N, RUN	1	1.	
N,LOAD	ENTER	1.	
N,LOAD	X	1.	X^2
N,LOAD	4	4	
N,LOAD	X	4.	$4X^2$
N,LOAD	16	16	
N,LOAD	X↔Y	4.	
N,LOAD	-	12	$16-4X^2$
N,LOAD	√x	3.4641016	$\sqrt{16-4X^2}$
N,LOAD	HALT	3.4641016	

b) Execution

Mode	Operation	Display	Description
N, RUN	START		
N, RUN	0	0	x=0
N, RUN	START	4	(x,y)=(0,4)
N, RUN	.5	.5	x=0.5
N, RUN	START	3.8729833	(x,y)=(0.5, 3.8729833)
N, RUN	1	1	x=1
N, RUN	START	3.4641016	(x,y)=(1, 3.4641016)
N, RUN	1.5	1.5	x=1.5
N, RUN	START	2.6457513	(x,y)=(1.5, 2.6457513)
N, RUN	2	2	x=2
N, RUN	START	0	(x,y)=(2,0)



Note:
1. Second quardent's is the image of the first quardent
2. The more (x,y) points we get, the more accuracy we obtain.

Example 4) Hyperbolic Function

1) Programming

Mode	Operation	Display	Description
N, LOAD	START		
N, LOAD	HALT		
N, RUN	2	2	Dummy name for X
N, LOAD	e^x	7.389051	e^x
N, LOAD	ENTER	7.389051	
N, LOAD	1/X	.13533537	e^{-x}
N, LOAD	MS	.13533537	
N, LOAD	-	7.2537157	$e^x - e^{-x}$
N, LOAD	2	2	
N, LOAD	÷	3.6268578	$\frac{e^x - e^{-x}}{2}$
N, LOAD	HALT	3.6268578	
N, LOAD	SKIP	3.6268578	
N, LOAD	ENTER	3.6268578	
N, LOAD	MR	.13533537	
N, LOAD	+	3.7621931	
N, LOAD	HALT	3.7621931	
N, LOAD	SKIP	3.7621931	
N, LOAD	÷	.9640295	
N, LOAD	HALT	.9640295	

b) Execution

Mode	Operation	Display	Description
N, RUN	START		
N, RUN	3	3	
N, RUN	START	10.017866	sinhx
N, RUN	SKIP	10.067653	coshx
N, RUN	SKIP	.9950475	tanhx

Example 5) A=X cos Wt + Y sin Wt
B=X cos Wt - Y sin Wt
Where X=3
Y=2
W=π
t=1/3

a) Programming

Mode	Operation	Dispaly	Description
N, LOAD	C	0.	
N, LOAD	START	0.	
N, LOAD	HALT	0.	
N, RUN	1	1	Dummy name for X
N, LOAD	ENTER	1.	
N, LOAD	HALT	1.	
N, RUN	2	2	Dummy name for W

Mode	Operation	Display	Description
N, LOAD	ENTER	2.	
N, LOAD	HALT	2.	
N, RUN	3	3	Dummy name for t
N, LOAD	X	6.	Wt
N, LOAD	MS	6.	
N, LOAD	F	6.	
N, LOAD	DG	343.77468	
N, LOAD	cos	.9601703	cos Wt
N, LOAD	X	.9601703	X cos Wt
N, LOAD	MR	6.	
N, LOAD	X↔Y	.9601703	
N, LOAD	MS	.9601703	
N, LOAD	C	6.	
N, LOAD	HALT	6.	
N, RUN	4	4	Dummy name for Y
N, LOAD	X↔Y	6.	
N, LOAD	F	6.	
N, LOAD	DG	343.77468	
N, LOAD	sin	- .2794165	sin Wt

Mode	Operation	Display	Description
N, LOAD	X	-1.117666	Y sin Wt
N, LOAD	ENTER	-1.117666	
N, LOAD	MR	.9601703	
N, LOAD	+	- .1574957	
N, LOAD	HALT	- .1574957	
N, LOAD	SKIP	- .1574957	
N, LOAD	X←→Y	-1.117666	
N, LOAD	MR	.9601703	
N, LOAD	X←→Y	-1.117666	
N, LOAD	-	2.0778363	
N, LOAD	HALT	2.0778363	

b) Execution

Mode	Operation	Display	Description
N, RUN	C		
N, RUN	START		
N, RUN	3	3	X
N, RUN	START	3.	
N, RUN	π		W
N, RUN	START	3.1415926	
N, RUN	3	3	
N, RUN	1/X	.33333333	t

Mode	Operation	Display	Description
N, RUN	START	1.0471975	
N, RUN	2	2	y
N, RUN	START	3.2320514	A
N, RUN	SKIP	- .2320502	B

Example 6) Borrow $5,000 at 8% per year for 6 years
How much the monthly payment is?

a) Programming $PMT=\frac{pvi(1+i)^n}{(1+i)^n-1}$

Mode	Operation	Display	Description
N, LOAD	C	0.	
N, LOAD	START	0.	
N, LOAD	HALT	0.	
N, RUN	2	2	Dummy name for interest
N, LOAD	MS	2.	
N, LOAD	1	1	
N, LOAD	+	3.	
N, LOAD	HALT	3.	
N, RUN	3	3	Dummy name for period
N, LOAD	y^x	27.	$(1+i)^n$
N, LOAD	MR	2.	

Mode	Operaiton	Display	Description
N, LOAD	[X⟷Y]	27.	
N, LOAD	[MS]	27.	
N, LOAD	[X]	54.	$i(1+i)^n$
N, LOAD	[HALT]	54.	
N, RUN	4	4	Dummy name for PV
N, LOAD	[X]	216.	$pvi(1+i)^n$
N, LOAD	[MR]	27.	
N, LOAD	1	1	
N, LOAD	[-]	26.	$(1+i)^n-1$
N, LOAD	[÷]	8.3076923	$\frac{pvi(1+i)^n}{(1+i)^n-1}$
N, LOAD	[HALT]	8.3076923	

b) Execution

Mode	Operation	Display	Description
N, RUN	[START]		
N, RUN	.08	.08	
N, RUN	[ENTER]	.08	
N, RUN	12	12.	
N, RUN	[÷]	.0066666	*
N, RUN	[START]	1.0066666	(1+i)
N, RUN	6	6.	
N, RUN	[ENTER]	6.	

Mode	Operation	Display	Description
N, RUN	12	12.	
N, RUN	[X]	72.	
N, RUN	[START]	.0107566	$i(1+n)^n$
N, RUN	5000	5000	
N, RUN	[START]	87.666994	PMT

* Change interest rate per year to interest per month.

Appendix
Conditions for Error Indication

Function	Conditions
+, -, X, ÷	Result > 9999.9999
÷ or 1/X	$\|x\| \leqslant 0.00000001$
$\sqrt{X}$	$X < 0$
y^x	$Y \leq 0$ $\ln 99999999 < X \ln Y < -28$
logX or lnX	$X \leqslant 0.00000001$
e^x	$\ln 99999999 < X < -28$
sinX or cosX	$X \geqslant 7$ radians or ~ 401°
$\sin^{-1}X$, $\cos^{-1}X$	$X > 1$
tanX	$X = \pm 90°$ or $X \geqslant 7$ radians