Canon

F-502G/F-502 II

Scientific Calculator

ENGLISH

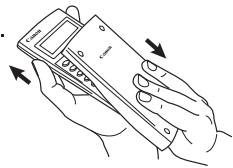
E-IE-418

PRINTED IN CHINA

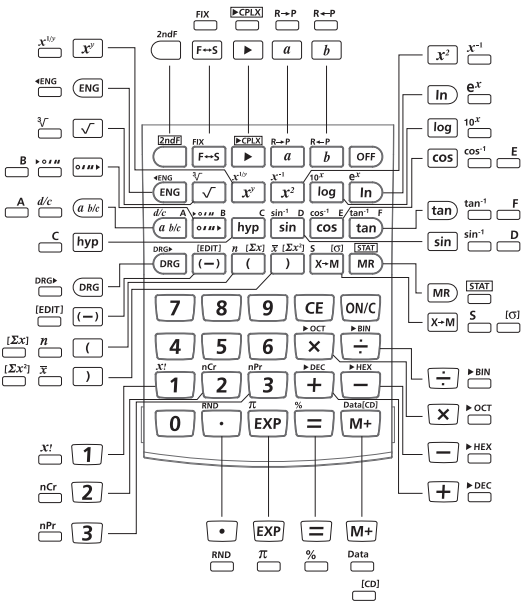
CONTENTS

NOTE: Calculator bottom case is made from recycled material of Canon product which might lead to black dot(s) or uneven plastic color.

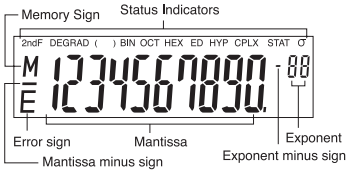
How To Open/Close the Cover:
Open or close the cover by sliding as shown in the figure.



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 page 23 “Errors”.

Examples:

Fraction (e.g. $1\frac{2}{5}$):

Hexadecimal numbers A ~ F:

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

KEY INDEX

Binary/Octal/Hexadecimal Number Keys

0 ~ 1	Binary Numbers	P. 15
0 ~ 7	Octal Numbers	P. 15
0 ~ 9	Hexadecimal Numbers (0~9)	P. 15
A ~ F	Hexadecimal Numbers (10~15)	P. 15

Random Number Generation

RND	Random	P. 16

Complex Number Calculation

a	Real Part	P. 16
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Statistical Calculation Keys ..... P. 19-22

Data [CD]	Data entry/Clear Data
[EDIT]	Statistic Edit Mode
$[\Sigma x]$	Summation of x
$[\Sigma x^2]$	Sum of Square
n	Number of data sample
$\bar{x}$	Mean of x
s	Sample Standard Deviation of x
[σ]	Population Standard Deviation of x

Function Keys

π	Pi	P. 29
sin $\sin^{-1}$	Sine/Arc Sine	P. 29
cos $\cos^{-1}$	Cosine/Arc Cosine	P. 29
tan $\tan^{-1}$	Tangent/Arc Tangent	P. 29
log	Common Logarithm	P. 29
ln	Natural Logarithm	P. 29
e^x	Exponential Function	P. 30
10^x	Common Exponential	P. 30
x^2	Square	P. 30
x^y	Power	P. 30
$\sqrt{}$	Square Root	P. 30
$\sqrt[x]{y}$	Multiple Root	P. 30
$\sqrt[3]{}$	Cubic Root	P. 31
x^{-1}	Reciprocal	P. 31
$x!$	Factorial	P. 31

Examples of Key Symbols

Example (sin⁻¹ D / sin):

sin To use a function printed on a key, press the key.

sin⁻¹ To use a function printed above a key, press the 2ndF key while in Decimal mode.

D The "D" key is colored in green.
To use a function printed above a key in green, press the 2ndF key while in Hexadecimal mode.

Note:

The blue keys are active in Statistic mode only. In Statistic mode ("STAT" Icon light up), they work as follows.

Example (n [Σx] / ( ):

n Calculate the number of data sample when it is pressed.

[Σx] **2nd function key:** Calculate the summation of "Σx" data were input when it is pressed immediately after 2ndF.

I. HOW TO USE THE F-502G/F-502 II

1. Pre-calculation check

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 press [ON/C] + [0] key to reset the calculator.

2. Keys

Power ON, OFF and Clear keys

■ **First time operation:**

1. Pull out the battery insulation sheet, then the battery will be loaded and the calculator can be powered on.
2. Press [ON/C] + [0] to reset the calculator.

[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 **7 minutes**, the calculator will automatically power off.

[OFF] **Power OFF Key:** Turns off the calculator when this key is pressed.

[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 and Important 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 → 1 2 3 (−) (–123.)

▶ **Backspace 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.

2ndF **2ndF Key:** For performing function indicated above the keys.

Example: $\sin^{-1}$ 0.5 → • 5 2ndF $\sin^{-1}$ (30.)

Mode Selection

To Specifies the calculation mode:

Operation	Mode	Display Indicator
2ndF ▶DEC	Decimal Calculation (Degree) 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

Display Mode Keys

(ENG) : Engineering Exponential mode.
2ndF (◂ENG) : Reverse Engineering Exponential mode
(F↔S) : Switch between Floating mode and Scientific Exponential mode.

Example:

Operation	Display	Explanation
	0.	Floating Mode
1 2 3 ×		
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 ◂ENG	$1230.^{00}$	Reverse Engineering Exponential

Display Range:

Floating mode

$10^{10} \leqq |x| < 10^{100}$ For exponential display

$10^{-99} \leqq |x| < 10^{-9}$ For exponential display

$x = 0$ or $10^{-9} \leqq |x| < 10^{10}$ For mantissa display

- Scientific Exponential Mode
  $x = 0$, and $10^{-99} \leqq |x| < 10^{100}$
- Engineering Exponential Mode
  $x = 0$, and $10^{-99} \leqq |x| < 10^{100}$
  Exponent: Multiple of 3

Decimal Point Selection Key

FIX Specifies the number of decimal places in the mantissa of decimal calculation results. Pressing 0 ~ 9 after 2ndF FIX keys to specify the number of decimal places.

Note:

To reset the decimal places, 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.

Degree/Radian/Gradient Mode Key

DRG Changing angle units.

2ndF DRG▸ **Angle Unit Conversion Mode:**
For converting angle values to different units.
(DEG → RAD → GRAD)

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

Example (in Degree mode) :

[1] [8] [0] [2ndF] [DRG▸] (RAD 3.141592654)

Basic Instruction Keys

[+] [−] [×] [÷] [=] **Basic Function Keys:** Used for basic arithmetic calculation.

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

Example: [1] [2] [3] [2ndF] [%] (1.23)

[(] [)] **Open, Close Parenthesis Keys**

Example:

Value	Operation	Display
2 × (3 + 4) = 14	[2] [×] [(] [3] [+] [4] [)] [=]	14.
1 + [(4 − 3.6 + 5) × 0.8 − 6] × 4.2 = − 6.056	[1] [+] [(] [(] [4] [−] [3] [•] [6] [+] [5] [)] [×] [•] [8] [−] [6] [)] [×] [4] [•] [2] [=]	− 6.056

- However, up to 15 consecutive open parentheses can be used at one time.
  Example: 5 × (((. . . ((4 + 2) × 3) + 8 . . .
  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. Parentheses indicators ( ) appear on the display.

Fractional Calculation Keys

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

[a b/c] **Fraction Key:** Use this key to enter both mixed and improper fractions.

[d/c] To enter improper fractions:

d (numerator) → [a b/c] → c (denominator).

a (integer) → [a b/c] → b (numerator) → [a b/c] → c (denominator)

■ The fraction $\frac{2}{3}$ is displayed as "2⌟3", and $1\frac{2}{5}$ as "1␣2⌟5".

Example:

Value	Operation	Display
$\frac{2}{3}$	2	2.
	[a b/c]	2⌟.
	3	2⌟3.
$1\frac{2}{5}$	1	1.
	[a b/c]	1⌟.
	2	1⌟2.
	[a b/c]	1␣2⌟.
	5	1␣2⌟5.

Result will be displayed in decimal format automatically whenever the total digits of a fractional value (integer + numerator + denominator + separator marks) exceeds 10.

- [a b/c] 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
1 a b/c 2 a b/c 3 +	1⌴2⌟3.
4 a b/c 5 a b/c 6 =	6⌴1⌟2.
a b/c	6.5
a b/c	6⌴1⌟2.

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 $\frac{10}{3}$ and convert it to a mixed fraction.

Operation	Display
1 0 a b/c 3	10⌟3.
=	3⌴1⌟3.
2ndF d/c	10⌟3.

Memory Keys

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

M+ **Memory Plus Key:** Add numbers to the independent memory.

MR **Memory Recall Key:** Retrieve the value of the independent memory.

X-M **Exchange Memory By Display Value:** Replaces the displayed number with the contents of the independent 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 memory with display
ON/C	M 0.	789	Clear display
X→M	0.	0	Clear 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
	2ndF ▶HEX	(HEX.)
AB7C	A B 7 C	Ab7C.

Random Number Generation

RND **Random Key:**
To generate a random number between 0.000 and 0.999.

Example: 2ndF RND (0.132)*
*The value is only a sample, results will differ each time.

Complex Number Calculation

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

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

Example:

Value	Operation	Display
	2ndF ▶CPLX	(CPLX)
(12 – 3i) – (4 + 7i)	1 2 a 3 (–)	
	b – 4 a 7	
= 8 – 10i	b =	8.
	b	–10.
(6 – 7i) × (–8 +9i)	6 a 7 (–) b	
	× 8 (–) a 9	
= 15 +110i	b =	15.
	b	110.

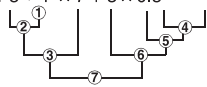
Rectangular ⟷ Polar Conversion
See P. 33 “Basic Function Calculations”.

3. Calculation Procedure

The calculator will automatically determine the operation priority that algebraic expressions can be entered just as they are written:

1. Calculation in ( ).
2. Type B functions:
   With these functions, the function key is passed and then the value is entered.
   Statistical: Data
   EXP
3. Type A functions:
   With these functions, the value is entered and then the function key is passed.
   x^3, x^2, x^{-1}, n!, °‴►, ►°‴, %
   Angle unit conversions (DRG►)
   $\sqrt{\ }$, $\sqrt[3]{\ }$, log, ln, e^x, 10^x,
   sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$
4. Fractions. (ab/c)
5. +/–
6. Powers and roots: x^y, $x\sqrt{\ }$
7. Permutations (nPr) and combinations (nCr)
8. ×, ÷
9. +, −

Example: $5 \div 4^2 \times 7 + 3 \times 0.5^{\cos 60^\circ} = 4.308820344$



Levels of calculations (Stack Memory)

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

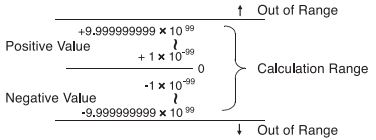
levels ..... ① ② ③ ④ ⑤

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 P.36 “Operation Range and Accuracy”.

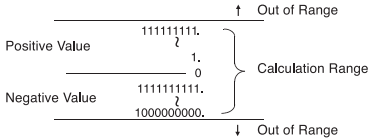
Decimal Numbers

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:



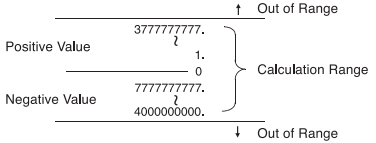
Binary Numbers

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:



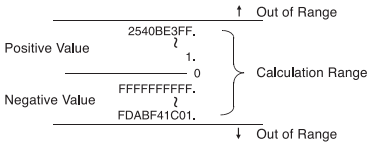
Octal Number

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. $\hat{S}$, $\bar{x}$ ...).
5) Press 2ndF, then STAT to exit the statistical calculation mode.

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.

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. Refer to example below.
   To add data, you need to exit the Edit mode.
3) Press 2ndF , then [EDIT] to exit Edit mode.

Correct / Edit Statistical Data

• Use ON/C, [EDIT] and [CD]

Example:

Operation	Display	Explanation
ON/C 2ndF STAT	(STAT) 0	Enter Statistic Mode
Data	dAtA 1	Data1 entry
3	3	Enter 3
Data	dAtA 2	Data2 entry
4	4	Enter 4
ON/C	0	Cancel Data 4
Data	dAtA 2	Data2 entry
9	9	Enter 9
2ndF [EDIT]	(ED) 0	Enter Edit Mode
Data	(ED) dAtA 1	Flash a second
	(ED) 3	Recall Data1
5	(ED) 5	Replace Data1 value (3 → 5)
Data	(ED) 9	Recall Data2
2ndF [CD]	5	Delete Data2 value (9) and display Data1 value (5)

Notes:

1. If there is 'NO" data being stored, "dEL Error" will appear when [2ndF] [CD] is pressed.
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 sample	[n]	--
Mean of x	[$\bar{x}$]	$x = \sum_{i=1}^{n} \bar{x}\, i / n$
Sample standard deviation of x	[s]	$s = \sqrt{\sum_{i=1}^{n} (xi - \bar{x})^2 / (n-1)}$
Population standard deviation of x	[2ndF] [σ]	$\sigma^n = \sqrt{\sum_{i=1}^{n} (xi - \bar{x})^2 / n}$
Variance of sample	[s] [x^2]	$V^{n-1} = \sum_{i=1}^{n} (xi - \bar{x})^2 / (n-1)$
Variance of population	[2ndF] [σ] [x^2]	$V^n = \sum_{i=1}^{n} (xi - \bar{x})^2 / n$
Summation of x	[2ndF] [Σx]	Σx
Sum of Square	[2ndF] [Σx²]	Σx^2

Statistical Calculation Examples

You bought 20 pcs of Pizzas. However, there are varied on the diameter of pizzas as following table please calculate the statistic information.

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
ON/C 2ndF STAT	(STAT) 0.	Statistic mode
2ndF FIX 4	0.0000	Decimal digit specification
Data 2 8 × 2	2.	Give the sum of frequency
Data 2 9 × 4	4.	
Data 3 0 × 5	5.	
Data 3 1 × 6	6.	
Data 3 2 × 3	3.	
n	20.0000	Total number of data sample
$\bar{x}$	30.2000	Mean of x
2ndF [Σx]	604.0000	Summation of x
2ndF [Σx^2]	18270.0000	Sum of Square of the value
s	1.2397	Sample Standard Deviation of x
2ndF [σ]	1.2083	Population of Standard Deviation of x

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.)
  Press [ON/C], to clear the error.

1. When the calculation result is outside the following range:
   $x = 0,\ 1 \times 10^{-99} \leqq |x| \leqq 9.999999999 \times 10^{99}$
   x: Calculation result
2. When the contents of the memory are outside the following range:
   $x = 0,\ 1 \times 10^{-99} \leqq |x| \leqq 9.999999999 \times 10^{99}$
   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.
   $x = 0,\ 1 \times 10^{-99} \leqq |x| \leqq 9.999999999 \times 10^{99}$
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 data Input
   2) To find $\bar{x}$, σ and S when n = 0
   3) When $n < 0$ or $n \geqq 10^{10}$
7. When the number of operators stored in the calculator during parentheses and arithmetic calculation exceeds 5 levels.
8. When more than 15 open parentheses are used at one time.

II. CALCULATION EXAMPLES

1. Decimal Calculations (Degree Mode)

Initial mode setting:

Calculation Mode: Decimal Degree Mode
2ndF ▸DEC (DEG)

Display Mode: Floating Mode

Decimal Point: Resetting
2ndF FIX • (0.)

Addition and Subtraction

Example	Operation	Display
8 + 3 + 5.5 = 16.5	8 + 3 + 5 • 5 =	16.5
4 – 7 – 3 = –6	4 − 7 − 3 =	–6

Multiplication and Division

Example	Operation	Display
3.6 x 1.7 = 6.12	3 • 6 × 1 • 7 =	6.12
592 ÷ 4.8 = 123.3333333	5 9 2 ÷ 4 • 8 =	123.3333333

Mixed Calculations

Example	Operation	Display
3 + 5 x 7 = 38	3 + 5 × 7 =	38.
6 x 9 + 3 ÷ 2 = 55.5	6 × 9 + 3 ÷ 2 =	55.5

Exponential Calculations

Example	Operation	Display
$(321 \times 10^{-14}) \times$ $(65 \times 10^{28}) =$ 2.0865×10^{18}	3 2 1 EXP 1 4 (−) × 6 5 EXP 2 8 =	2.0865^{18}

Fractional Calculations

Example	Operation	Display
$2\frac{3}{4} + 3\frac{4}{7} - \frac{5}{4} = 2\frac{83}{84}$	2 a b/c 3 + 3 a b/c 4 a b/c 7 − 5 a b/c 4 =	2␣83␣84.
$(\frac{3}{5} + 2\frac{3}{8}) \times \frac{2}{5} \div 2 - 1 = -\frac{81}{200}$	(3 a b/c 5 + 2 a b/c 3 a b/c 8) × 2 a b/c 5 ÷ 2 − 1 =	–81␣200.

Constant Calculations

Example	Operation	Display
2 + 3 = 5	2 + 3 =	5.
4 + 3 = 7	4 =	7.
1 − 2 = –1	1 − 2 =	–1.
2 − 2 = 0	2 =	0.
3 x 2 = 6	3 × 2 =	6.
3 x 4 = 12	4 =	12.
6 ÷ 3 = 2	6 ÷ 3 =	2.
9 ÷ 3 = 3	9 =	3.

Parentheses Calculations

Example	Operation	Display
3 + [(4 – 3.6 + 5) x 0.8 – 6] x 4.2 = –4.056	3 + ((4 − 3 • 6 + 5) × • 8 − 6) × 4 • 2 =	–4.056

Percentage Calculations

Example	Operation	Display
200 x 17% = 34	2 0 0 × 1 7 2ndF % =	34.
$\frac{456}{789}$ × 100 = 57.79467681%	4 5 6 ÷ 7 8 9 2ndF % =	57.79467681

Add-On (Mark Up) Calculation

Example	Operation	Display
200 + (200 x 20%)	2 0 0 + 2 0	
= 240	2ndF % =	240.

Discount Calculation

Example	Operation	Display
200 – (200 x 20%)	2 0 0 – 2 0	
= 160	2ndF % =	160.

Constant Percentage Calculations

Example	Operation	Display
12% x 1200 = 144	1 2 2ndF % × 1	
	2 0 0 =	144.
12% x 1500 = 180	1 5 0 0 =	180.
$\frac{765}{987}$ x 100% =	7 6 5 ÷ 9 8	
77.50759878%	7 2ndF % =	77.50759878
$\frac{654}{987}$ x 100% =		
66.26139818%	6 5 4 =	66.26139818

Memory Calculations

Example	Operation	Display
	ON/C X-M	0.
20 x 30 = 600	2 0 × 3 0 =	
	M+	M 600.
40 x 50 = 2000	4 0 × 5 0 =	
	M+	M 2000.
+) 15 x 20 = 300	1 5 × 2 0 =	
	M+	M 300.
2900	MR	M 2900.
–) 125 x 40 = –5000	1 2 5 × 4 0	
	= (–) M+	M –5000.
–2100	MR	M –2100.
	ON/C X-M	0.

Composition Ratio Calculations

Example	Operation	Display
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): ON/C 2ndF ▸BIN

Example	Operation	Display
10101011 + 1100 +	1 0 1 0 1 0	
1110 = 11000101	1 1 + 1 1 0	
	0 + 1 1 1 0	
	=	11000101.
11100011 –	1 1 1 0 0 0	
10101100 = 110111	1 1 − 1 0 1	
	0 1 1 0 0 =	110111.

• Multiplication and Division (BIN)

Example	Operation	Display
11 x 1001 = 11011	1 1 × 1 0 0	
	1 =	11011.
1101110 ÷ 1010 =	1 1 0 1 1 1	
1011	0 ÷ 1 0 1 0	
	=	1011.

Octal Calculations

• Addition and Subtraction (OCT):

ON/C 2ndF ▸OCT

Example	Operation	Display
654 + 321 = 1175	6 5 4 + 3 2	
	1 =	1175.
741 – 357 = 362	7 4 1 – 3 5	
	7 =	362.

• Multiplication and Division (OCT)

Example	Operation	Display
56 x 23 = 1552	5 6 × 2 3 =	1552.
621 ÷ 12 = 50	6 2 1 ÷ 1 2	
	=	50.

• Mixed Calculations (OCT)

Example	Operation	Display
52 + 63 x 14 =	5 2 + 6 3 ×	
1216	1 4 =	1216.

Hexadecimal Calculations

• Addition and Subtraction (HEX):

ON/C 2ndF ▸HEX

Example	Operation	Display
AAA + BB + C =	A A A + B B	
B71	+ C =	b71.
DEF – EFE =	D E F – E F	
FFFFFFFEF1	E =	FFFFFFFEF1.

• Multiplication and Division (HEX)

Example	Operation	Display
FEDC x A9 =	F E D C × A	
A83F3C	9 =	A83F3C.
CA11 ÷ DF = E7	C A 1 1 ÷ D	
	F =	E7.

• Mixed Calculations (HEX)

Example	Operation	Display
(AB + 9) x D ÷ F =	(A B + 9)	
9C	× D ÷ F =	9C.

3. Basic Function Calculations

Pi Function: [π]

Example	Operation	Display
π x 10	[2ndF] [π] [×] [1] [0] [=]	31.41592654

Trigonometric Functions: [sin] [cos] [tan]

Example	Operation	Display
sin53 = 0.79863551	[DEG mode] [5] [3] [sin]	0.79863551
$\cos\frac{\pi}{6}^{RAD}$ =	[RAD mode] [2ndF] [π] [÷]	
0.866025403	[6] [=] [cos]	0.866025403
$\tan 65^{GRAD}$ =	[GRAD mode] [6] [5] [tan]	
1.631851687		1.631851687

Inverse Trigonometric Functions: [sin⁻¹] [cos⁻¹] [tan⁻¹]

Example	Operation	Display
$\sin^{-1}$ 0.3 =	[DEG mode] [•] [3] [2ndF]	
17.45760312°	[sin⁻¹]	17.45760312
$\cos^{-1}$ 0.8 =	[DEG mode] [•] [8] [2ndF]	
36.86989765°	[cos⁻¹]	36.86989765
$\tan^{-1}$ 1.5 =	[DEG mode] [1] [•] [5]	
56.30993247°	[2ndF] [tan⁻¹]	56.30993247

Logarithmic Functions: [log] [ln]

Example	Operation	Display
log123 =	[1] [2] [3] [log]	
2.089905111		2.089905111
ln123 =	[1] [2] [3] [ln]	
4.812184355		4.812184355

Logarithmic Mean: [ln]

Example	Operation	Display
$L = \frac{4-8}{\ln 4-\ln 8}$ =	[(] [4] [−] [8] [)] [÷]	
5.770780164	[(] [4] [ln] [−] [8] [ln]	
	[)] [=]	5.770780164

Exponential Functions: e^x / 10^x

Example	Operation	Display
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

Example	Operation	Display
1.25^2 = 1.5625	1 • 2 5 x^2	1.5625

Power Calculations: x^y

Example	Operation	Display
5.43^3 =	5 • 4 3 x^y 3	
160.103007	=	160.103007
$2^{3.4}$ =	2 x^y 3 • 4	
10.55606329	=	10.55606329

Constant Power Calculations: x^y

Example	Operation	Display
$2^{2.34}$ =	2 x^y 2 • 3 4	
5.063026376	=	5.063026376
$3^{2.34}$ = 13.07566351	3 =	13.07566351
$4^{2.34}$ = 25.63423608	4 =	25.63423608

Extraction of Square Root: $\sqrt{}$

Example	Operation	Display
$\sqrt{(5+6) \times 7}$ =	(5 + 6) ×	
8.774964387	7 = $\sqrt{}$	8.774964387

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

Example	Operation	Display
$\sqrt[5.3]{100}$ =	1 0 0 2ndF $\sqrt[x]{y}$ 5	
2.384286779	• 3 =	2.384286779

Constant multiple root Calculations: $x^{1/y}$

Example	Operation	Display
$\sqrt[5]{1024} = 4$	1 0 2 4 2ndF $x^{1/y}$	
	5 =	4.
$\sqrt[5]{3125} = 5$	3 1 2 5 =	5.
$\sqrt[5]{7776} = 6$	7 7 7 6 =	6.

Geometric Mean: $x^{1/y}$

Example	Operation	Display
$\overline{G} = \sqrt[4]{1.23 \times 1.48 \times 1.96 \times 2.2}$ = 1.673830182	1 • 2 3	
	× 1 • 4	
	8 × 1 •	
	9 6 × 2	
	• 2 = 2ndF	
	$x^{1/y}$ 4 =	1.673830182

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

Example	Operation	Display
$\sqrt[3]{123}$ = 4.973189833	1 2 3 2ndF $\sqrt[3]{}$	4.973189833

Reciprocal Calculations: x^{-1}

Example	Operation	Display
$\frac{1}{2 \times 3 + 4} = 0.1$	2 × 3 + 4 =	
	2ndF x^{-1}	0.1

Trigonometric Calculations: x^{-1}

Example	Operation	Display
cosec x = 1/sin x	[DEG mode]	
cosec 45° =	4 5 sin	
1.414213562	2ndF x^{-1}	1.414213562

Factorial Calculations: $x!$

Example	Operation	Display
(4 x 2 – 3) ! = 120	4 × 2 − 3 =	
	2ndF $x!$	120.

Hyperbolic Functions: hyp

Example	Operation	Display
cosh34 =	3 4 hyp cos	
$2.917308713 \times 10^{14}$		2.917308713^{14}
tanh1.23 =	1 • 2 3 hyp tan	
0.842579325		0.842579325

Degree → Radian Conversion: DRG

Example	Operation	Display
60° =	[DEG mode]	
1.047197551^{RAD}	6 0 2ndF DRG▸	1.047197551

Radian → Gradient Conversion: DRG▸

Example	Operation	Display
2^{RAD} =	[RAD mode]	
127.3239545^{GRAD}	2 2ndF DRG▸	127.3239545

Gradient → Degree Conversion: DRG▸

Example	Operation	Display
$120^{GRAD} = 108$	[GRAD mode]	
	1 2 0 2ndF DRG▸	108.

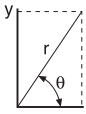
Permutations (of n things taken r at a time): nPr

Example	Operation	Display
${}_nP_r = \frac{n!}{(n-r)!}$		
${}_5P_3 = \frac{5!}{(5-3)!} = 60$	5 2ndF nPr 3 =	60.

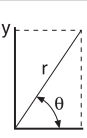
Combinations (of n things taken r at a time): nCr

Example	Operation	Display
${}_nC_r = \frac{n!}{r!(n-r)!}$		
${}_5C_3 = \frac{5!}{3!(5-3)!} = 10$	5 2ndF nCr 3 =	10.

Rectangular → Polar Conversion: R→P

Example	Operation	Display
	[DEG mode] 1 a 3 √ b 2ndF R→P b	 2. 60.

Polar → Rectangular: R←P

Example	Operation	Display
	[DEG mode] 2 a 6 0 b 2ndF R→P b	 1. 1.732050808

Degrees-Minutes-Seconds (DMS) → Decimal Degrees: °'"

Example	Operation	Display
123°45'06" → 123.7516667°	1 2 3 °'" 4 5 °'" 0 6 °'"	 123.7516667

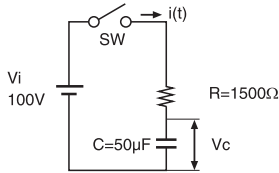
Decimal Degrees → Degrees-Minutes-Seconds: ▸°'"

Example	Operation	Display
2.3456 → 2°20'44.16"	2 • 3 4 5 6 2ndF ▸°'"	 2°20'44"16

4. Applied Calculations

Electricity - Integrating Circuit Problem

Obtain the voltage Vc across the capacitor at t=56ms after the switch is turned on.



Example	Operation	Display
$Vc = Vi\,(1 - e^{-\frac{1}{RC}})$ $= 100 \times \left(1 - e^{-\frac{56 \times 10^{-3}}{1500 \times 50 \times 10^{-6}}}\right)$ $= 52.60562649$	1 0 0 × (1 − (1 5 0 0 × 5 0 EXP 6 (−) ÷ 5 6 EXP 3 (−)) 2ndF x^{-1} (−) 2ndF e^{x}) =	52.60562649

Algebra

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

Example	Operation	Display
$4x^2 + 9x + 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} =$ $\frac{-9 \pm \sqrt{9^2 - 4 \times 4 \times 2}}{2 \times 4}$ $x = \begin{cases} -0.25 \\ -2 \end{cases}$	9 x^2 − 4 × 4 × 2 = X-M (9 (−) + MR √) ÷ 2 ÷ 4 = (9 (−) − MR √) ÷ 2 ÷ 4 =	M 49. M –0.25 M –2.

Calculation of time

Example 1:

The air flight depart at 2 o'clock 9 minutes and 56 seconds (2°09'56''), and the destination at 4 o'clock 18 minutes and 23 seconds (4°18'23''). What is the travel time?

Example	Operation	Display
4º18'23'' – 2º09'56'' = 2º08'27''	4 °'" 1 8 °'" 2 3 °'" − 2 °'" 0 9 °'" 5 6 °'" = 2ndF °'"	2º8'27''

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°46´)
2nd day: 4 hours 39 minutes (4°39´)
3rd day: 3 hours 55 minutes (3°55´)

Example	Operation	Display
5º46' + 4º39' + 3º55' = 14º20'	5 °'" 4 6 °'" + 4 °'" 3 9 °'" + 3 °'" 5 5 °'" = 2ndF °'"	14º20'0''

5. Operation Range and Accuracy

Internal digits: 14

Accuracy*: ±1 at the 10^{th} digits

Output Ranges : 1×10^{-99} to $\pm 9.999999999 \times 10^{99}$

Function		Input
sin x	DEG	$0 \leqq \|x\| \leqq 4.499999999 \times 10^{10}$
	RAD	$0 \leqq \|x\| \leqq 785398163.3$
	GRAD	$0 \leqq \|x\| \leqq 4.999999999 \times 10^{10}$
cos x	DEG	$0 \leqq \|x\| \leqq 4.499999999 \times 10^{10}$
	RAD	$0 \leqq \|x\| \leqq 785398163.3$
	GRAD	$0 \leqq \|x\| \leqq 4.999999999 \times 10^{10}$
tan x	DEG	Same as sin x except $\|x\| = (2n-1) \cdot 90$
	RAD	Same as sin x except $\|x\| = (2n-1) \cdot \pi/2$
	GRAD	Same as sin x except $\|x\| = (2n-1) \cdot 100$
$\sin^{-1}x$	DEG	$0 \leqq \|x\| \leqq 1$
	RAD	$0 \leqq \|x\| \leqq 1$
	GRAD	$0 \leqq \|x\| \leqq 1$
$\cos^{-1}x$	DEG	Same as $\sin^{-1}x$
	RAD	Same as $\sin^{-1}x$
	GRAD	Same as $\sin^{-1}x$
$\tan^{-1}x$	DEG	$0 \leqq \|x\| \leqq 9.999999999 \times 10^{99}$
	RAD	$0 \leqq \|x\| \leqq 9.999999999 \times 10^{99}$
	GRAD	$0 \leqq \|x\| \leqq 9.999999999 \times 10^{99}$
sinh x		$0 \leqq \|x\| \leqq 230.2585092$
cosh x		$0 \leqq \|x\| \leqq 230.2585092$
tanh x		$0 \leqq \|x\| \leqq 9.999999999 \times 10^{99}$
$\sinh^{-1}x$		$0 \leqq \|x\| \leqq 4.999999999 \times 10^{99}$
$\cosh^{-1}x$		$1 \leqq x \leqq 4.999999999 \times 10^{99}$
$\tanh^{-1}x$		$0 \leqq \|x\| \leqq 9.999999999 \times 10^{-1}$
ln x		$0 < X \leqq 9.999999999 \times 10^{99}$
log x		$0 < X \leqq 9.999999999 \times 10^{99}$
e^x		$-9.999999999 \times 10^{99} \leqq x \leqq 230.2585092$
10^x		$-9.999999999 \times 10^{99} \leqq x \leqq 99.99999999$
x!		$0 \leqq x \leqq 69$ (Integer)

Function	Input
x^{-1}	$1\times10^{-99} \leqq \lvert x\rvert \leqq 9.999999999\times10^{99}$, $x \neq 0$
x^2	$0 \leqq \lvert x\rvert \leqq 9.999999999\times10^{49}$
$\sqrt{x}$	$0 \leqq x \leqq 9.999999999\times10^{99}$
$\sqrt[3]{x}$	$0 \leqq \lvert x\rvert \leqq 9.999999999\times10^{99}$
○ ▮ ▮▮ ▶	$0 \leqq \lvert x\rvert \leqq 99998.9999$
▶ ○ ▮ ▮▮	$0 \leqq \lvert x\rvert \leqq 99998\ 59'59$
DEG→RAD	$0 \leqq \lvert x\rvert \leqq 9.999999999\times10^{99}$
RAD→GRAD	$0 \leqq \lvert x\rvert \leqq 1.570796326\times10^{98}$
GRAD→DEG	$0 \leqq \lvert x\rvert \leqq 9.999999999\times10^{99}$
x^y	$-9.999999999\times10^{99} \leqq x \cdot \ln\lvert y\rvert \leqq 230.2585092$
	y>0…The above range y<0…x (integer) or, 1/x (odd, x≠0) … The above range y=0…0<x
$x^{1/y}$	$-9.999999999\times10^{99} \leqq 1/x \cdot \ln\lvert y\rvert \leqq 230.2585092$
	y>0…The above range y<0…x (odd) or, 1/x (integer, x ≠ 0) …The above range y = 0 … 0<x
R→P (xy→rθ)	$\lvert x\rvert \cdot \lvert y\rvert \leqq 9.999999999\times10^{49}$ $(x^2+y^2) \leqq 9.999999999\times10^{99}$ y/x : same as $\tan^{-1}x$
P→R (rθ→xy)	$0 \leqq r \leqq 9.999999999\times10^{99}$ θ : same as sin x, cos x
nPr	$0 \leqq r \leqq n \leqq 9999999999$ (r and n are integer) result $\leqq 9.999999999\times10^{99}$
nCr	$0 \leqq r \leqq n \leqq 9999999999$ (r and n are integer) result $\leqq 9.999999999\times10^{99}$

Function		Input
Complex number calculation	(x1+y1 i) $\frac{+}{\times}$ (x2+y2 i)	
	Addition Subtraction	$\|x1+x2\| \leqq 9.999999999 \times 10^{99}$ $\|y1+y2\| \leqq 9.999999999 \times 10^{99}$
	Multiplication	(x1x2–y1y2)$\leqq 9.999999999 \times 10^{99}$ (y1x2+x1y2)$\leqq 9.999999999 \times 10^{99}$ (x1x2), (y1y2), (y1x2), (x1y2) $\leqq 9.999999999 \times 10^{99}$
	Division	$\frac{x1x2+y1y2}{x2^2+y2^2}, \frac{y1x2-x1y2}{x2^2+y2^2} \leqq 9.999999999 \times 10^{99}$ $x2^2 + y2^2$, $x2^2$, $y2^2$x1x2 + y1y2, y1x2 – x1y2, x1x2, y1y2, y1x2, x1y2, $\leqq 9.999999999 \times 10^{99}$
→DEC		The following operation range after the conversion. $0 \leqq \|x\| \leqq 9999999999$
→BIN		The following operation range after the conversion. $1000000000 \leqq x \leqq 1111111111$ $0 \leqq x \leqq 1111111111$
→OCT		The following operation range after the conversion. $4000000000 \leqq x \leqq 7777777777$ $0 \leqq x \leqq 3777777777$
→HEX		The following operation range after the conversion. FDABF41C01$\leqq x \leqq$FFFFFFFFFF $0 \leqq x \leqq$ 2540BE3FF
Normal Distribution-statistic Calculation	DATA EDIT	$\|x\| \leqq 9.999999999 \times 10^{49}$ $\|\Sigma x\| \leqq 9.999999999 \times 10^{99}$ $\Sigma x^2 \leqq 9.999999999 \times 10^{99}$ $0 \leqq n \leqq 18870$ n = Integer max n = 255 for one variable
	$\bar{x}$	$n \neq 0$
	s	$n \neq 1$, $n \neq 0$ $0 \leqq \frac{\Sigma x^2 - ((\Sigma x)^2/n)}{n-1} \leqq 9.999999999 \times 10^{99}$
	$x\sigma^n$	$n \neq 0$ $0 \leqq \frac{\Sigma x^2 - ((\Sigma x)^2/n)}{n} \leqq 9.999999999 \times 10^{99}$

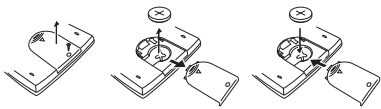
* Error are cumulative in the case of consecutive calculations, this is also true as internal consecutive calculations are perfumed in the case of (x^y), $x^{1/y}$, x!, nPr, nCr, etc and may become large.

III. BATTERY REPLACEMENT

When the display characters are dim, turn it off, replace the lithium battery immediately

Please replace the lithium battery by the following procedures.

1. Press [OFF] to power off the calculator.
2. Remove the screw that securely fixes the battery cover in place.
3. Slide the battery cover slightly and lift it.
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/C], [ON/C]+[0] to initialize the calculator.



Battery Replacement

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/C]+[0] to restart the calculator.

IV. 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 his 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 every 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.

■ When you are not sure the current calculations and setting mode you are recommended to intialize the calculator to default value by pressing [ON/C] + [0].

V. SPECIFICATIONS

Power Supply : Single Lithium battery (CR2032 x 1)
Power Consumption : DC 3.0V / 0.9mW
Battery Life : Approximately 2 years
(Base on 1 hour operation per day)
Auto power off : Approx. **7 minutes**
Usable Temperature : 0° ~ 40°C (32°F ~ 104°F)
Size: 145 (L) × 83.5 (W) × 20.3 (H) mm (with cover)
5-11/16" × 3-5/16" × 13/16" (with cover)
Weight: 114 g (4.02 oz) (with cover) / 86.5 g (3.05 oz)
*Specifications are subject to change without notice.

For CA, USA Only
Included battery contains perchlorate material - special handling may apply.
See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/ for detail.