Canon

F-960SG

SCIENTIFIC CALCULATOR
User instruction

IMPORTANT: READ BEFORE USE

Please read the following instructions and safety
precautions before using the Scientific Calculator.
Keep this manual on hand for future reference.

ENGLISH

CONTENTS

How to Open / Close the cover

Open or close the cover by sliding as shown in the figure.
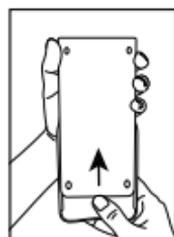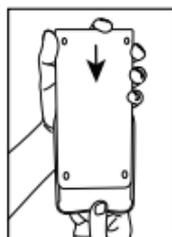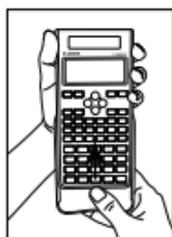
OPEN   CLOSE
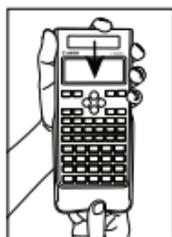
DISPLAY

<Status Indicators>
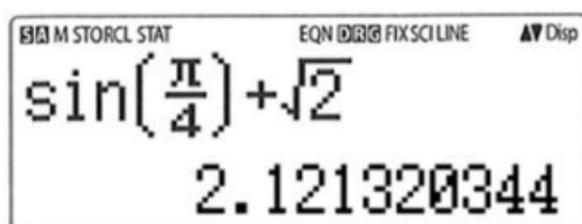
S	: Shift key
A	: Alpha key
M	: Independent memory
STO	: Store memory
RCL	: Recall memory
STAT	: Statistics mode
EQN	: Equation calculation mode
D	: Degree mode
R	: Radian mode
G	: Gradient mode
FIX	: Fixed-decimal setting
SCI	: Scientific notation
LINE	: Line display mode
▲	: Up arrow
▼	: Down arrow
Disp	: Multi-statements display

GETTING STARTED

■ First time operation:
1. Pull out the battery insulation sheet, then the battery will be loaded.
2. Press $\boxed{ON}$ $\overset{Shift}{\boxed{}}$ $\overset{CLR}{\boxed{}}$ $\boxed{3}$ $\boxed{=}$ $\boxed{CA}$ to reset the calculator.

Power ON: When $\boxed{ON}$ is pressed.

Power OFF: $\overset{Shift}{\boxed{}}$ $\overset{OFF}{\boxed{}}$ are pressed.

■ Auto Power off Function:
When the calculator is not used for about 7 minutes, it will automatically power off.

Display Contrast Adjustment

■ Press $\overset{Shift}{\boxed{}}$ $\overset{SET-UP}{\boxed{}}$ $\odot$ $\boxed{6}$ (6: ◀ CONT ▶), enter the Display Contrast Adjustment screen.

```
CONTRAST

LIGHT          DARK
 [ ◀ ]         [ ▶ ]
```
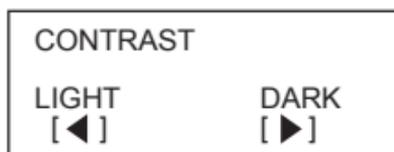
Press $\odot$ to make the display contrast darken.
Press $\odot$ to make the display contrast lighten.
Press $\boxed{CA}$ or $\boxed{ON}$ to confirm and clear the screen.

■ To initialize the LCD contrast, press $\overset{Shift}{\boxed{}}$ $\overset{CLR}{\boxed{}}$ $\boxed{3}$ $\boxed{=}$ $\boxed{CA}$ outside the **Display Contrast Adjustment** screen.

Mode Selection

■ Press $\boxed{MODE}$ to enter the Calculation Mode Selection screen.

```
1 : COMP    2 : STAT
3 : BASE    4 : EQN
```
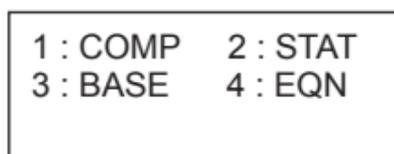
Operation	Mode		LCD Indicator
MODE 1	COMP	Normal calculation	
MODE 2	STAT	Statistical calculation	STAT
MODE 3	BASE	Calculations involving specific number systems	
MODE 4	EQN	Equation solution	EQN

■ The default mode is COMP mode.

Calculator Set-up Menu

■ Press [Shift] [SET-UP] to enter the **Calculator Set-up Menu**; press
$\odot$ / $\bigcirc$ for next / previous page.

```
1: MthIO    2: LineIO▼
3: Deg      4: Rad
5: Gra      6: Fix
7: Sci      8: Norm
```
Press $\odot$ or $\bigcirc$ key ↔
```
1: ab/c     2: d/c      ▲
3: CPLX     4: STAT
5: Disp     6: ◀CONT▶
```

■ To select the calculator input & output format [1] MthIO or [2] LineIO

[1] MthIO - (Maths mode). Most of the input (e.g. Fraction, pi, square root number) are shown in Mathematics textbook format.

Maths mode
$$\frac{\sqrt{5}+1}{3-1}$$
$$1.224744871$$

And there are 3 "Result Format" (MathO, LineO or DecimalO) for selection.

Result Format?
1: MathO   2: LineO
3: DecimalO

In MathO, fraction calculation result will be shown same as Input.
In LineO, fraction calculation result will be in line format.
In DecimalO, fraction calculation result will be in decimal number format. No fraction will be display.

[2] LineIO – (Line mode): The majority of calculation input and output are shown in the lines format. and "LINE" icon will be shown.

Line mode
$$\sqrt{(5+1)} \rfloor (3-1)^{\text{LINE}}$$
$$1.224744871$$

And there are 2 "Result Format" (LineO, DecimalO) for selection.

Result Format?
1: LineO
2: DecimalO

For the STAT mode, the Input & Display format will switch to LineIO mode automatically.

5

■ **To select the angle unit [3] Deg, [4] Rad or [5] Gra**
   [3] Deg: Angle unit in Degree
   [4] Rad: Angle unit in Radian
   [5] Gra: Angle unit in Gradient

   $90° = \frac{\pi}{2}$ radians = 100grads

■ **To select display digit or notation [6] Fix, [7] Sci or [8] Norm**
   [6] Fix: Fixed Decimal, [Fix 0~9?] appears, specify the number of decimal places by pressing [0] – [9].
   Example: 220 ÷ 7   = 31.4286 (FIX 4)
                  = 31.43 (FIX 2)

   [7] Sci: Scientific Notation, [Sci 0~9?] appears, specify the number of significant digits by pressing [0] – [9].
   Example: 220 ÷ 7   = 3.1429×10^1 (SCI 5)
                  = 3.143×10^1 (SCI 4)

   [8] Norm: Exponential Notation, [Norm 1~2?] appears, specify the exponential notation format by pressing [1] or [2].
   Norm 1: Exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than **TWO** decimal points.

   Norm 2: Exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than **NINE** decimal places.

   Example: 1 ÷ 1000   = 1×10^{-3} (Norm 1)
                    = 0.001 (Norm 2)

■ **To select the fraction format [1] a b/c or [2] d/c**
   [1] a b/c: specify Mixed fraction display
   [2] d/c: specify Improper fraction display

■ **To select the complex number display format [3] CPLX ([1] a+bi or [2] r<θ)**
   [1] a+bi : specify Rectangular Coordinates
   [2] r<θ : specify Polor Coordinates

■ **To select the statistical display format [4] STAT**
   ([1] ON or [2] OFF)
   [1] ON: Show FREQ (Frequency) Column in Statistical Data
   Input Screen
   [2] OFF: Hide FREQ (Frequency) Column in Statistical Data
   Input Screen

■ **To select the decimal point display format [5] Disp**
   ([1] Dot or [2] Comma)
   [1] Dot: specify dot format for Decimal point result display
   [2] Comma: specify comma format for Decimal point result
   display

■ **To Adjust Display contrast [6] ◀ CONT ▶**
   See "Display Contrast Adjustment" section.

Before Using the Calculator

■ **Check the current Calculation Mode**
Be sure to check the status indicators that indicate the current
calculation mode (COMP, STAT, BASE, EQN), display formats
setting and angle unit setting (Deg, Rad, Gra)

■ **Return to initial setup**
Pressing $\overset{Shift}{\square}$ $\overset{CLR}{\square}$ $\boxed{1}$ (Setup) $\boxed{=}$ (Yes) $\boxed{CA}$ to return the
initial calculator setup
   Calculation mode   : COMP
   Input/Output Format   : MthIO/MathO
   Angle unit   : Deg
   Display Digits   : Norm 2
   Fraction Display Format   : d/c
   Statistical Data Input : OFF
   Decimal Point format : Dot
This action will not clear the variable memories.

■ **Initialize the calculator**
When you are not sure of the current calculator setting, you are
recommended to initialize the calculator (reset calculation mode
"COMP", angle unit "Degree", and clear reply and variable
memories), and LCD contrast by
pressing $\overset{Shift}{\square}$ $\overset{CLR}{\square}$ $\boxed{3}$ (All) $\boxed{=}$ (Yes) $\boxed{CA}$.

INPUTTING EXPRESSIONS AND VALUES

Input Capacity

F-960SG allows you to input a single calculation up to 99 bytes.
Normally, one byte is used as each time you press one of the
numeric keys, arithmetic keys, scientific function keys or $\boxed{\text{Ans}}$.
Some functions require 4 – 13bytes.
$\overset{Shift}{\boxed{}}$, $\overset{Alpha}{\boxed{}}$, and the direction keys will not use up any bytes.
When input capacity is less than 10bytes, the input cursor will
change from "▮" to "▆" that notifying the memory is running
now.

Input Editing

■ New Input begins on the left of display. If input data are more
than 15 characters, the line will scroll to the right consecutively.
You can scroll back to the left by using $\textcircled{\scriptsize <}$ and $\textcircled{\scriptsize >}$ to review
the input

■ In LineIO mode, press $\textcircled{\scriptsize \wedge}$ to let the cursor jump to the
beginning of inputting, while $\textcircled{\scriptsize \vee}$ will jump to the end.

■ In MthIO mode, press $\textcircled{\scriptsize >}$ to let the cursor jump to the
beginning of inputting while it is at the end of the input
calculation. Or press $\textcircled{\scriptsize <}$ to let the cursor jump to the end of
inputting while it is at the beginning of the input calculation.

■ Omit the multiplication sign and final close parenthesis.

Example: 2 x log 100 x (1+3) = 16

	Operation 1:	**Display 1**
Including $\boxed{\times}$ *1, $\boxed{)}$ *2, $\boxed{)}$ *3	$\boxed{2}\boxed{\times}\boxed{\text{log}}\boxed{1}\boxed{0}\boxed{0}\boxed{)}\boxed{\times}$ *2 $\boxed{(}\boxed{1}\boxed{+}\boxed{3}\boxed{)}\boxed{=}$ *3 *1	2xlog(100) x (1+3) 16
	Operation 2:	**Display 2**
Omitting $\boxed{\times}$ *1, Omitting $\boxed{)}$ *3	$\boxed{2}\boxed{\text{log}}\boxed{1}\boxed{0}\boxed{0}\boxed{)}\boxed{(}\boxed{1}$ $\boxed{+}\boxed{3}\boxed{=}$	2log(100)(1+3 16

*1. Omit multiplication sign (x)
   - Input before an open parentheses $\boxed{(}$: 1 x (2+3)
   - Input before scientific functions that includes parenthesis:
     2 x cos(30)
   - Input before Random number function $\overset{Ran\#}{\boxed{}}$
   - Input before Variable (A, B, C, D, X, Y, M), π, e

*2. Scientific functions come with the open parenthesis.
   Example: sin(, cos(, Pol(, You need to input the argument
   and the close parenthesis $\boxed{)}$.

*3. Omit the last close parenthesis before the $\boxed{=}$, $\boxed{M+}$, $\overset{M-}{\boxed{}}$,
   $\overset{Shift}{\boxed{}}$ $\overset{STO}{\boxed{}}$.

■ **Insert and overwrite Input mode** $\overset{Insert}{\boxed{}}$

In LineIO mode, you can use INSERT $\overset{}{\boxed{}}$ or overwrite mode
for inputting.
   - In Insert mode (Default input mode), the cursor is a
     vertical flashing line " **|** " for inserting a new character.
   - In overwrite mode, press $\overset{Shift}{\boxed{}}$ $\overset{Insert}{\boxed{}}$ key to switch the cursor
     to a flashing horizontal (_) and replace the character at
     the current cursor position.

In MthIO mode, you can only use the insert mode.

Whenever the display format changes from LineIO mode to
MthIO mode, it will automatically switch to the insert mode.

■ Deleting and Correcting an Expression

In insert mode: Move the cursor to the right of the character or function that needs to be deleted, then press `DEL`.

In overwrite mode: Move the cursor under the character or function being deleted, then press `DEL`.

Example: 1234567 + 889900

(1) Replace an entry (1234567 → 1234560)

Mode Setting	Key In operation	Display (input Line only)
Method 1: LineIO/MthIO mode – Insert mode	1234567 `+` 889900 `<` 7 times	1234567❙+889900
	`DEL` `0`	1234560❙+889900

Method 2: LineIO mode –
Overwrite mode
	`Shift` `SET-UP` `2` `1`
	1234567 `+` 889900
	`Shift` `Insert`
		1234567+889900_

	`<` 8 times	123456<u>7</u>+889900
	`0`	1234560+889900

(2) Deletion (1234567 → 134567)

Method 1: LineIO/MthIO mode – Insert mode	`<` 12 times	12❙34567+889900
	`DEL`	1❙34567+889900
Method 2: LineIO mode – Overwrite mode	`Shift` `Insert` `<` 13 times	1234567+889900_ 1<u>2</u>34567+889900
	`DEL`	13<u>4</u>567+889900

(3) Insertion (889900 → 2889900)

LineIO/MthIO mode – Insert mode	`<` 6 times	1234567+❙889900
	`2`	1234567+2❙889900

Inputting and Display result in MthIO Mode

■ In MthIO Mode, the Input display of fraction or certain functions (log, x^2, x^3, $x^\blacksquare$, $\sqrt{\blacksquare}$, $\sqrt[3]{\blacksquare}$, $\sqrt[\blacksquare]{\square}$, x^{-1}, $10^\blacksquare$, $e^\blacksquare$, Abs) is shown in Mathematics textbook format.

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}$ $\overset{SET\text{-}UP}{\boxed{}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
$\left\lvert\sqrt{3}-\dfrac{2}{\sqrt{2}}\right\rvert$	$\boxed{\text{Abs}}$ $\boxed{\sqrt{\blacksquare}}$ $\boxed{3}$ $\boxed{\odot}$ $\boxed{-}$ $\boxed{2}$ $\boxed{\frac{\blacksquare}{\blacksquare}}$ $\boxed{\sqrt{\blacksquare}}$ $\boxed{2}$ $\boxed{=}$	$\left\lvert\sqrt{3}-\frac{2}{\sqrt{2}}\right\rvert$ 0.3178372452

Remark
 (1) Some input expressions cause the height of a calculation expression to be greater than one display screen. Maximum input capacity: 2 display screen (31 dots x 2).
 (2) Calculator memory limits how many functions or parentheses can be input in any single expression. In this case divide the expression into multiple parts and calculate separately.
 (3) If part of the expression you input is cut off after calculation and in the result display screen you can press $\boxed{\textless}$ or $\boxed{\textgreater}$ to view the full expression.

INPUT RANGE AND ERROR MESSAGE

Calculation Precision, Input Range

Number of Digits for Internal Calculation	Up to 18 digits
Precision*	±1 at the 10th digit for a single calculation. ±1 at the least significant for exponential display
Calculation Range	±1 × 10⁻⁹⁹ to ±9.999999999 × 10⁹⁹ or 0

■ Function Calculation Input Ranges

Functions	Input Range	
sinx	DEG	$0 \leq |x| < 9 \times 10^9$
	RAD	$0 \leq |x| < 157079632.7$
	GRA	$0 \leq |x| < 1 \times 10^{10}$
cosx	DEG	$0 \leq |x| < 9 \times 10^9$
	RAD	$0 \leq |x| < 157079632.7$
	GRA	$0 \leq |x| < 1 \times 10^{10}$
tanx	DEG	Same as sinx, except when $|x| = (2n-1) \times 90$
	RAD	Same as sinx, except when $|x| = (2n-1) \times \pi/2$
	GRA	Same as sinx, except when $|x| = (2n-1) \times 100$
$\sin^{-1}x$	$0 \leq |x| \leq 1$	
$\cos^{-1}x$		
$\tan^{-1}x$	$0 \leq |x| \leq 9.999999999 \times 10^{99}$	
sinhx	$0 \leq |x| \leq 230.258509\ 2$	
coshx		
$\sinh^{-1}x$	$0 \leq |x| \leq 4.999999999 \times 10^{99}$	
$\cosh^{-1}x$	$1 \leq x \leq 4.999999999 \times 10^{99}$	
tanhx	$0 \leq |x| \leq 9.999999999 \times 10^{99}$	
$\tanh^{-1}x$	$0 \leq |x| \leq 9.999999999 \times 10^{-1}$	
logx/lnx	$0 < x \leq 9.999999999 \times 10^{99}$	
$10^{\blacksquare}$	$-9.9999999999 \times 10^{99} \leq x \leq 99.99999999$	
$e^{\blacksquare}$	$-9.9999999999 \times 10^{99} \leq x \leq 230.2585092$	
$\sqrt{\blacksquare}$	$0 \leq x < 1 \times 10^{100}$	
x^2	$|x| < 1 \times 10^{50}$	
x^3	$|x| \leq 2.15443469 \times 10^{33}$	
x^{-1}	$|x| < 1 \times 10^{100}, x \neq 0$	
$\sqrt[3]{\blacksquare}$	$|x| < 1 \times 10^{100}$	
$x!$	$0 \leq x \leq 69$ (x is an integer)	
nPr	$0 \leq n \leq 1 \times 10^{10}$, $0 \leq r \leq n$ (n,r are integers)	
	$1 \leq n!/((n-r)!) \leq 1 \times 10^{100}$	
nCr	$0 \leq n \leq 1 \times 10^{10}$, $0 \leq r \leq n$ (n,r are integers)	
	$1 \leq n!/r! \leq 1 \times 10^{100}$ or $1 \leq n!/(n-r)! < 1 \times 10^{100}$	

Functions	Input Range
Pol(x,y)	$\|x\|,\|y\| \leqq 9.999999999\times10^{99}$ $\sqrt{x^2+y^2} \leqq 9.999999999\times10^{99}$
Rec(r,θ)	$0 \leqq r \leqq 9.999999999\times10^{99}$ θ : Same as sinx
° ′ ″	$\|a\|,b,c <1\times10^{100}$ $0 \leqq b,c$
← / °′″	$\|x\| \leqq 1\times10^{100}$ Deciaml ↔ Sexagesimal Conversions $0°0'0'' \leqq \|x\| \leqq 9999999°59'59''$
$x^{\blacksquare}(x^y)$	x>0: $-1\times10^{100} < y\log x <100$ x=0: y>0 x<0: y=n,m/(2n+1) (m,n are integers) However: $-1\times10^{100}<y\log\|x\|<100$
$^{\blacksquare}\!\sqrt{\Box}\,(^x\!\sqrt{y})$	y>0: x≠0, $-1\times10^{100}<1/x \log y<100$ y=0:x>0 y<0:x=2n+1,(2n+1)/m (m≠0;m,n are integers)
■ 吕	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
RanInt#(a,b)	$0 \leqq a<1\times10^{10}$, $0 \leqq b<1\times10^{10}$ (a,b should be positive integers or 0)
Ran#	Result generates a 3 digits pseudo random number(0.000~0.999)
1-variable Statistical calculation	$\|x\|<1\times10^{100}$ $\|FREQ\|<1\times10^{100}$
2-variable Statistical calculation	$\|x\|<1\times10^{100}$ $\|y\|<1\times10^{100}$ $\|FREQ\|<1\times10^{100}$
ABS	$\|x\|<1\times10^{100}$
Pfact	$x \leqq 9999999999$ (positive integers)
BIN	Positive: 0 ~ 0111 1111 1111 1111 1111 1111 1111 1111 Negative: 1000 0000 0000 0000 0000 0000 0000 0000 ~ 1111 1111 1111 1111 1111 1111 1111 1111
DEC	Positive: 0 ~ 2147483647 Negative: –2147483648 ~ –1
OCT	Positive: 0 ~ 177 7777 7777 Negative: 200 0000 0000 ~ 377 7777 7777
HEX	Positive: 0 ~ 7FFF FFFF Negative: 8000 0000 ~ FFFF FFFF

- Errors are cumulative in the case of consecutive calculations, this is also true as internal consecutive calculation are performed in the case of $x^{\blacksquare}$, $\sqrt[\blacksquare]{\square}$, $\sqrt[3]{\blacksquare}$, x!, nPr, nCr , etc. And may become large.

Order of Operations

This calculator will automatically determine the operation priority of each individual command as follows:-

1st Priority	Recall memory (A, B, C, D, E, F, X, Y, M), Ran#
2nd	Calculation within parentheses ( ).
3rd	Function with parentheses that request the input argument to the right: Pol(, Rec(, P(, Q(, R(, sin(, cos(, tan(, sin⁻¹(, cos⁻¹(, tan⁻¹(, sinh(, cosh(, tanh(, sinh⁻¹(, cosh⁻¹(, tanh⁻¹(, log(, ln(, e^(, 10^(, $\sqrt{}$(, $\sqrt[3]{}$(, Abs(, Rnd(, RanInt#(
4th	Functions that come after the input value preceded by values, powers, power roots: x^2, x^3, x^{-1}, x!, ° ' ", °, r, g, ^(, $\sqrt[x]{}$(, Percent %, x10^x, ▶t
5th	Fractions: a ^{b}/c, d/c
6th	Prefix symbol: (–) (negative sign), base-n symbols (d, h, b, o, Neg, Not)
7th	Statistical estimated value calculation: $\hat{x}$, $\hat{y}$, $\hat{x}1$, $\hat{x}2$
8th	Multiplication where sign is omitted: Multiplication sign omitted immediately before π, e, variables (2π, 5A, πA, etc.), functions with parentheses ($2\sqrt{}$(3), Asin(30), etc.)
9th	Permutations, combinations: nPr, nCr
10th	Multiplication and division: ×, ÷
11th	Addition and subtraction: +, −
12th	Logical AND (and)
13th	Logical OR, XOR, XNOR (or xor, xnor)
14th	Calculation ending instruction: =, M+,M− STO(store memory)

- In the same precedence level, calculations are performed from left to right.
- Operation enclosed within parentheses is performed first. When a calculation contains an argument that is a negative number, the negative number must be enclosed within parentheses.

Example:

$\boxed{(-)}$ $\boxed{2}$ $\boxed{x^2}$ $\boxed{=}$ $\qquad$ $-2^2 = -4$

$\boxed{(}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{)}$ $\boxed{x^2}$ $\boxed{=}$ $\qquad$ $(-2)^2 = 4$

- The calculator will automatically determine the operation priority of each individual command.

Example 1:

$\boxed{1}$ $\boxed{\div}$ $\boxed{2}$ $\overset{Shift}{\boxed{\pi}}$ $\boxed{=}$ $\qquad$ $1 \div 2\pi = 0.1591549431$

Example 2:

$\boxed{2}$ $\overset{Shift}{\boxed{STO}}$ $\boxed{(-)}$ $\qquad\qquad\qquad 2 \rightarrow A$

$\boxed{1}$ $\boxed{\div}$ $\boxed{2}$ $\overset{Alpha}{\boxed{A}}$ $\boxed{=}$ $\qquad\quad 1 \div 2A = \dfrac{1}{4}$

Calculation Stacks

- This calculator uses memory areas, called "stacks", to temporarily store numeric value (numbers) and commands (+, −, x…) according to their precedence during calculations.
- The numeric stack has 10 levels and command stack has 128 levels. A stack error [Stack ERROR] occurs whenever you try to perform a calculation that exceeds the capacity of stacks.
- Calculations are performed in sequence according to "Order of Operations". After the calculation is performed, the stored stack values will be released.

Error Messages and Error locator

The calculator is locked up while an error message is shown on the display to indicate the cause of the error.
- Press $\boxed{CA}$ to clear the error message, then return to the initial display of latest mode.
- Press $\boxed{<}$ or $\boxed{>}$ to display input expression with the cursor positioned next to the error.
- Press $\boxed{ON}$ to clear the error message, clear the replay memory history and return to the initial display of the latest mode.

Error Message	Cause	Action
Math ERROR	• The intermediate or final result is outside the allowable calculation range. • Attempt to perform a calculation using a value that exceeds the allowable input range. • An attempt to perform an illegal operation (division by zero, etc.)	• Check the input values and make sure they are all within the allowable ranges, Pay special attention to values in any using memory areas
Stack ERROR	• The capacity of the numeric stack or operator stack is exceeded.	• Simplify the calculation. • Divide the calculation into two or more separate parts.
Syntax ERROR	• An attempt to perform an illegal mathematical operation.	• Press $\textcircled{\scriptsize <}$ or $\textcircled{\scriptsize >}$ to display the cursor at the location of the error, make appropriate corrections

BASIC CALCULATIONS

■ Press $\boxed{\text{MODE}}$ $\boxed{1}$ to enter COMP mode.
■ During the busy calculation, the calculator shows only the indicators (without any calculation result). You can press $\boxed{\text{CA}}$ key to interrupt the calculating operation.

Arithmetic Calculations

• To calculate with negative values (exclude the negative exponent) enclose then with parentheses.
• This calculator supports 99 levels of parenthetical expression.

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}$ $\overset{SET\text{-}UP}{\boxed{}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
$(-2.5)^2$	$\boxed{(}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{.}$ $\boxed{5}$ $\boxed{)}$ $\boxed{x^2}$ $\boxed{=}$	$(-2.5)^2$ $\dfrac{25}{4}$
$(4 \times 10^{75})(-2 \times 10^{-79})$	$\boxed{4}$ $\boxed{\times 10^x}$ $\boxed{7}$ $\boxed{5}$ $\boxed{\times}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{\times 10^x}$ $\boxed{(-)}$ $\boxed{7}$ $\boxed{9}$ $\boxed{=}$	$4_{\times 10}75x-2_{\times 10}-79$ $-\dfrac{1}{1250}$

16

Memory Calculations

Memory Variables
- There are 9 memory variables (A – F, M, X and Y), which store data, results, or dedicated values.
- Store values into memory by pressing $\overset{Shift}{\square}$ $\overset{STO}{\square}$ + Memory variable.
- Recall memory values by pressing $\boxed{RCL}$ + Memory variable.
- Memory content can be cleared by pressing $\boxed{0}$ $\overset{Shift}{\square}$ $\overset{STO}{\square}$ + Memory variable.

Example: 23 + 7→A (30 store into A), calculate 2 sinA and clear memory A.

MthlO & MathO MODE : $\overset{Shift}{\square}$ $\overset{SET\text{-}UP}{\square}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
23 + 7 → A	$\boxed{2}$ $\boxed{3}$ $\boxed{+}$ $\boxed{7}$ $\overset{Shift}{\square}$ $\overset{STO}{\square}$ $\overset{A}{\square}$	23+7→A 30
2 x sin A = 1	$\boxed{2}$ $\boxed{sin}$ $\overset{Alpha}{\square}$ $\overset{A}{\square}$ $\boxed{=}$	2sin(A 1
Clear memory	$\boxed{0}$ $\overset{Shift}{\square}$ $\overset{STO}{\square}$ $\overset{A}{\square}$	0→A 0

Independent Memory
- Independent memory $\overset{Alpha}{\square}$ $\overset{M}{\square}$ uses the same memory area as variable M. It is convenient for calculating cumulative total by just pressing $\boxed{M+}$ (add to memory) or $\overset{Shift}{\square}$ $\overset{M-}{\square}$ (subtract from memory)
- Memory contents are retained even when the calculator is powered off.
- Clear independent memory (M) by pressing $\boxed{0}$ $\overset{Shift}{\square}$ $\overset{STO}{\square}$ $\overset{M}{\square}$.
- Clear all memory values by pressing $\overset{Shift}{\square}$ $\overset{CLR}{\square}$ $\boxed{2}$ (Clear Memory) $\boxed{=}$ $\boxed{CA}$

17

Answer Memory

- The input values or the most recent calculation result will be automatically stored into Answer memory whenever you press $=$, $\boxed{M+}$, $\overset{Shift}{\boxed{}}\boxed{M-}$, $\overset{Shift}{\boxed{}}\boxed{STO}$. Answer memory can hold up to 18 digits.
- Recall and use the latest stored Answer memory by pressing $\boxed{Ans}$.
- Answer memory is not updated as an error operation had been performed.
- Answer memory contents can be maintained even if pressing $\boxed{CA}$, changing the calculation mode, or turning off the calculator.

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{1}\boxed{1}$

Example	Key in operation	Display
123 + 456 → M+,	$\boxed{1}\boxed{2}\boxed{3}\boxed{+}\boxed{4}$	Ans^2
Ans^2 = 335,241	$\boxed{5}\boxed{6}\boxed{M+}\boxed{x^2}\boxed{=}$	335241
789900 – Ans =	$\boxed{7}\boxed{8}\boxed{9}\boxed{9}\boxed{0}$	789900–Ans
454,659	$\boxed{0}\boxed{-}\boxed{Ans}\boxed{=}$	454659

Fraction Calculations

The calculator supports Fraction calculation and the conversions between Fraction, Decimal point, Mixed fraction and Improper fraction.

- Specify the fraction calculation result display format by either **mixed fraction** ($\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{\vee}\boxed{1}$) or **improper fraction** ($\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{\vee}\boxed{2}$) in set-up menu.
- At the default setting, fractions are displayed as improper fractions ($\frac{\blacksquare}{\square}$).
- Mixed Fraction display result only available after set the ($\blacksquare\frac{\square}{\square}$) in the setup menu.

	Improper Fraction ($\frac{\blacksquare}{\square}$)	Mixed Fraction ($\blacksquare\frac{\square}{\square}$)
MthIO Mode	$\dfrac{11}{3}$	$3\dfrac{2}{3}$
LineIO Mode	11⌴3	3⌴2⌴3

- Press $\boxed{S \leftrightarrow D}$ to switch a calculation result between fraction and decimal format.
- Press $\overset{Shift}{\boxed{}}\ \overset{\underline{\text{Mode}}}{\boxed{}}$ to switch a calculation result between improper fraction and mixed fraction format.
- Result will be displayed in decimal format automatically whenever the total digit of a fractional value (integer + numerator + denominator + separator marks) exceeds 10.
- When fraction calculation in DecimalO mode (MthIO, DecimalO and LineIO, DecimalO), the calculation result will be shown in decimal format.

Fraction ⟷ Decimal point conversion

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\ \overset{SET\text{-}UP}{\boxed{}}\ \boxed{1}\ \boxed{1}$

Example	Key in operation	Display
$1\frac{1}{2} + \frac{5}{6} = \frac{7}{3}$	$\boxed{1}\ \overset{Shift}{\boxed{}}\ \overset{\blacksquare\frac{\square}{\square}}{\boxed{}}\ \boxed{1}\ \boxed{\triangleright}$ $\boxed{2}\ \boxed{\triangleright}\ \boxed{+}\ \boxed{5}\ \boxed{\frac{\blacksquare}{\square}}$ $\boxed{6}\ \boxed{=}$	$1\frac{1}{2} + \frac{5}{6}$ $\frac{7}{3}$
$\frac{7}{3} \leftrightarrow 2.333333333$ (Fraction ⟷ Decimal)	$\boxed{S \leftrightarrow D}$	$1\frac{1}{2} + \frac{5}{6}$ 2.333333333
$2.333333333 \leftrightarrow 2\frac{1}{3}$ (Decimal ⟷ Mixed Fraction)	$\overset{Shift}{\boxed{}}\ \overset{\underline{\text{Mode}}}{\boxed{}}$	$1\frac{1}{2} + \frac{5}{6}$ $2\frac{1}{3}$

Percentage Calculations

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\ \overset{SET\text{-}UP}{\boxed{}}\ \boxed{1}\ \boxed{1}$

Example	Key in operation	Display
To calculate 25% of 820	$\boxed{8}\ \boxed{2}\ \boxed{0}\ \boxed{\times}\ \boxed{2}$ $\boxed{5}\ \overset{Shift}{\boxed{}}\ \overset{\%}{\boxed{}}\ \boxed{=}$	$820 \times 25\%$ 205
The percentage of 750 against 1,250	$\boxed{7}\ \boxed{5}\ \boxed{0}\ \boxed{\div}\ \boxed{1}$ $\boxed{2}\ \boxed{5}\ \boxed{0}\ \overset{Shift}{\boxed{}}\ \overset{\%}{\boxed{}}$ $\boxed{=}$	$750 \div 1250\%$ 60

19

Degree-Minutes-Seconds Calculations

Use degrees (hours), minutes and seconds key to perform a sexagesimal (base-60 notational system) calculation or convert the sexagesimal value into decimal value.

Degree-Minutes-seconds ⟷ Decimal points

MthIO & MathO MODE : $\underset{\text{Shift}}{\boxed{}}$ $\underset{\text{SET-UP}}{\boxed{}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
86°37'34.2" ÷ 0.7 = 123°45'6"	$\boxed{8}\boxed{6}\boxed{\circ\,,\,,}\boxed{3}\boxed{7}$ $\boxed{\circ\,,\,,}\boxed{3}\boxed{4}\boxed{\bullet}\boxed{2}$ $\boxed{\circ\,,\,,}\boxed{\div}\boxed{0}\boxed{\bullet}\boxed{7}$ $\boxed{=}$	86°37'34.2° ÷ 0.7 123°45'6"
123°45'6" → 123.7516667	$\boxed{\circ\,,\,,}$	86°37'34.2° ÷ 0.7 123.7516667
2.3456 → 2°20'44.16"	$\boxed{2}\boxed{\bullet}\boxed{3}\boxed{4}\boxed{5}$ $\boxed{6}\boxed{=}\boxed{\circ\,,\,,}$	2.3456 2°20'44.16"

Replay & Multi-statements

■ Replay Memory Function

- Replay memory is only available in COMP and BASE mode.
- After the calculation is executed, the calculation input and result will be stored in the replay memory automatically.
- Pressing $\odot$ (or $\bigcirc$) can replay the performed calculation input and result history.
- After obtaining the calculation result on the display, press $\bigcirc$ or $\bigcirc$ to edit the input expression of that result.
- If the ▷ Indicator is on the right side of a calculation result display, you need to press $\boxed{CA}$ and then $\bigcirc$ or $\bigcirc$ to scroll the calculation.
- Replay memory is cleared when you press
  - ■ Initialize calculator setting by $\underset{\text{Shift}}{\boxed{}}$ $\underset{\text{CLR}}{\boxed{}}$ $\boxed{3}$ $\boxed{=}$ $\boxed{CA}$
  - ■ Change from one calculation mode or display mode to other.
  - ■ Press $\boxed{ON}$ key.
  - ■ Press $\underset{\text{Shift}}{\boxed{}}$ $\underset{\text{OFF}}{\boxed{}}$ to power off machine.

■ Multi-statements Function

- Use a colon $\boxed{:}$ to put two or more calculation input together.
- The first executed statement will have "Disp" indicator; and the "Disp" icon will disappeared after the last statement is being executed.

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{1}\boxed{1}$

Example	Key in operation	Display
1x12=12 2+25=27 using a multi-statement	$\boxed{1}\boxed{\times}\boxed{1}\boxed{2}\overset{Alpha}{\boxed{:}}$ $\boxed{2}\boxed{+}\boxed{2}\boxed{5}$	1x12:2+25|
	$\boxed{=}$	1x12 ▲ Disp 12
	$\boxed{=}$	2+25 ▲ 27
Replay the previous calculation history 1 x 12 = 12	$\bigotimes$	1x12 ▼ 12

FUNCTIONAL SCIENTIFIC CALCULATIONS

- Press $\boxed{MODE}\boxed{1}$ to enter COMP mode.
- $\pi = 3.14159265358979323$
- $e = 2.71828182845904523$

Square Root, Cube, Cube Root, Power, Power Root, Reciprocal and Pi

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{1}\boxed{1}$

Example	Key in operation	Display
$\left(\sqrt[3]{2^2+5^3}\right)^{-1}\times\pi$ = 0.6217559776	$\boxed{(}\overset{Shift}{\boxed{\sqrt[3]{\Box}}}\boxed{2}\boxed{x^2}$ $\boxed{+}\boxed{5}\boxed{x^3}\boxed{\triangleright}\boxed{)}$ $\boxed{x^{-1}}\boxed{\times}\overset{Shift}{\boxed{\pi}}\boxed{=}$	$\left(\sqrt[3]{2^2+5^3}\right)^{-1}\times\pi$ 0.6217559776
$\left(\sqrt[3]{2^6}+\sqrt[5]{243}\right)$ = 7	$\boxed{(}\overset{Shift}{\boxed{\sqrt[3]{\Box}}}\boxed{2}\boxed{x^\Box}$ $\boxed{6}\boxed{\triangleright}\boxed{\triangleright}\boxed{+}\overset{Shift}{\boxed{}}$ $\overset{\sqrt[n]{\Box}}{\boxed{}}\boxed{5}\boxed{\triangleright}\boxed{2}\boxed{4}$ $\boxed{3}\boxed{\triangleright}\boxed{)}\boxed{=}$	$\left(\sqrt[3]{2^6}+\sqrt[5]{243}\right)$ 7

21

Logarithm, Natural Logarithm and Antilogarithm

MthIO & MathO MODE : $\overset{Shift}{\square}$ $\overset{SET-UP}{\square}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
$e^{-3} + 10^{1.2} + \ln 3 =$ 16.99733128	$\overset{Shift}{\square}$ $\boxed{e^{\blacksquare}}$ $\boxed{(-)}$ $\boxed{3}$ $\boxed{\odot}$ $\boxed{+}$ $\overset{Shift}{\square}$ $\boxed{10^{\blacksquare}}$ $\boxed{1}$ $\boxed{.}$ $\boxed{2}$ $\boxed{\odot}$ $\boxed{+}$ $\boxed{\ln}$ $\boxed{3}$ $\boxed{=}$	$e^{-3} + 10^{1.2} + \ln(3$ 16.99733128

Angle Unit Conversion

The calculator angle unit setting is "Degree". Pressing $\overset{Shift}{\square}$ $\overset{SET-UP}{\square}$ enter the setup menu to change the unit to "Radian" or "Gradient":

```
1:MthIO 2:LineIO
3:Deg   4:Rad
5:Gra   6:Fix
7:Sci   8:Norm
```

Press the corresponding number key $\boxed{3}$, $\boxed{4}$ or $\boxed{5}$ for the angle unit you need. Then the display will show the **D**, **R**, **G** Indicator accordingly.

Convert an angle unit between "Degree", "Radian" and "Gradient" by pressing $\overset{Shift}{\square}$ $\overset{DRG\blacktriangleright}{\square}$

```
1:°     2:ʳ
3:ᵍ
```

Then, pressing $\boxed{1}$, $\boxed{2}$, or $\boxed{3}$ will convert the displayed value into the selected angle unit.

MthIO & MathO MODE : $\overset{Shift}{\square}$ $\overset{SET-UP}{\square}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
Convert 180 degree into radian and gradient $(180° = \pi^{Rad} =$ $200^{Gad})$	$\overset{Shift}{\square}$ $\overset{SET-UP}{\square}$ $\boxed{4}$ $\boxed{1}$ $\boxed{8}$ $\boxed{0}$ $\overset{Shift}{\square}$ $\overset{DRG\blacktriangleright}{\square}$ $\boxed{1}$ $\boxed{=}$	$180°$ **R** 3.141592654
	$\overset{Shift}{\square}$ $\overset{SET-UP}{\square}$ $\boxed{5}$ $\boxed{=}$	$180°$ 200

Trigonometry Calculations

■ Before using the trigonometric functions (except hyperbolic calculations), select the appropriate angle unit (Deg/Rad/Gra) by pressing $\boxed{\text{Shift}}$ $\boxed{\text{SET-UP}}$ $\boxed{3}$ $\boxed{4}$ $\boxed{5}$.

Angle Unit Setting	Angle Value Input	Input Value Range for √ form result
Deg	Units of 15º	$|\pi| < 9 \times 10^9$
Rad	Multiples of $\frac{1}{12}\pi$ radians	$|\pi| < 20\pi$
Gra	Multiples of $\frac{50}{3}$ grads	$|\pi| < 10000$

■ 90º = $\frac{\pi}{2}$ Radians = 100 Gradients.

MthlO & MathO MODE : $\boxed{\text{Shift}}$ $\boxed{\text{SET-UP}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
Degree Mode	$\boxed{\text{Shift}}$ $\boxed{\text{SET-UP}}$ $\boxed{3}$	**D**
sin 60 = 0.8660254038	$\boxed{\sin}$ $\boxed{6}$ $\boxed{0}$ $\boxed{=}$	sin(60 0.8660254038
$\frac{1}{\text{Sin}45^\circ}$ =Cosec 45º = 1.414213562	$\boxed{\sin}$ $\boxed{4}$ $\boxed{5}$ $\boxed{)}$ $\boxed{x^{-1}}$ $\boxed{=}$	sin(45)⁻¹ 1.414213562

■ Hyperbolic (sinh/ cosh/ tanh), Inverse Hyperbolic (sinh⁻¹/cosh⁻¹/tanh⁻¹) functions

■ Pressing $\boxed{\text{hyp}}$ enter sub-hyperbolic menu.

```
1:sinh  2:cosh
3:tanh  4:sinh-1
5:cosh-1 6:tanh-1
```

MthlO & MathO MODE : $\boxed{\text{Shift}}$ $\boxed{\text{SET-UP}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
sinh2.5 – cosh 2.5 = -0.08208499862	$\boxed{\text{hyp}}$ $\boxed{1}$ $\boxed{2}$ $\boxed{.}$ $\boxed{5}$ $\boxed{)}$ $\boxed{-}$ $\boxed{\text{hyp}}$ $\boxed{2}$ $\boxed{2}$ $\boxed{.}$ $\boxed{5}$ $\boxed{)}$ $\boxed{=}$	sinh(2.5)-cosh(▷ -0.08208499862
Cosh⁻¹45 = 4.499686191	$\boxed{\text{hyp}}$ $\boxed{5}$ $\boxed{4}$ $\boxed{5}$ $\boxed{=}$	cosh⁻¹(45 4.499686191

Permutation, Combination, Factorials and Random Number Generation

■ Permutation: $nPr = \dfrac{n!}{(n-r)!}$

■ Combination: $nCr = \dfrac{n!}{r!(n-r)!}$

■ Factorial : $x! = x(x-1)(x-2)\ldots(2)(1)$

MthIO & MathO MODE : $\overset{\text{Shift}}{\square} \overset{\text{SET-UP}}{\square} \boxed{1} \boxed{1}$

Example	Key in operation	Display
$_{10}P_3 = 720$	$\boxed{1}\boxed{0}\overset{\text{Shift}}{\square}\overset{nPr}{\square}\boxed{3}$ $\boxed{=}$	10P3 720
$_5C_2 = 10$	$\boxed{5}\overset{\text{Shift}}{\square}\overset{nCr}{\square}\boxed{2}\boxed{=}$	5C2 10
$5! = 120$	$\boxed{5}\boxed{X!}\boxed{=}$	5! 120

■ Random Number Generation

$\overset{\text{Shift}}{\square}\overset{\text{Ran\#}}{\square}$: Generate a random number between 0.000 and 0.999. And the display result will be fraction format in Maths mode status.

$\overset{\text{Alpha}}{\square}\overset{\text{RanInt\#}}{\square}$: Generate a random number between two specified positive integers. The entry is divided by ".".

MthIO & MathO MODE : $\overset{\text{Shift}}{\square} \overset{\text{SET-UP}}{\square} \boxed{1} \boxed{1}$

Example	Key in operation	Display
Generate a random number between 0.000 & 0.999	$\overset{\text{Shift}}{\square}\overset{\text{Ran\#}}{\square}\boxed{=}$	Ran# $\frac{283}{500}$
Generate an integer from range of 1 to 100	$\overset{\text{Alpha}}{\square}\overset{\text{RanInt\#}}{\square}\boxed{1}\overset{\text{Shift}}{\square}\overset{,}{\square}$ $\boxed{1}\boxed{0}\boxed{0}\boxed{=}$	RanInt#(1,100 81

* The value is only a sample, results will different of each time.

Coordinate Conversion

- With polar coordinates, you can calculate and Display θ within −180º < θ < 180º range. (Same as Radian and Gradient)
- In Maths mode, press $\textcircled{\small <}$ or $\textcircled{\small >}$ to scroll the calculation result.
- In Line mode, (x,y) or (r, θ) will be shown over 2 line.
- After conversion, the results will automatically be assigned to memory variables X and Y. Press $\boxed{RCL}$ $\underset{}{\boxed{}}^X$ or $\underset{}{\boxed{}}^Y$ to show the results.

Rectangular Coordinates (Rec)   Polar Coordinates (Pol)
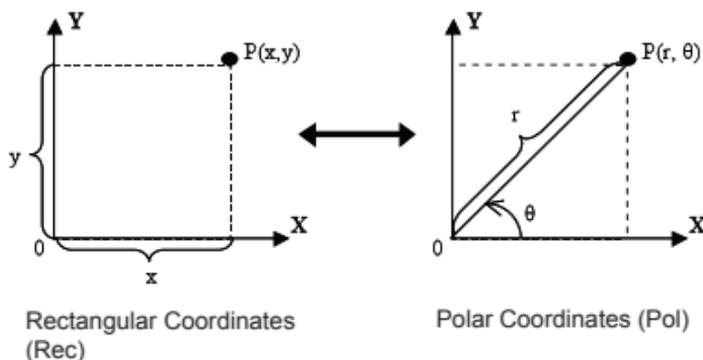
$\underset{}{\boxed{\text{Shift}}}$ $\underset{}{\boxed{\text{Pol}}}$: Convert rectangular coordinates (x, y) to polar coordinates (r, θ); Press $\boxed{RCL}$ $\underset{}{\boxed{}}^X$ for r, or $\boxed{RCL}$ $\underset{}{\boxed{}}^Y$ for θ.

MthIO & MathO MODE : $\underset{}{\boxed{\text{Shift}}}$ $\underset{}{\boxed{\text{SET-UP}}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
With rectangular coordinate (x=1, y=√3). Find Polar coordinate (r, θ) at degree mode	$\underset{}{\boxed{\text{Shift}}}$ $\underset{}{\boxed{\text{Pol}}}$ $\boxed{1}$ $\underset{}{\boxed{\text{Shift}}}$ $\boxed{,}$ $\boxed{\sqrt{\blacksquare}}$ $\boxed{3}$ $\boxed{=}$	Pol(1,$\sqrt{3}$ r=2,θ=60
	$\boxed{RCL}$ $\underset{}{\boxed{}}^X$	X 2
	$\boxed{RCL}$ $\underset{}{\boxed{}}^Y$	Y 60

$\overset{Shift}{\square}\overset{Rec}{\square}$: Convert polar coordinates (r, θ) to rectangular coordinates (x, y); Press $\boxed{RCL}\overset{x}{\square}$ for x, or $\boxed{RCL}\overset{y}{\square}$ for y.

LineIO & LineO MODE : $\overset{Shift}{\square}\overset{SET-UP}{\square}\boxed{2}\boxed{1}$

Example	Key in operation	Display
With Polar coordinate (r=2, θ=60°). Find Rectangular coordinate (x, y) at degree mode	$\overset{Shift}{\square}\overset{Rec}{\square}\boxed{2}\overset{Shift}{\square}\overset{,}{\square}$ $\boxed{6}\boxed{0}\boxed{=}$	Rec(2,60 X= 1 Y= 1.732050808
	$\boxed{RCL}\overset{x}{\square}$	x 1
	$\boxed{RCL}\overset{y}{\square}$	Y 1.732050808

Absolute Value Calculation

MthIO & MathO MODE : $\overset{Shift}{\square}\overset{SET-UP}{\square}\boxed{1}\boxed{1}$

Example	Key in operation	Display
$\left|\sin(60-5)\times(-\pi)\right|$ =2.573442045	$\boxed{Abs}\boxed{\sin}\boxed{6}\boxed{0}\boxed{-}$ $\boxed{5}\boxed{)}\boxed{\times}\boxed{(}\boxed{(-)}$ $\overset{Shift}{\square}\boxed{\pi}\boxed{)}\boxed{=}$	$\left|\sin(60-5)\times(-\pi)\right|$ 2.573442045

Engineering Notation

LineIO & LineO MODE : $\overset{Shift}{\square}\overset{SET-UP}{\square}\boxed{2}\boxed{1}$

Example	Key in operation	Display
$1\div200 = 5\times10^{-3}$	$\boxed{1}\boxed{\div}\boxed{2}\boxed{0}\boxed{0}$ $\boxed{=}\boxed{ENG}$	$1\div200$ 5×10^{-3}
	$\boxed{ENG}$	$1\div200$ 5000×10^{-6}
	$\overset{Shift}{\square}\overset{\leftarrow}{\boxed{ENG}}$	$1\div200$ 5×10^{-3}

Display Values Exchange

■ In MathIO and LineIO mode, pressing $\boxed{\text{s↔d}}$ to change the calculation result value between fraction form ↔ Decimal form, the other pi and Square root calculation will display a decimal value only.

LineIO & LineO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{2}\boxed{1}$

Example	Key in operation	Display
$\frac{2}{3} + 2 = \frac{8}{3} = 2.666666667$	$\boxed{2}\boxed{\frac{\blacksquare}{\square}}\boxed{3}\boxed{+}\boxed{2}$	2⌐3+2
	$\boxed{=}$	8⌐3
	$\boxed{\text{s↔d}}$	2⌐3+2 2.666666667

LineIO & DecimalO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{2}\boxed{2}$

Example	Key in operation	Display
$\frac{2}{3} + 2 = \frac{8}{3} = 2.666666667$	$\boxed{2}\boxed{\frac{\blacksquare}{\square}}\boxed{3}\boxed{+}\boxed{2}$	2⌐3+2
	$\boxed{=}$	2.666666667
	$\boxed{\text{s↔d}}$	2⌐3+2 8⌐3

MthIO & MathO MODE : $\overset{Shift}{\boxed{}}\overset{SET-UP}{\boxed{}}\boxed{1}\boxed{1}$

Example	Key in operation	Display
$\frac{2}{3} + 2 = \frac{8}{3} = 2.666666667$	$\boxed{2}\boxed{\frac{\blacksquare}{\square}}\boxed{3}\boxed{\triangleright}\boxed{+}$ $\boxed{2}\boxed{=}$	$\frac{2}{3}+2$ $\frac{8}{3}$
	$\boxed{\text{s↔d}}$	$\frac{2}{3}+2$ 2.666666667

REMARK
- Some Calculation results, pressing $\boxed{\text{s↔d}}$ key will not convert the display value.
- Some display result conversion may take a long time.

Base-n Calculations and Logical Calculations

■ Press $\boxed{\text{MODE}}$ $\boxed{3}$ to enter Base-n mode.
   Decimal (base 10), Hexadecimal (base 16), Binary (base 2),
   Octal (base 8), or logical calculations.
■ To select a specific number system in base mode, simply
   press $\overset{\text{DEC}}{\boxed{}}$ Decimal [DEC], $\overset{\text{HEX}}{\boxed{}}$ Hexadecimal [HEX],
   $\overset{\text{BIN}}{\boxed{}}$ Binary [BIN] or $\overset{\text{OCT}}{\boxed{}}$ Octal [OCT].
■ Press $\overset{\text{Shift}}{\boxed{}}$ $\boxed{3}$ to perform logical calculations including:
   Logic connection [and] / [or], exclusive or [Xor], exclusive nor
   [Xnor], argument complement [Not], and negation [Neg].
■ If the binary calculation result is more than 8 digits,
   ◀Blk will be displayed to indicate the result has a next block.
■ Press $\overset{\text{◀Blk}}{\boxed{}}$ to loop between result blocks.
   In Base-n mode all the scientific functions cannot be used, and
   you cannot input the value with decimal places or exponents.

MthIO & MathO MODE : $\overset{\text{Shift}}{\boxed{}}$ $\overset{\text{SET-UP}}{\boxed{}}$ $\boxed{1}$ $\boxed{1}$

Example	Key in operation	Display
10101011+1100– 1001x101÷10 =10100001 (in Binary Mode)	$\overset{\text{BIN}}{\boxed{}}$ $\boxed{1}$ $\boxed{0}$ $\boxed{1}$ $\boxed{0}$ $\boxed{1}$ $\boxed{0}$ $\boxed{1}$ $\boxed{1}$ $\boxed{+}$ $\boxed{1}$ $\boxed{1}$ $\boxed{0}$ $\boxed{0}$ $\boxed{-}$ $\boxed{1}$ $\boxed{0}$ $\boxed{0}$ $\boxed{1}$ $\boxed{\times}$ $\boxed{1}$ $\boxed{0}$ $\boxed{1}$ $\boxed{\div}$ $\boxed{1}$ $\boxed{0}$ $\boxed{=}$	10101011+1100–1 ▷ BIN 1010 0001
645+321–23x7÷2 =1064 (in Octal Mode)	$\overset{\text{OCT}}{\boxed{}}$ $\boxed{6}$ $\boxed{4}$ $\boxed{5}$ $\boxed{+}$ $\boxed{3}$ $\boxed{2}$ $\boxed{1}$ $\boxed{-}$ $\boxed{2}$ $\boxed{3}$ $\boxed{\times}$ $\boxed{7}$ $\boxed{\div}$ $\boxed{2}$ $\boxed{=}$	645+321–23x7÷2 OCT 00000001064
(77A6C+D9)xB÷F =57C87 (in Hexadecimal Mode)	$\overset{\text{HEX}}{\boxed{}}$ $\boxed{(}$ $\boxed{7}$ $\boxed{7}$ $\overset{\text{A}}{\boxed{}}$ $\boxed{6}$ $\overset{\text{C}}{\boxed{}}$ $\boxed{+}$ $\overset{\text{D}}{\boxed{}}$ $\boxed{9}$ $\boxed{)}$ $\boxed{\times}$ $\overset{\text{B}}{\boxed{}}$ $\boxed{\div}$ $\overset{\text{F}}{\boxed{}}$ $\boxed{=}$	(77A6C+D9)xB÷F HEX 00057C87

Base-n Transformation $\overset{DEC}{\square} \to \overset{OCT}{\square} \to \overset{HEX}{\square} \to \overset{BIN}{\square}$

Example	Key in operation	Display
12345+101=12446	`1` `2` `3` `4` `5` `+` `1` `0` `1` `=`	12345+101 ▲ DEC 12446
	$\overset{HEX}{\square}$	12345+101 ▲ HEX 0000309E
	$\overset{BIN}{\square}$	12345+101 ▲ ◄BlK1/2 BIN 1001 1110
	$\overset{OCT}{\square}$	12345+101 ▲ OCT 00000030236

Logical Operation

MthIO & MathO MODE : $\overset{Shift}{\square} \overset{SET-UP}{\square}$ `1` `1` , $\overset{HEX}{\square}$

Example	Key in operation	Display
789ABC Xnor 147258	`7` `8` `9` $\overset{A}{\square}$ $\overset{B}{\square}$ $\overset{C}{\square}$ $\overset{Shift}{\square}$ `3` `4` `1` `4` `7` `2` `5` `8` `=`	789ABCxnor147258 ▲ HEX FF93171B
Ans or 789ABC	`Ans` $\overset{Shift}{\square}$ `3` `2` `7` `8` `9` $\overset{A}{\square}$ $\overset{B}{\square}$ $\overset{C}{\square}$ `=`	Ansor789ABC ▲ HEX FFFB9FBF
Neg 789ABC	$\overset{Shift}{\square}$ `3` `6` `7` `8` `9` $\overset{A}{\square}$ $\overset{B}{\square}$ $\overset{C}{\square}$ `=`	Neg(789ABC ▲ HEX FF876544

STATISTICAL CALCULATIONS

Statistical Type Selection

■ Press $\boxed{\text{MODE}}$ $\boxed{2}$ to enter Statistical calculation mode.

■ There are 8 types of Statistical Calculation and press the number to select the type of Statistic calculation.

```
1:1-VAR  2:A+BX
3:_+cX²  4:ln X
5:e^X    6:A·B^X
7:A·X^B  8:1/X
```

Pressing Key	Statistical Calculation
1 (1-VAR)	Single-variable statistics (X)
2 (A+Bx)	2-variable (X,Y), Linear regression (y=A+Bx)
3 (_+Cx²)	2-variable (X,Y), Quadratic regression (y=A+Bx+Cx²)
4 (ln x)	2-variable (X,Y), Logarithmic regression (y=A+Blnx)
5 (e^x)	2-variable (X,Y), E exponential regression (y=Ae^{Bx})
6 (A · B^x)	2-variable (X,Y), ab Exponential regression (y=AB^x)
7 (A · x^B)	2-variable (X,Y), Power regression (y=Ax^B)
8 (1/X)	2-variable (X,Y), Inverse regression (y=A+B/x)

Statistical Data Input

After confirmed the calculation type of the above **Statistical Type Selection** screen or by pressing $\boxed{\text{Shift}}$ $\boxed{\text{STAT}}$ $\boxed{2}$ (Data) in the STAT mode, the following Statistical Data Input screen will be shown.
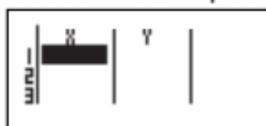
1-variable STAT   2-variable STAT   1-variable STAT "FREQ ON"

• After turned on Data Frequency "FREQ" in calculator's setup menu, the FREQ column will be added into the above screen.
• The followings are the maximum number of line for data input.

Statistic type	FREQ ON	FREQ OFF
Single-Variable (only x input)	40	80
2-Variable (x & y input)	26	40

• Input expression and display result value in Statistical Data Input screen are in Line mode (same as Comp mode with Line mode status).
• After inputted the data, then press $\boxed{=}$ to store the value into statistical registers and display the value (max. 6 digits) in the cell. And you can press cursor key to move the cursor between each cell.

Editing Statistical Sample Data

■ **Replacing the Data in a cell**
   (1) In Statistical Data Input screen, move the cursor to cell you want to edit.
   (2) Input the new data value or expression, and then press $=$

■ **Deleting a line**
   (1) In Statistical Data Input screen, move the cursor to line you want to delete.
   (2) Press `DEL`.

■ **Inserting a line**
   (1) In Statistical Data Input screen, move the cursor to the line that will be under the line being inserted.
   (2) Press $\overset{Shift}{\square}$ $\overset{STAT}{\square}$ `3` (Edit)
   (3) Press `1` (Ins)

■ **Deleting All STAT Data Input**
   (1) Press $\overset{Shift}{\square}$ $\overset{STAT}{\square}$ `3` (Edit)
   (2) Press `2` (Del-A)

Statistical Calculation Screen

■ After inputting the STAT Data, press `CA` to enter **Statistical Calculation** screen.
■ **Statistical Calculation** screen are in either LineIO, LineO mode or LineIO, DecimalO mode.
■ Use **Statistical Menu** to calculate the Statistical result. (S-SUM, S-VAR, S-PTS, Distr (1-Var), Reg (2-Var)).

Statistical Menu

In **Statistical Calculation** screen, you can press $\overset{Shift}{\square}$ $\overset{STAT}{\square}$ to display the **Statistical Menu** screen.

1: Type	2: Data
3: S-SUM	4: S-VAR
5: S-PTS	6: Distr

1-variable STAT

1: Type	2: Data
3: S-SUM	4: S-VAR
5: S-PTS	6: Reg

2-variable STAT

STAT items	Description
1: Type	To enter the statistical calculation type screen
2: Data	To enter the statistical Data input screen
3: S-SUM	To enter S-SUM sub-menu (calculating sum)
4: S-VAR	To enter S-VAR sub-menu (calculating variable)
5: S-PTS	To enter S-PTS sub-menu (calculating Min & Max values)
6: Distr (1-Var)	To enter Distr sub-menu (calculating P(t), Q(t), R(t))
7: Reg (2-Var)	To enter Reg sub-menu (Regression calculation)

Statistical calculation result in [3] S-SUM, [4] S-VAR, [5] S-PTS, [6] Reg

STAT sub-menu	STAT Type	Value	Symbol	Operation
S-SUM	1 & 2 variable STAT	Summation of all x^2 value	$\sum x^2$	Shift STAT 3 1
		Summation of all x value	$\sum x$	Shift STAT 3 2
	2-variable STAT only	Summation of all y^2 value	$\sum y^2$	Shift STAT 3 3
		Summation of all y value	$\sum y$	Shift STAT 3 4
		Summation of xy pairs	$\sum xy$	Shift STAT 3 5
		Summation of all x^3 value	$\sum x^3$	Shift STAT 3 6
		Summation of all x^2y pairs	$\sum x^2 y$	Shift STAT 3 7
		Summation of all x^4 pairs	$\sum x^4$	Shift STAT 3 8
S-VAR	1 & 2 variable STAT	Number of data sample	n	Shift STAT 4 1
		Mean of the x values	$\bar{x}$	Shift STAT 4 2
		Population standard deviation of x	$x\sigma_n$	Shift STAT 4 3
		Sample sstandard deviation of x	$x\sigma_{n-1}$	Shift STAT 4 4
	2-variable STAT only	Mean of the y values	$\bar{y}$	Shift STAT 4 5
		Population standard deviation of y	$y\sigma_n$	Shift STAT 4 6
		Sample standard deviation of y	$y\sigma_{n-1}$	Shift STAT 4 7
S-PTS	1 or 2 variable STAT	Minimum value of X	minX	Shift STAT 5 1
		Maximum value of X	maxX	Shift STAT 5 2
	2-variable STAT only	Minimum value of Y	minY	Shift STAT 5 3
		Maximum value of Y	maxY	Shift STAT 5 4
Reg	For non-Quad Reg	Regression coefficient A	A	Shift STAT 6 1
		Regression coefficient B	B	Shift STAT 6 2
		Correlation coefficient r	r	Shift STAT 6 3
		Estimated value of x	$\hat{x}$	Shift STAT 6 4
		Estimated value of y	$\hat{y}$	Shift STAT 6 5
Reg	For Quad ($\_+Cx^2$) Reg only	Regression coefficient A	A	Shift STAT 6 1
		Regression coefficient B	B	Shift STAT 6 2
		Regression coefficient C	C	Shift STAT 6 3
		Estimated value of x1	$\hat{x}1$	Shift STAT 6 4
		Estimated value of x2	$\hat{x}2$	Shift STAT 6 5
		Estimated value of y	$\hat{y}$	Shift STAT 6 6

Statistical Calculation Example

1-Var mode Example: To calculate $\sum x^2$, $\sum x$, n, $\bar{x}$, xσn, xσn-1, minX, maxX of data: 75, 85, 90, 77, 79 in 1-Var mode (Freq: OFF)

Key in operation	Display
[MODE] [2]	1:1-VAR 2:A+BX 3:_+cX² 4:ln X 5:e^X 6:A·B^X 7:A·X^B 8:1/X
[1] (1-VAR)	
[7][5][=][8][5][=][9] [0][=][7][7][=][7][9] [=]	
[CA] [Shift] [STAT] [3][1][=]	$\sum x^2$ 33120
[CA] [Shift] [STAT] [3][2][=]	$\sum x$ 406
[CA] [Shift] [STAT] [4][1][=]	n 5
[CA] [Shift] [STAT] [4][2][=]	$\bar{x}$ 81.2
[CA] [Shift] [STAT] [4][3][=]	xσn 5.528109984
[CA] [Shift] [STAT] [4][4][=]	xσn-1 6.180614856
[CA] [Shift] [STAT] [5][1][=]	minX 75
[CA] [Shift] [STAT] [5][2][=]	maxX 90

Quadratic Regression type Statistical Calculation

Example: ABC Company investigate the effectiveness of the advertisement expense in coded units, the following data were obtained:

Advertisement expenses: X	18	35	40	21	19
Effectiveness: y (%)	38	54	59	40	38

Please use the regression to estimate the effectiveness (estimate the value of y) if the advertisement expenses X=30, and estimate the advertisement expenses level (estimate the value of X_1, X_2) for effectiveness y = 50.

Key in operation	Display
$\boxed{\text{MODE}}$ $\boxed{2}$	1:1-VAR 2:A+BX 3:_+CX2 4:ln X 5:e^X 6:A·B^X 7:A·X^B 8:1/X
$\boxed{3}$ (_+Cx²)	X | Y 1 2 3
$\boxed{1}$ $\boxed{8}$ $\boxed{=}$ $\boxed{3}$ $\boxed{5}$ $\boxed{=}$ $\boxed{4}$ $\boxed{0}$ $\boxed{=}$ $\boxed{2}$ $\boxed{1}$ $\boxed{=}$ $\boxed{1}$ $\boxed{9}$ $\boxed{=}$ $\boxed{\vee}$ $\boxed{\rangle}$ $\boxed{3}$ $\boxed{8}$ $\boxed{=}$ $\boxed{5}$ $\boxed{4}$ $\boxed{=}$ $\boxed{5}$ $\boxed{9}$ $\boxed{=}$ $\boxed{4}$ $\boxed{0}$ $\boxed{=}$ $\boxed{3}$ $\boxed{8}$ $\boxed{=}$	X | Y 4 21 | 40 5 19 | 38 6
$\boxed{\text{CA}}$ $\boxed{3}$ $\boxed{0}$ $\overset{Shift}{\boxed{}}$ $\overset{STAT}{\boxed{}}$ $\boxed{6}$ $\boxed{6}$ $\boxed{=}$	30ŷ 48.69615715
$\boxed{\text{CA}}$ $\boxed{5}$ $\boxed{0}$ $\overset{Shift}{\boxed{}}$ $\overset{STAT}{\boxed{}}$ $\boxed{6}$ $\boxed{4}$ $\boxed{=}$	50$\hat{x}_1$ 31.30538226
$\boxed{\text{CA}}$ $\boxed{5}$ $\boxed{0}$ $\overset{Shift}{\boxed{}}$ $\overset{STAT}{\boxed{}}$ $\boxed{6}$ $\boxed{5}$ $\boxed{=}$	50$\hat{x}_2$ -167.1096731

Probability Distribution Calculation

■ After sample data is entered in either Statistic (SD) or Regression (REG) mode, you can perform the normal distribution or probability distribution calculation such as P(t), Q(t) and R(t) in which t is the variate of the probabilistic experiment.
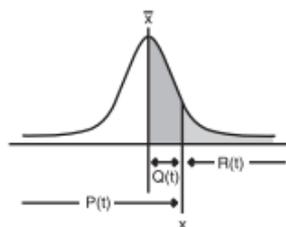
$$t = \frac{x - \bar{x}}{x\sigma_n}$$

x : Random variable

$\bar{x}$: Mean of sample

$x\sigma_n$: Standard deviation

■ Press $\overset{Shift}{\square}$ $\boxed{1}$ $\boxed{6}$ to display the distribution calculations screen.

1: P(	2: Q(
3: R(	4: ▶t

■ Press $\boxed{1}$, $\boxed{2}$, $\boxed{3}$ or $\boxed{4}$ for the corresponding calculations.

P(t): Probability below a given point x	$P(t) = \int_{-\infty}^{x} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}(\frac{t-u}{\sigma})^2} dt$,	
Q(t): Probability below a given point x and above the mean	$Q(t) = 0.5 - R(t)$,	
R(t): Probability above a given point x	$R(t) = 1 - P(t)$,	
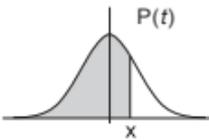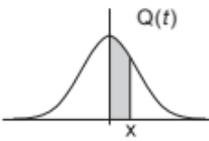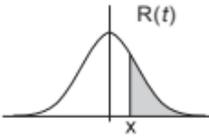
▶t : This function is preceded by the argument X, and determines the normalized variate $X \blacktriangleright t = \frac{x - \bar{x}}{x\sigma_n}$

Example: Calculate the probability distribution P(t) for the sample
data: 20, 43, 26, 46, 20, 43, when x = 26.

Key in operation	Display
[MODE] [2] [1]	
[2][0][=] [4][3][=] [2][6][=] [4][6][=] [2][0][=] [4][3][=]	
[CA] [2] [6] [Shift] [STAT] [6] [4] [=]	26▸t −0.6236095645
[Shift] [STAT] [6] [1] [Ans] [=]	P(Ans 0.26644

EQUATION CALCULATIONS

■ Press [MODE] [4] to enter the equation mode.

> 1:anX+bnY=cn
> 2:anX+bnY+cnZ=dn
> 3:aX^2+bX+c=0
> 4:aX^3+bX^2+cX+d=0

Equation Item	Description
[1] 2 unknow EQN	Simultaneous Linear Equations with two unknowns
[2] 3 unknow EQN	Simultaneous Linear Equations with three unknowns
[3] Quad EQN	Quadratic Equation, degree 2 equation
[4] Cubic EQN	Cubic Equation, degree 3 equation

Simultaneous Linear Equations

Simultaneous Linear Equations with Two Unknowns:

$$a_1x + b_1y = c_1$$
$$a_2x + b_2y = c_2$$

Simultaneous Linear Equations with Three Unknowns:

$$a_1x + b_1y + c_1z = d_1$$
$$a_2x + b_2y + c_2z = d_2$$
$$a_3x + b_3y + c_3z = d_3$$

Example: Solve the simultaneous equation with three unknowns

$$2x + 4y - 4z = 20$$
$$2x - 2y + 4z = 8$$
$$5x - 2y - 2z = 20$$

Key in operation	Display
$\boxed{\text{MODE}}$ $\boxed{4}$ $\boxed{2}$ (3 unknowns)	a b c 0 0 0 0
$\boxed{2}$ $\boxed{=}$ $\boxed{4}$ $\boxed{=}$ $\boxed{(-)}$ $\boxed{4}$ $\boxed{=}$ $\boxed{2}$ $\boxed{0}$ $\boxed{=}$	a b c 2 4 -4 0
$\boxed{2}$ $\boxed{=}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{=}$ $\boxed{4}$ $\boxed{=}$ $\boxed{8}$ $\boxed{=}$	a b c 2 -2 4 0
$\boxed{5}$ $\boxed{=}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{=}$ $\boxed{(-)}$ $\boxed{2}$ $\boxed{=}$ $\boxed{2}$ $\boxed{0}$ $\boxed{=}$	b c d -2 -4 20 20
$\boxed{=}$	X= $\frac{11}{2}$
$\boxed{=}$	Y= 3
$\boxed{=}$	Z= $\frac{3}{4}$

37

Quadratic and Cubic Equations

Quadratic equation : $ax^2 + bx + c = 0$ (a second-order polynomial equation with a single variable x)

Cubic equation : $ax^3 + bx^2 + cx + d = 0$ (an equation with cubic polynomial)

Example: Solve the Cubic equation $5x^3 + 2x^2 - 2x + 1 = 0$

Key in operation	Display
[MODE] [4] [4] (Cubic equation)	a͞ b c □ □ □ 0
[5] [=] [2] [=] [(-)] [2] [=] [1] [=]	b c d 2 -2 □ 1
[=]	$X_1 =$ -1
[=]	$X_2 =$ $\frac{3}{10} + 0.331662479i$
[=]	$X_3 =$ $\frac{3}{10} - 0.331662479i$

■ For quadratic, cubic, or quartic equations, the variable name starts with "X_1".

BATTERY REPLACEMENT

When the display characters are dim or show the follow message on the screen, turn the calculator off and replace the lithium battery immediately.

LOW BATTERY

Please replace the lithium battery using the following procedures,
1. Press [Shift] [OFF] to power off the calculator.
2. Remove the screw that securely fixes the battery cover in place.
3. Remove battery cover.
4. Remove the old battery with ball pen or similar sharp object.
5. Load the new battery with positive "+" side facing up.
6. Replace the battery cover, screw, and press [ON], [Shift] [CLR] [3] [=] [CA] to initialize the calculator.

⚠ **Caution:** Risk of explosion if battery is replaced by an incorrect type. Dispose of used battery according to the instruction.

ⓘ Electromagnetic interference or electrostatic discharge may cause the display to malfunction or the contents of the memory to be lost or altered.
Should this occur, press `ON` , `Shift` `CLR` `3` `=` `CA` to restart the calculator.

ADVICE AND PRECAUTIONS

- This calculator contains precision components such as LSI chips and should not be used in place subject to rapid variations in temperature, excessive humidity dirt or dust, or exposed to direct sunlight.
- The liquid crystal display panel is made of glass and should not be subjected to excessive pressure.
- When cleaning the device do not use a damp cloth or volatile liquid such as paint thinner. Instead, use only a soft, dry cloth.
- Do not under any circumstances dismantle this device. If you believe that the calculator is not functioning properly, either bring or mail the device together with the guarantee to service representative of Canon Business office.
- Never dispose the calculator improperly such as burning; it can create risks of personal injury or harm. You are suggested to dispose this product according to your national law.
- Do replace the battery once very two years even it is not used frequently.

Battery Caution!
- Keep the Battery out of reach of children. If the battery is swallowed, contact a doctor immediately.
- Misuse of battery may cause leakage, explosion, damages or personal injury.
- Don't recharge or disassemble the battery, it could cause a short circuit.
- Never expose the battery to high temperatures, direct heat, or dispose by incineration.
- Never leave a dead battery in the calculator as the dead battery may leak and cause damage to the calculator.
- Continue using the calculator in the low battery condition may have improper operation or the stored memory may be corrupted or lost completely. Keep the written records of important data all the time; and replace the battery as soon as possible.

SPECIFICATIONS

Power Supply : Solar and Lithium battery (CR2032 x 1)
Power Consumption : DC 3.0V / 0.3mW
Battery Life : Approximately 3 years
(Base on 1 hour operation per day)
Auto power off : Approx. 7 minutes
Usable Temperature : 0° ~ 40°C
Dimension: 171 (L) × 86 (W) × 18.75 (H) mm (with cover) /
168 (L) × 80 (W) × 14.5 (H) mm (without cover)
Weight: 131 g (with cover) / 94.5 g (without cover)
*Specifications are subject to change without notice.