

Canon

ENGLISH

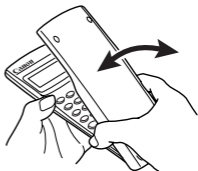
F-604

Scientific Calculator

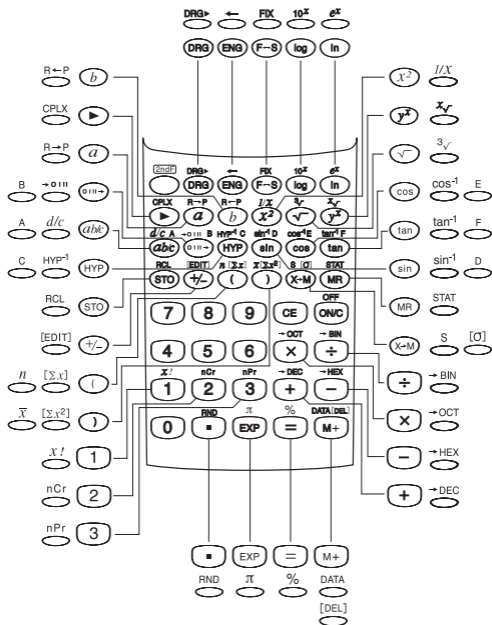
How To Open/Close the Cover:

Open or close the cover by turning it as shown in the figure.

To avoid making a flaw in the calculator, do not slide the cover to remove or install it.



KEY ASSIGNMENT



DISPLAY



- 2ndF :2nd Function
- DEG :Degree Mode
- GRAD :Gradient Mode
- RAD :Radian Mode
- () :Calculation in Parentheses
- BIN :Binary Mode
- OCT :Octal Mode
- HEX :Hexadecimal Mode
- ED :Edit Mode
- HYP :Hyperbolic
- CPLX :Complex Mode
- STAT :Statistic Mode
- σ :Standard Deviation of Population

Note:

For possible errors, see I-6 "Errors".

Examples:

Fraction (e.g. 1-2/5):

1.25

Hexadecimal numbers A ~ F:

ABCDEF

Statistic data number (e.g. DATA 1):






DATA 1

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









Clear Keys

	Power ON/Clear.....	8
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 + 	All Clear	8











Numeric Entry Keys

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A ~ F	Hexadecimal Numbers (10~15)	16

Random Key

RND	Random	16
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Complex Number Calculation Keys










a	Real Part	16
b	Imaginary Part	16

Statistical Calculation Keys


DATA $[\text{DEL}]$	Variable entry/Variable correction
$[\text{EDIT}]$	Edit Mode
$[\Sigma x]$	Sum
$[\Sigma x^2]$	Square Sum
n	Number of Data
\bar{x}	Mean
s	Standard Deviation of Sample
$[\sigma]$	Standard Deviation Population Parameter






Function Keys

π	Pi	29
\sin \sin^{-1}	Sine/Arc Sine	29
\cos \cos^{-1}	Cosine/Arc Cosine	29
\tan \tan^{-1}	Tangent/Arc Tangent	29
\log	Common Logarithm	29
\ln	Natural Logarithm	30
e^x	Exponential Function	30
10^x	Common Exponential	30
x^2	Square	30
y^x	Raising Powers	30
$\sqrt{\quad}$	Square Root	30
$\sqrt[x]{\quad}$	Multiple Root	30
$\sqrt[3]{\quad}$	Cubic Root	31
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Examples of Key Symbols




Example ():

-  To use a function printed on a key, press the key.
-  To use a function printed above a key, press the  key while in Decimal mode.
-  To use a function printed above a key in green, press the  key while in Hexadecimal mode. The “D” key is colored in green.

Note:

The blue keys are active in Statistic mode only. In Statistic mode (“STAT” lights up), they work as follows.

Example ():

-  Functions as the “n” key when it is pressed.
-  **2nd function key:** Functions as the “Σx” key when it is pressed immediately after .

I. HOW TO USE THE F-604

1. Pre-calculation check

- Calculation Mode

Before starting calculation, be sure to check the Calculation mode from the status indicators, such as DEG (degree), BIN (binary), STAT (statistic) and CPLX (complex). Also, pay attention to the Display mode, such as Floating mode.

If you get into trouble, you can use the All Clear Key (ON/C + 0) which will reset the calculator to the Decimal Calculation/Floating mode. This key also clears the contents of memory.

2. Keys

Power ON, OFF and Clear keys

ON/C **Power ON/Clear Key:** Turns the calculator on. When power is turned on, all registers except the memory registers are cleared.

Auto Power Off Function

When the calculator is not used for about 15 minutes, the calculator is automatically turned off to save power.

OFF **Power OFF Key:** Turns off the calculator when this key is pressed immediately after 2ndF .

CE **Clear Entry Key:** Clears the content just entered.

ON/C + 0 **All Clear Key:**

Resets the calculator when these keys are simultaneously pressed. The memory is cleared, and the calculation mode is reset to Decimal Calculation/Floating mode.

Numeric Entry Keys

0 ~ 9 **Numeric Keys:** Enter numbers.

▣ Decimal Point Key: Enters a decimal point.

EXP Exponential Key: Used to enter exponents.

Example: $35 \times 10^{43} \rightarrow$ **3** **5** **EXP** **4** **3** (35.43)

+/- Sign Change Key: For changing the sign (+ or -) of the displayed mantissa or exponents.

Example: $123 \rightarrow$ **1** **2** **3** **+/-** ($-123.$)

▶ Back Space Key: Clears the last digit entered and shifts any remaining digits one place to the right.

Example:

Value	Operation	Display
12345	1 2 4 incorrect entry	124.
	▶	12.
	3 4 5	12345.

Mode Selection Keys

2ndF Key: For performing function indicated above the keys. These functions are shown with asterisks (*) in the explanations below.

Example: $\sin^{-1} 0.5 \rightarrow$ **▣** **5** **2ndF** **sin⁻¹** ($30.$)

***Calculation Mode Keys:**

Specifies the calculation mode.

Operation	Mode	Display Indicator
2ndF →DEC	Decimal Calculation Mode	DEG
2ndF →BIN	Binary Calculation Mode	BIN
2ndF →OCT	Octal Calculation Mode	OCT
2ndF →HEX	Hexadecimal Calculation Mode	HEX
2ndF STAT	Statistical Calculation Mode	STAT
2ndF CPLX	Complex Number Calculation Mode	CPLX

ENG **F↔S** **Display Mode Keys:****ENG** : Engineering Exponential mode.**F↔S** : Changes the display mode between Floating mode and Scientific Exponential mode.**↵** ***Display Mode Key (for Engineering Exponential Display)****Example:**

Operation	Display	Explanation
	0. ⁰⁰	Scientific Exponential Mode
F↔S	0.	Floating Mode
1 2 3		
x		
1 0 =	1230.	
F↔S	1.23 ⁰³	Scientific Exponential Mode
ENG	1.23 ⁰³	Engineering Exponential Mode
ENG	1230. ⁰⁰	
ENG	1230000. ⁻⁰³	
2ndF ↵	1230. ⁰⁰	

Display Range:

Floating mode

 $10^{10} \leq |x| < 10^{100}$ For exponential display $10^{-99} \leq |x| < 10^{-9}$ For exponential display $x = 0$ and $10^{-9} \leq |x| < 10^{10}$ For mantissa display• **Scientific Exponential Mode** $x = 0$, and $10^{-99} \leq |x| < 10^{100}$ • **Engineering Exponential Mode** $x = 0$, and $10^{-99} \leq |x| < 10^{100}$

Exponent: Multiple of 3

FIX *Decimal Point Selection Key:

Specifies the number of decimal places in the mantissa of decimal calculation results. Pressing **0** ~ **9** after this key specifies the number of decimal places as follows:

2ndF **FIX** **0** ~ **9** 0 ~ 9 decimal places

Note:

To reset the decimal specification, press **2ndF**, **FIX**, then **□**.

Example:

Operation	Display	Explanation
2ndF FIX 3	0.000	3 decimal places
1 2 3		
4 5 6		
7 8 9	123456789.0	
×		
□ 0 0		
1 =	123456.789	
2ndF FIX 0	123457. ^(*1)	0 decimal places
2ndF FIX 5	123456.7890 ^(*2)	5 decimal places
2ndF FIX □	123456.789	Reset decimal places

*1 The displayed value is rounded up within the specified range, but the actual calculation result is retained in the register.

*2 The number is displayed with left justification. In this case, 5 decimal places are specified, but only the 10 most significant digits are displayed. The 5th decimal place is not displayed.

DRG *Degree/Radian/Gradient Mode Key:

For changing angle units.

DRG *Angle Unit Conversion Key:

For converting angle values to different units.
(DEG → RAD → GRAD)

- Relationship of units: $200^{\text{GRAD}} = 180^{\circ} = \pi^{\text{RAD}}$

Example (in Degree mode) :

DRG **1** **8** **0** **2ndF** **DRG** (RAD 3.141592654)

Basic Instruction Keys

(+) **(-)** **(x)** **(÷)** **(=)** **Basic Function Keys:**

Used for basic arithmetic calculation. Press keys as they are written.

(%) ***Percent key:** Used for percentage, add-on and discount calculations.

Example: **1** **2** **3** **2ndF** **(%)** (1.23)

(()) **Open, Close Parenthesis Keys:**

For performing parenthesis calculations where numbers and instructions to be stored in the register are within 5 levels.

Example:

Value	Operation	Display
$2 \times (3 + 4) = 14$	2 (x) ((3 (+) 4) =	(14.)
$1 + [(4 - 3.6 + 5) \times 0.8 - 6] \times 4.2 = -6.056$	1 (+) ((((4 (-) 3 (.) 6 (+) 5) (x) (.) 8 (-) 6) (x) 4 (.) 2 =	(- 6.056)

- However, up to 15 consecutive open parentheses can be used at one time.

Example: $5 \times (((\dots ((4 + 2) \times 3) + 8 \dots$

Up to 15 parentheses

- **((** and **))** are always used together. If either key is pressed alone during an operation, the intended result cannot be obtained.
- **((** key is effective only when pressed immediately after a calculation instruction.
- When **((** is effective, "0" will be displayed. Special parentheses indicators () appear on the display.

Fractional Calculation Keys

Both mixed and improper fractions can be entered. Answers are given in mixed fractions.

(abc) Fraction Key: Use this key to enter both mixed and improper fractions.

To enter improper fractions (A/B):

A (numerator) → (abc) → B (denominator).

To enter mixed fractions (A B/C):

A (integer) → (abc) → B (numerator) → (abc) → C (denominator)

The fraction $2/3$ is displayed as "2┘3", and $1\frac{2}{5}$ as "1┘2┘5".

Example:

Value	Operation	Display
$\frac{2}{3}$	(2)	2.
	(abc)	2┘.
	(3)	2┘3.
$1\frac{2}{5}$	(1)	1.
	(abc)	1┘.
	(2)	1┘2.
	(abc)	1┘2┘.
	(5)	1┘2┘5.

The maximum number of digits for improper fractions is 6 digits for the numerator and 3 digits for the denominator, totalling 9 digits. For mixed fractions, up to 3 digits for each integer, numerator and denominator are permitted, but the total must be no more than 8 digits.

- (abc) can convert the results of fractional calculations to decimal notation, and vice versa. However, the value in the memory, even after converting to a decimal fraction, is stored as a fractional expression.

Example: Calculate $1\frac{2}{3} + 4\frac{5}{6}$ and convert the result to a decimal fraction.

Operation	Display
$\textcircled{1}$ \textcircled{abc} $\textcircled{2}$ \textcircled{abc} $\textcircled{3}$ $\textcircled{+}$	1 $\frac{2}{3}$
$\textcircled{4}$ \textcircled{abc} $\textcircled{5}$ \textcircled{abc} $\textcircled{6}$ $\textcircled{=}$	$6\frac{1}{2}$
\textcircled{abc}	6.5
\textcircled{abc}	$6\frac{1}{2}$

$\textcircled{d/c}$ ***Mixed/Improper Fraction Conversion Key:**
It converts mixed fractions to improper fractions and vice versa. It changes alternatively at each time the key is pressed.

Example: Enter $10/3$ and convert it to a mixed fraction.

Operation	Display
$\textcircled{1}$ $\textcircled{0}$ \textcircled{abc} $\textcircled{3}$	$10\frac{1}{3}$
$\textcircled{2ndF}$ $\textcircled{d/c}$ $\textcircled{=}$	$3\frac{1}{3}$
$\textcircled{2ndF}$ $\textcircled{d/c}$	$10\frac{1}{3}$

Memory Keys

The data in memory is retained even when the calculator is turned off.

$\textcircled{M+}$ **Memory Plus Key:** Adds numbers to the independent memory.

\textcircled{MR} **Memory Recall Key:**
Retrieves the contents of the independent memory.

$\textcircled{X-M}$ **Display/Independent Memory Replace Key:**
Replaces the displayed number with the contents of the independent memory.

\textcircled{STO} **Store Key:** Stores data into the store memory. By combining with $\textcircled{0}$ ~ $\textcircled{9}$ key, up to 10 numbers can be stored. (e.g. \textcircled{STO} $\textcircled{0}$)

\textcircled{RCL} ***Recall Key:**
Recalls the contents of the store memory.

Example Using the Independent Memory:

Operation	Display	Memory contents	Explanation
(1) (2) (3)	123.	0	Enter 123
(M+)	M 123.	123	Store 123
(4) (5) (6) (M+)	M 456.	579	Add 456
(MR)	M 579.	579	Recall from memory
(7) (8) (9)	M 789.	579	Enter 789
(X-M)	M 789.	789	Replace display for memory
(ONC)	M 0.	789	Clear display
(X-M)	0.	0	Clear memory

Example Using the Store Memory:

Operation	Display	Memory contents	Explanation
(1) (2) (x) (3) (=)	36.	0	
(STO) (9)	36.	36	Store 36
(ONC)	0.	36	Clear register
(2ndF) (RCL) (9)	36.	36	Recall from memory

Binary/Octal/Hexadecimal Number Keys

(0) ~ (1) **Binary Number Entry Keys:** (2) ~ (9) are ignored in Binary mode.

(0) ~ (7) **Octal Number Entry Keys:** (8) and (9) are ignored in Octal mode.

0 ~ 9 Hexadecimal Number Entry Keys (0~9):

A ~ F *Hexadecimal Number Entry Keys (10~15):

Example:

Value	Operation	Display
AB7C	2ndF \rightarrow HEX	(HEX.)
	A B 7 C	Ab7C.

Random Key

RND *Random Key:

Generates a random number between 0.000 and 0.999.

Example: 2ndF RND (0.132)

Complex Number Calculation

(a) Real Part Key: For storing the real part number in Complex mode.

(b) Imaginary Part Key: For storing the imaginary part number in Complex mode.

Examples:

Value	Operation	Display
$(12 - 3i) - (4 + 7i)$	2ndF CPLX	(CPLX)
	1 2 a 3 +/-	
	b $-$ 4 a 7	
	b $=$	8.
	b	-10.
$(6 - 7i) \times (-8 + 9i)$	6 a 7 +/- b	
	x 8 +/- a 9	
	b $=$	15.
	b	110.

Rectangular \leftrightarrow Polar Conversion

See II-3 "Basic Function Calculations".

3. Calculation Procedure

Calculation Precedence

The precedence of calculations is automatically determined by the calculator. This means that algebraic expressions can be entered just as they are written. The precedence of calculations is as follows:

High
Priority

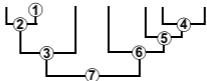


- One-variable function
- Calculation in ()
- y^x , $x\sqrt{\quad}$
- \times , \div
- $+$, $-$

Example:

Calculation Order

$$5 \div 4^2 \times 7 + 3 \times 0.5^{\cos 60^\circ} =$$



Mode: DEG

Operation	Display	Order
5 ÷	(5)	
4 x^2	(16.)	①
×	(0.3125)	②
7 +	(2.1875)	③
3 ×	(3.)	⑥
· 5 y^x	(0.5)	⑤
6 0 cos	(0.5)	④
=	(4.308820344)	⑦

Levels

During actual calculation, lower precedence calculations are stored in the stack memory and then processed in turn. This stack memory can store up to 5 levels of calculations.

Example:

$$1 + 2 \times (\sin 30^\circ + 6 \times (2 + 3 \times 2.2)) = 105.2$$

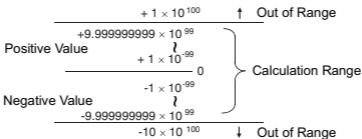
levels.....

4. Calculation Range

- If the result of a calculation is out of the range indicated here, an error occurs.
- For the calculation range during function calculation, refer to II-5 "Operation Range and Accuracy".

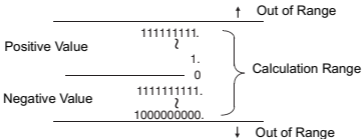
Decimal Numbers

A maximum of 10 digits in the mantissa, or 10 digits in the mantissa with 2 digits in the exponent, can be entered or displayed. A negative value is indicated by adding a minus (-) sign, the calculation range is defined as follows:



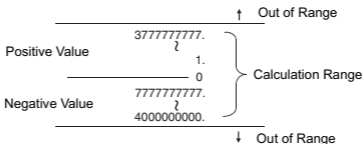
Binary Numbers

Binary integers of up to 10 digits can be entered and displayed. Negative binary values are expressed by their two's complement. The calculation range is defined as follows:



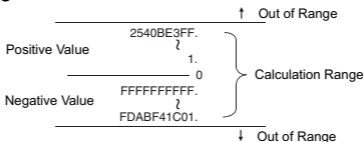
Octal Number

A maximum of 10 octal digits can be entered and displayed. Negative octal values are expressed by their two's complement. The calculation range is defined as follows:



Hexadecimal Numbers

A maximum of 10 hexadecimal digits can be entered and displayed. Negative hexadecimal values are expressed by their two's complement. The calculation range is defined as follows:



Two's Complement Calculation

In computer calculations the complement is used to express negative values without using + and – signs. And subtraction is performed by adding the complement.

Example: Enter 1 in binary and subtract 1 three times.

Operation	Display	Decimal
ON/C 2ndF -BIN	(BIN) 0.	
1	1.	1
- 1 =	0.	0
=	1111111111.	-1
=	1111111110.	-2

5. Statistical Calculations

Basic procedure

- 1) Before entering Statistic mode, press ON/C to clear the statistical calculation memory.
- 2) Press 2ndF , then STAT . The "STAT" indicator lights up.
- 3) Press DATA and enter the first data.
- 4) After entering the data, press the statistical calculation keys (e.g. \bar{x}).
- 5) Press 2ndF , then STAT to terminate the statistical calculation.
Repeat from step 1) for the next calculation.

Example:

Operation	Display	Explanation
ON/C 2ndF STAT	(STAT) 0.	Statistic mode
DATA (*)	dAtA 1.	DATA1 entry
1 0	10.	Enter 10
DATA (*)	dAtA 2.	DATA2 entry
2 0	20.	Enter 20
\bar{x}	15.	Find the mean

* Display will continue to blink until the number is entered.

Correcting Statistical Data

ON/C , EDIT and DEL may be used.

Confirming/Entering statistical data:

- 1) In Statistic mode, press 2ndF , then EDIT to enter Edit mode. "ED" will appear.
- 2) Press DATA . The first data number and then the contents appear. Each time you press DATA , the next entry appears.
If necessary, delete the data or change the value. See example 3 below. (To add data, you need to exit the Edit mode.)
- 3) Press 2ndF , then EDIT to exit Edit mode.

Correction Examples:

Example 1: DATA (1) (log) DATA (2) (log) (ON/C)
 (Entry of DATA2 is cancelled.)

Example 2: DATA (1) DATA (2) DATA (3) (ON/C) DATA (9)
 (DATA3 is changed from "3" to "9".)

Example 3: (Changing DATA1 to "9" and deleting DATA2)

DATA (1) DATA (2) DATA (3)
 (2ndF) (EDIT) Enter Edit mode
 DATA (dAtA 1. → 1.)
 (9) (9.)
 DATA (dAtA 2. → 2.)
 (2ndF) (DEL) (3.)
 DATA (dAtA 1. → 9.)
 DATA (dAtA 2. → 3.)

Notes:

1. In example 1, you cannot use (DEL) instead of (ON/C). If (DEL) is used, "dEL Error" appears and must be clean with (ON/C).
2. The maximum number of data is 73. If you enter the 74th data, "FULL 1" appears on the display.

Output of Statistical Calculation Results

Output	Operation	Equation
Number of data	\bar{n}	--
Mean	\bar{x}	$x = \frac{1}{n} \sum_{i=1}^n x_i$
Standard deviation of sample	s	$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$
Standard deviation population parameter	(2ndF) (σ)	$\sigma^n = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2}$
Variance of sample	s^2 (x^2)	$v^{n-1} = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$
Variance of population	(2ndF) (σ^2) (x^2)	$v^n = \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$
Sum	(2ndF) (Σx)	Σx
Square sum	(2ndF) (Σx^2)	Σx^2

Statistical Calculation Examples

You bought 20 large Pizzas for the party. A large is supposed to be 30 cm in diameter. Their sizes, however, varied as shown below.

Diameter	Midpoint	Frequency
27.6 ~ 28.5	28	2
28.6 ~ 29.5	29	4
29.6 ~ 30.5	30	5
30.6 ~ 31.5	31	6
31.6 ~ 32.5	32	3
		(20 in total)

Operation	Display	Explanation
	(STAT) 0.	Statistic mode
	0.0000	Decimal digit specification
	2.	Give the sum of frequency
	4.	
	5.	
	6.	
	3.	
	20.0000	Total number of data
	30.2000	Mean
	604.0000	Sum of the values
	18270.0000	Square sum of the values
	1.2397	Standard deviation of sample
	1.2083	Standard deviation of population

6. Errors

The calculator will overflow in the following instances.

Further calculations will not be possible as the calculator will be electronically locked.

- The overflow display is: (E 0.)

To clear the error, press **(ON/C)**.

1. When the calculation result is outside the following range:

$$x = 0, 1 \times 10^{-99} \leq |x| \leq 9.999999999 \times 10^{99}$$

x: Calculation result

2. When the contents of the memory are outside the following range:

$$x = 0, 1 \times 10^{-99} \leq |x| \leq 9.999999999 \times 10^{99}$$

x: Memory contents

(The data stored before the overflow error are retained.)

3. When numbers are entered outside the following range and a basic function key (+, -, ×, ÷) is pressed.

$$x = 0, 1 \times 10^{-99} \leq |x| \leq 9.999999999 \times 10^{99}$$

4. When a ÷ 0 (division by 0) is performed.

5. When data exceeds the range of any function or statistical calculation.

6. During statistical calculation;

1) If s is calculated with only one datum

2) To find \bar{x} , σ and s when $n = 0$

3) When $n < 0$ or $n \geq 10^{10}$

7. When the number of operators stored in the calculator during parentheses and arithmetic calculation exceeds 5 levels.

8. When the number of calculation nesting levels exceeds 3 in Statistic mode.

9. When more than 15 open parentheses are used at one time.

II. CALCULATION EXAMPLES

1. Decimal Calculations

Initial mode setting:

Calculation Mode: Decimal Mode



Display Mode: Floating Mode



(0.) (not 0.00)

Decimal Point: Resetting



(0.)

Addition and Subtraction

$8 + 3 + 5.5 = 16.5$	
	(16.5)
$4 - 7 - 3 = -6$	
	(-6.)

Multiplication and Division

$3.6 \times 1.7 = 6.12$	
	(6.12)
$592 \div 4.8 =$ 123.3333333	
	(123.3333333)

Mixed Calculations

$3 + 5 \times 7 = 38$	
	(38.)
$6 \times 9 + 3 \div 2 = 55.5$	
	(55.5)

Exponential Calculations

$(321 \times 10^{-14}) \times (65 \times 10^{28})$	
$= 2.0865 \times 10^{18}$	
	(2.0865 ¹⁸)

Fractional Calculations

$\frac{2}{3} + 3\frac{4}{7} - \frac{5}{4} = 2\frac{83}{84}$	$(2) (abc) (3) (+) (3) (abc) (4)$ $(abc) (7) (-) (5) (abc) (4) (=)$ $(2 \lfloor 83 \lfloor 84.)$
	$(\frac{3}{5} + 2\frac{3}{8}) \times \frac{2}{5} \div 2 - 1$ $= -\frac{81}{200}$

Constant Calculations

$2 + 3 = 5$	$(2) (+) (3) (=)$	(5.)
$4 + 3 = 7$	$(4) (=)$	(7.)
$1 - 2 = -1$	$(1) (-) (2) (=)$	(-1.)
$2 - 2 = 0$	$(2) (=)$	(0.)
$3 \times 2 = 6$	$(3) (\times) (2) (=)$	(6.)
$3 \times 4 = 12$	$(4) (=)$	(12.)
$6 \div 3 = 2$	$(6) (\div) (3) (=)$	(2.)
$9 \div 3 = 3$	$(9) (=)$	(3.)

- In constant addition, subtraction, multiplication, or division, the addend, subtrahend, multiplier, or divisor is automatically specified as the constant, respectively.

Parentheses Calculations

$3 + [(4 - 3.6 + 5) \times 0.8 - 6] \times 4.2$ $= -4.056$	$(3) (+) (((4) (-) (3)$ $(. (6) (+) (5)) (\times) (.$ $(8) (-) (6)) (\times) (4) (.$ $(2) (=)$	(-4.056)
--	---	------------

Percentage Calculations

$200 \times 17\% = 34$	$(2) (0) (0) (\times) (1) (7) (2ndF) (\%)$ $(=)$	$(34.)$
	$\frac{456}{789} \times 100 =$ 57.79467681%	$(4) (5) (6) (\div) (7) (8) (9)$ $(2ndF) (\%) (=)$

Add-On Calculations

$200 + (200 \times 20\%) = 240$	$\text{2} \text{0} \text{0} + \text{2}$ $\text{0} \text{2ndF} \% = (240.)$
---------------------------------	---

Discount Calculations

$200 - (200 \times 20\%) = 160$	$\text{2} \text{0} \text{0} - \text{2} \text{0}$ $\text{2ndF} \% = (160.)$
---------------------------------	---

Constant Percentage Calculations

$12\% \times 1200 = 144$	$\text{1} \text{2} \text{2ndF} \% \times \text{1}$ $\text{2} \text{0} \text{0} = (144.)$
$12\% \times 1500 = 180$	$\text{1} \text{5} \text{0} \text{0} =$ $(180.)$
$\frac{765}{987} = 77.50759878\%$	$\text{7} \text{6} \text{5} \div \text{9}$ $\text{8} \text{7} \text{2ndF} \% =$ (77.50759878)
$\frac{654}{987} = 66.26139818\%$	$\text{6} \text{5} \text{4} =$ (66.26139818)

Memory Calculations

	$\text{ONC} \text{X-M} (0.)$
$20 \times 30 = 600$	$\text{2} \text{0} \times \text{3} \text{0} =$ $\text{M+} (M 600.)$
$40 \times 50 = 2000$	$\text{4} \text{0} \times \text{5} \text{0} =$ $\text{M+} (M 2000.)$
$\begin{array}{r} +) \quad 15 \times 20 = 300 \\ \hline \end{array}$	$\text{1} \text{5} \times \text{2} \text{0} =$ $\text{M+} (M 300.)$
$\begin{array}{r} \quad \quad 2900 \\ -) \quad 125 \times 40 = -5000 \\ \hline \end{array}$	$\text{MR} (M 2900.)$ $\text{1} \text{2} \text{5} \times \text{4} \text{0}$ $= \text{+/-} \text{M+} (M-5000.)$ $\text{MR} (M-2100.)$
$\quad \quad \quad -2100$	$\text{ONC} \text{X-M} (0.)$

Composition Ratio Calculations

A 125 (25%)	(1) (2) (5) (+)	
B 185 (37%)	(1) (8) (5) (+)	
C 190 (38%)	(1) (9) (0) (=) (M+)	(M 500.)
(500) (100%)	(1) (2) (5) (÷) (MR)	
	(2ndF) (%) (=)	
	(X-M)	(M 25.)
	(1) (8) (5) (=) (M+)	(M 37.)
	(1) (9) (0) (=) (M+)	(M 38.)
	(MR)	(M 100.)

2. Binary/Octal/Hexadecimal Calculations

Binary Calculations




- **Addition and Subtraction (BIN)** : (ONC) (2ndF) → BIN

















10101011 + 1100 + 1110	(1) (0) (1) (0) (1) (0)	
= 11000101	(1) (1) (+) (1) (1) (0)	
	(0) (+) (1) (1) (1) (0)	
	(=)	(11000101.)
11100011 – 10101100	(1) (1) (1) (0) (0) (0)	
= 110111	(1) (1) (-) (1) (0) (1)	
	(0) (1) (1) (0) (0) (=)	
		(110111.)

- **Multiplication and Division (BIN)**














11 × 1001 = 11011	(1) (1) (×) (1) (0) (0)	
	(1) (=)	(11011.)
1101110 ÷ 1010 = 1011	(1) (1) (0) (1) (1) (1)	
	(0) (÷) (1) (0) (1) (0)	
	(=)	(1011.)

Octal Calculations









- **Addition and Subtraction (OCT) :**   

654 + 321 = 1175	      
	 (1175.)
741 - 357 = 362	      
	 (362.)




- **Multiplication and Division (OCT)**


















56 × 23 = 1552	      (1552.)
621 ÷ 12 = 50	       (50.)

- **Mixed Calculations (OCT)**

















52 + 63 × 14 = 1216	     
	   (1216.)

Hexadecimal Calculations












- **Addition and Subtraction (HEX) :**   

AAA + BB + C = B71	     
	   (b71.)
DEF - EFE = FFFFFFFFEF1	     
	  (FFFFFFFEEF1.)

- **Multiplication and Division (HEX)**

FEDC × A9 = A83F3C	      
	 (A83F3C.)
CA11 ÷ DF = E7	      
	 (E7.)

- **Mixed Calculations (HEX)**

(AB + 9) × D ÷ F = 9C	      
	    (9C.)

3. Basic Function Calculations

Pi Function : π

$\pi \times 10$	$\frac{2ndF}{\pi} \times 10 = (31.41592654)$
-----------------	--

Trigonometric Functions : \sin \cos \tan

$\sin 53^\circ = 0.79863551$	[DEG] 5 3 \sin (0.79863551)
$\cos \frac{\pi}{6} = 0.866025403$	[RAD] $\frac{2ndF}{\pi} \div 6 =$ \cos (0.866025403)
$\tan 65^{GRAD} = 1.631851687$	[GRAD] 6 5 \tan (1.631851687)
$\sin \frac{\pi}{3} = 0.866025403$	[RAD] $\frac{2ndF}{\pi} \div 3 =$ \sin (0.866025403)

Inverse Trigonometric Functions : \sin^{-1} \cos^{-1} \tan^{-1}

$\sin^{-1} 0.3 = 17.45760312^\circ$	[DEG] $\sin^{-1} 0.3 =$ (17.45760312)
$\cos^{-1} 0.8 = 36.86989765^\circ$	[DEG] $\cos^{-1} 0.8 =$ (36.86989765)
$\tan^{-1} 1.5 = 56.30993247^\circ$	[DEG] $\tan^{-1} 1.5 =$ (56.30993247)
$\sin^{-1} 1 = 1.570796327$ (rad)	[RAD] $\sin^{-1} 1 =$ (1.570796327)

Logarithmic Functions : \log \ln

$\log 123 = 2.089905111$	1 2 3 \log (2.089905111)
$\ln 123 = 4.812184355$	1 2 3 \ln (4.812184355)

Logarithmic Mean : \ln

$\bar{L} = \frac{4-8}{\ln 4 - \ln 8} = 5.770780164$	((4 - 8) ÷ (4 ln - 8 ln) = (5.770780164)
---	--

Exponential Functions : e^x / 10^x

$e^{22} = 3584912846$	(2) (2) (2ndF) e^x (3584912846.)
$10^{2.3} = 199.5262315$	(2) (.) (3) (2ndF) 10^x (199.5262315)

Square Calculations : x^2

$1.25^2 = 1.5625$	(1) (.) (2 5) (x^2) (1.5625)
-------------------	--

Power Calculations : y^x

$5.43^3 = 160.103007$	(5) (.) (4 3) (y^x) (3) (=) (160.103007)
$2^{3.4} = 10.55606329$	(2) (y^x) (3) (.) (4) (=) (10.55606329)

Constant Power Calculations : y^x

$2^{2.34} = 5.063026376$	(2) (y^x) (2) (.) (3 4) (=) (5.063026376)
$3^{2.34} = 13.07566351$	(3) (=) (13.07566351)
$4^{2.34} = 25.63423608$	(4) (=) (25.63423608)

Extraction of Square Root : $\sqrt{\quad}$

$\sqrt{(5+6) \times 7} =$ 8.774964387	((5 + 6) (× 7) = ($\sqrt{\quad}$) (8.774964387)
--	--

Multiple Root : $\sqrt[x]{\quad}$

$5.3 \sqrt{100} = 2.384286779$	(1) (0) (0) (2ndF) $\sqrt[x]{\quad}$ (5) (.) (3) (=) (2.384286779)
--------------------------------	---

Constant Power Calculations : $\sqrt[x]{y}$

$\sqrt[5]{1024} = 4$	(1) (0) (2) (4) (2ndF) $\sqrt[x]{y}$ (5) = (4.)
$\sqrt[5]{3125} = 5$	(3) (1) (2) (5) (=) (5.)
$\sqrt[5]{7776} = 6$	(7) (7) (7) (6) (=) (6.)

Geometric Mean : $\sqrt[x]{y}$

$\bar{G} = \sqrt[4]{1.23 \times 1.48 \times 1.96 \times 2.2}$ $= 1.673830182$	(1) (.) (2) (3) (x) (1) (.) (4) (8) (x) (1) (.) (9) (6) (x) (2) (.) (2) (=) (2ndF) $\sqrt[x]{y}$ (4) (=) (1.673830182)
--	--

Extraction of Cubic Root : $\sqrt[3]{y}$

$\sqrt[3]{123} = 4.973189833$	(1) (2) (3) (2ndF) $\sqrt[3]{y}$ (4.973189833)
-------------------------------	---

Reciprocal Calculations : $1/x$

$\frac{1}{2 \times 3 + 4} = 0.1$	(2) (x) (3) (+) (4) (=) (2ndF) $1/x$ (0.1)
----------------------------------	---

Trigonometric Calculations : $1/x$

$\operatorname{cosec} x = \frac{1}{\sin x}$ $\operatorname{cosec} 45^\circ = 1.414213562$	[DEG] (4) (5) (sin) (2ndF) $1/x$ (1.414213562)
--	---

Factorial Calculations : $x!$

$(4 \times 2 - 3)! = 120$	(4) (x) (2) (-) (3) (=) (2ndF) $x!$ (120.)
---------------------------	---

Hyperbolic Functions : HYP

$\cosh 34 = 2.917308713 \times 10^{14}$	3 4 HYP cos (2.917308713 ¹⁴)
$\tanh 1.23 = 0.842579325$	1 . 2 3 HYP tan (0.842579325)

Inverse Hyperbolic Functions : HYP^{-1}

$\sinh^{-1} 1 = 0.881373587$	1 2ndF HYP^{-1} sin (0.881373587)
------------------------------	--

Degree \rightarrow Radian Conversion : DRG°

$60^{\circ} = 1.047197551^{\text{RAD}}$	DRG $[\text{DEG}]$ 6 0 2ndF DRG° (1.047197551)
---	---

Radian \rightarrow Gradient Conversion : DRG^{RAD}

$2^{\text{RAD}} = 127.3239545^{\text{GRAD}}$	$[\text{RAD}]$ 2 2ndF DRG^{RAD} (127.3239545)
--	--

Gradient \rightarrow Degree Conversion : DRG^{GRAD}

$120^{\text{GRAD}} = 108^{\circ}$	$[\text{GRAD}]$ 1 2 0 2ndF DRG^{GRAD} (108.)
-----------------------------------	---

Permutations (of n things taken r at a time) : nPr

$nP_r = \frac{n!}{(n-r)!}$ $5P_3 = \frac{5!}{(5-3)!} = 60$	5 2ndF nPr 3 = (60.)
---	---

Combinations (of n things taken r at a time) : nCr

$nC_r = \frac{n!}{r!(n-r)!}$ $5C_3 = \frac{5!}{3!(5-3)!} = 10$	5 2ndF nCr 3 = (10.)
---	---

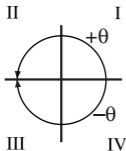
Rectangular → Polar Conversion : $\overset{R \rightarrow P}{\text{○}}$

	[DEG] 1 a 3 $\sqrt{\text{○}}$ b
	$\overset{2ndF}{\text{○}}$ $\overset{R \rightarrow P}{\text{○}}$ (2.)
	b (60.)

Polar → Rectangular : $\overset{R \rightarrow P}{\text{○}}$

	[DEG] 2 a 6 0 b
	$\overset{2ndF}{\text{○}}$ $\overset{R \rightarrow P}{\text{○}}$ (1.)
	b (1.732050808)

* In polar conversion θ in the third and fourth quadrant are as shown in the diagram below.



Degrees-Minutes-Seconds (DMS) → Decimal Degrees : $\overset{DMS \rightarrow DD}{\text{○}}$

$123^{\circ}45'06'' \rightarrow 123.7516667^{\circ}$	1 2 3 $\overset{DMS \rightarrow DD}{\text{○}}$ 4
	5 $\overset{DMS \rightarrow DD}{\text{○}}$ 0 6 $\overset{DMS \rightarrow DD}{\text{○}}$
	(123.7516667)

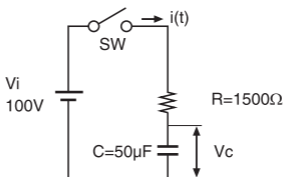
Decimal Degrees → Degrees-Minutes-Seconds : $\overset{DD \rightarrow DMS}{\text{○}}$

$2.3456 \rightarrow 2^{\circ}20'44.16''$	2 . 3 4 5
	6 $\overset{2ndF}{\text{○}}$ $\overset{DD \rightarrow DMS}{\text{○}}$ ($2^{\circ}20'44''16$)

4. Applied Calculations

Electricity - Integrating Circuit Problem

Obtain the voltage V_c across the capacitor at $t=56$ msec after the switch is turned on.



$$V_c = V_i (1 - e^{-\frac{t}{RC}})$$

$$= 100 \times \left(1 - e^{-\frac{56 \times 10^{-3}}{1500 \times 50 \times 10^{-6}}}\right) = 52.60562649$$

Calculator keypad input sequence: 1 0 0 x (1 - (1 5 0 0 x 5 0 EXP 6 +/- ÷ 5 6 EXP 3 +/-) 2ndF 1/x +/- 2ndF e^x) =

(52.60562649)

Algebra

The Root of a Quadratic Equation (Only for problems having a real root)

$$4x^2 + 9x + 2 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-9 \pm \sqrt{9^2 - 4 \times 4 \times 2}}{2 \times 4}$$

$$x = \begin{cases} -0.25 \\ -2 \end{cases}$$

Calculator keypad input sequence: 9 x^2 - 4 x 4 x 2 (M 49.) = x-M

Calculator keypad input sequence: (9 +/- + MR sqrt) ÷ 2 (M -0.25) ÷ 4 =

Calculator keypad input sequence: (9 +/- - MR sqrt) ÷ 2 (M -2.) ÷ 4 =

Calculation of time

Example 1:

Departing at 2 hours 9 minutes and 56 seconds ($2^{\circ}09'56''$) the destination was reached at 4 hours 18 minutes and 23 seconds ($4^{\circ}18'23''$). What was the travel time?

4	0111→	1	8	0111→	2	3	0111→	-	2	0111→
0	9	0111→	5	6	0111→	=	2ndF	→0111		
2 hours 8 minutes 27 seconds									$(2^{\circ}8'27'')$	

Example 2:

The following shows the amount of time worked on three days. What was the total time?

1st day: 5 hours 46 minutes ($5^{\circ}46'$)

2nd day: 4 hours 39 minutes ($4^{\circ}39'$)

3rd day: 3 hours 55 minutes ($3^{\circ}55'$)

5	0111→	4	6	0111→	+	4	0111→	3	9	0111→
+	3	0111→	5	5	0111→	=	2ndF	→0111		
14 hours 20 minutes									$(14^{\circ}20'0'')$	

5. Operation Range and Accuracy

Function		Operation Range	Under Flow Area	Normal Accuracy
	Angle Unit			
sin x	DEG	$0 \leq x \leq 4.499999999 \times 10^{10}$	$0 \leq x \leq 5.729577951 \times 10^{-98}$	10 digits ± 1
	RAD	$0 \leq x \leq 785398163.3$	—	
	GRAD	$0 \leq x \leq 4.999999999 \times 10^{10}$	$0 \leq x \leq 6.366197723 \times 10^{-98}$	
cos x	DEG	$0 \leq x \leq 4.500000008 \times 10^{10}$	—	
	RAD	$0 \leq x \leq 785398164.9$	—	
	GRAD	$0 \leq x \leq 5.000000009 \times 10^{10}$	—	
tan x	DEG	Same as sin x except $ x \neq (2n-1) \cdot 90$	Same as sin x	
	RAD	Same as sin x except $ x \neq (2n-1) \cdot \pi/2$	Same as sin x	
	GRAD	Same as sin x except $ x \neq (2n-1) \cdot 100$	Same as sin x	
$\sin^{-1}x$	DEG	$0 \leq x \leq 1$	$0 \leq x \leq 1.570796326 \times 10^{-99}$	
	RAD	$0 \leq x \leq 1$	—	
	GRAD	$0 \leq x \leq 1$	$0 \leq x \leq 1.570796326 \times 10^{-99}$	
$\cos^{-1}x$	DEG	Same as $\sin^{-1}x$	—	
	RAD	Same as $\sin^{-1}x$	—	
	GRAD	Same as $\sin^{-1}x$	—	
$\tan^{-1}x$	DEG	$0 \leq x \leq 9.999999999 \times 10^{99}$	Same as $\sin^{-1}x$	
	RAD	$0 \leq x \leq 9.999999999 \times 10^{99}$	—	
	GRAD	$0 \leq x \leq 9.999999999 \times 10^{99}$	Same as $\sin^{-1}x$	
sinh x		$0 \leq x \leq 230.2585092$	—	
cosh x		$0 \leq x \leq 230.2585092$	—	
tanh x		$0 \leq x \leq 9.999999999 \times 10^{99}$	—	
$\sinh^{-1}x$		$0 \leq x \leq 4.999999999 \times 10^{99}$	—	
$\cosh^{-1}x$		$1 \leq x \leq 4.999999999 \times 10^{99}$	—	
$\tanh^{-1}x$		$0 \leq x \leq 9.999999999 \times 10^{-1}$	—	
ln x		$0 < X$	—	
log x		$0 < X$	—	
e^x		$-9.999999999 \times 10^{99} \leq x \leq 230.2585092$	$-9.999999999 \times 10^{99} \leq x \leq -227.9559243$	
10^x		$-9.999999999 \times 10^{99} \leq x \leq 99.99999999$	$-9.999999999 \times 10^{99} \leq x \leq -99.00000001$	
x!		$0 \leq x \leq 69$ (Integer)	—	

Function		Operation Range	Under Flow Area	Normal Accuracy
	Angle Unit			
1/x		$1 \times 10^{-99} \leq x \leq 9.999999999 \times 10^{99}$	$1.000000001 \times 10^{99} \leq x \leq 9.999999999 \times 10^{99}$	10 digits ± 1
x^2		$0 \leq x \leq 9.999999999 \times 10^{49}$	$0 \leq x \leq 3.162277660 \times 10^{-50}$	
\sqrt{x}		$0 \leq x \leq 9.999999999 \times 10^{99}$	—	
$\sqrt[3]{x}$		$0 \leq x \leq 9.999999999 \times 10^{99}$	—	
DMS \rightarrow DEG		$0 \leq x \leq 99998.9999$	—	lowest digits ± 1
DEG \rightarrow DMS		$0 \leq x \leq 99998^{\circ}59'59''$	—	
DEG \rightarrow RAD		$0 \leq x \leq 9.999999999 \times 10^{99}$	$0 \leq x \leq 5.729577951 \times 10^{-98}$	10 digits ± 1
RAD \rightarrow GRAD		$0 \leq x \leq 1.570796326 \times 10^{98}$	—	
GRAD \rightarrow DEG		$0 \leq x \leq 9.999999999 \times 10^{99}$	$0 \leq x \leq 1.111111111 \times 10^{-99}$	
y^x		$-9.999999999 \times 10^{99} \leq x \cdot \ln y \leq 230.2585092$	$-9.999999999 \times 10^{99} \leq x \cdot \ln y \leq 227.9559243$	
		$y > 0 \dots$ The above range $y < 0 \dots x$ (integer) or, $1/x$ (odd, $x \neq 0$) ... The above range $y = 0 \dots 0 < x$		
$x\sqrt{\quad}$		$-9.999999999 \times 10^{99} \leq 1/x \cdot \ln y \leq 230.2585092$	$-9.999999999 \times 10^{99} \leq 1/x \cdot \ln y \leq -227.9559243$	
		$y > 0 \dots$ The above range $y < 0 \dots x$ (odd) or, $1/x$ (integer, $x \neq 0$) ... The above range $y = 0 \dots 0 < x$		
R \rightarrow P ($xy \rightarrow y\theta$)		$ x y \leq 9.999999999 \times 10^{49}$ $(x^2 + y^2) \leq 9.999999999 \times 10^{99}$ y/x : same as $\tan^{-1}x$	y/x : same as $\tan^{-1}x$	
P \rightarrow R ($y\theta \rightarrow xy$)		$0 \leq r \leq 9.999999999 \times 10^{99}$ θ : same as $\sin x, \cos x$	θ : same as $\sin x, \cos x$	
nPr		$0 \leq n \leq 99, r \leq n, r = \text{Integer}$ $1 \leq ((n!/(n-r)!)) \leq 9.999999999 \times 10^{99}$		
nCr		$0 \leq n \leq 99, 1 \leq n, r = \text{Integer}$		

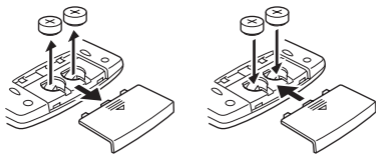
Function		Operation range	Normal Accuracy
Complex number calculation	$(x1+y1 i) \pm (x2+y2 i)$		10 digits ± 1
	Addition	$ x1+x2 \leq 9.999999999 \times 10^{99}$	
	Subtraction	$ y1+y2 \leq 9.999999999 \times 10^{99}$	
	Multiplication	$(x1x2-y1y2) \leq 9.999999999 \times 10^{99}$ $(y1x2+x1y2) \leq 9.999999999 \times 10^{99}$ $(x1x2), (y1y2), (y1x2), (x1y2) \leq 9.999999999 \times 10^{99}$	
Division	$\frac{x1x2+y1y2}{x2^2 + y2^2}, \frac{y1x2-x1y2}{x2^2 + y2^2} \leq 9.999999999 \times 10^{99}$ $x2^2 + y2^2, x2^2, y2^2, x1x2 + y1y2, y1x2 - x1y2, x1x2, y1y2, y1x2, x1y2, \leq 9.999999999 \times 10^{99}$	—	
→DEC	The following operation range after the conversion. $0 \leq x \leq 9999999999$	—	
→BIN	The following operation range after the conversion. $1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 1111111111$	—	
→OCT	The following operation range after the conversion. $4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$	—	
→HEX	The following operation range after the conversion. $FDABF41C01 \leq x \leq FFFFFFFF$ $0 \leq x \leq 2540BE3FF$	—	
Normal Distributions-statistic Calculation	DATA DEL	$ x \leq 9.999999999 \times 10^{49}$ $ \Sigma x \leq 9.999999999 \times 10^{99}$ $\Sigma x^2 \leq 9.999999999 \times 10^{99}$ $0 \leq n \leq 18870 \quad n = \text{Integer}$ * max n = 255 for one variable	10 digits ± 1
	\bar{x}	$n \neq 0$	
	s	$n \neq 1, n \neq 0$ $0 \leq \frac{\Sigma x^2 - \{(\Sigma x)^2/n\}}{n-1} \leq 9.999999999 \times 10^{99}$	
	$x\sigma^n$	$n \neq 0$ $0 \leq \frac{\Sigma x^2 - \{(\Sigma x)^2/n\}}{n} \leq 9.999999999 \times 10^{99}$	

iii. Power Source

Battery

2 alkaline batteries (Type: LR44): Approx. 1,000 hours continuous display. When the display dims, change the batteries.

- Do not leave batteries within the reach of children. If a battery is swallowed, contact a doctor immediately.
- Do not try to recharge, disassemble or do anything to the battery that could cause a short circuit.
- Do not expose the battery to high temperatures or open flames.
- Install batteries according to polarity (+ and -) diagrams. Replace both batteries at the same time.
- Loud external noise or static electricity may cause the display to malfunction or the contents of the memory to be lost or altered. Should this occur, press **ON/C** + **0**, or remove batteries once and then reinstall them.



Battery Replacement

IV. Advice and Precautions

- This calculator contains precision components such as LSI chips and should not be used in places subject to rapid variations in temperature, excessive humidity, and dirt or dust, and should not be 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 a 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, bring or mail the device together with the guarantee to the service representative of a Canon business office.

V. Specifications

Exponential Type...Mantissa, 10 digits + exponent, 2 digits + sign, 2 digits

Floating Type.....Mantissa, 10 digits + sign, 1 digit

Calculation Range:

Decimal $\pm 1 \times 10^{-99} \sim \pm 9.999999999 \times 10^{99}$

Binary11111111 ~ 0 ~ 1000000000

Octal.....3777777777 ~ 0 ~ 4000000000

Hexadecimal2540BE3FF ~ 0 ~ FDABF41C01

Auto power off: Approx. 15 min

Power Source: DC 3 V, 0.06 mW

Alkaline battery (LR44) × 2: Approx. 1,000 hours continuous display

Usable Temperature: 0° ~ 40°C (32°F ~ 104°F)

Size: 152 (L) × 78 (W) × 18 (H) mm

(5 – 63/64" × 3 – 5/64" × 45/64")

Weight: 96 g (3.4 oz)

* Specifications are subject to change without notice.

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