

Canon

F-715SG

Scientific Calculator

Instruction

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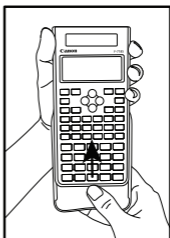
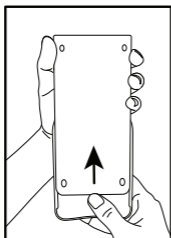
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Thank you for purchasing Canon Scientific Calculator. The F-715SG features 250 scientific, statistical and other advance functions such as LCM, GCD, Quotient and Remainder Calculations.

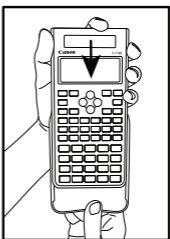
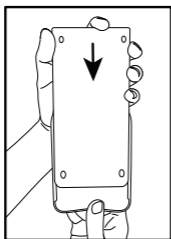
We recommend you to read this user manual and all the important notices before start using F-715SG. And please keep this user manual with you for future use.

How to use the slide cover

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

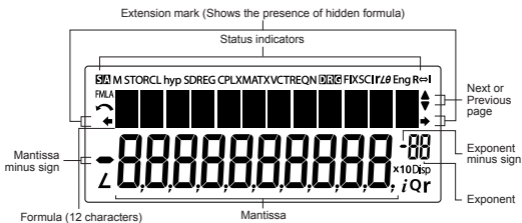


OPEN



CLOSE

DISPLAY (2-LINE DISPLAY)



<Status Indicators>

- S** : Shift Key
- A** : Alpha Key
- hyp : Hyperbolic Key
- M : Independent Memory
- STO : Store Memory
- RCL : Recall Memory
- SD : Statistic Mode
- REG : Regression Mode
- D** : Degree Mode
- R** : Radian Mode
- G** : Gradient Mode
- FIX : Fixed-decimal Setting
- SCI : Scientific Notation
- Disp : Multi-statements Display
- Q** : Quotient Value
- r** : Remainder Value
- ↶ : Undo
- ▲ : Upper Arrow
- ▼ : Down Arrow

TO GET START

Power ON, OFF

■ First time operation:

1. Pull out the battery insulation sheet, then the battery will be loaded.
2. Press ON/CA Alpha CLR 3 (All) = ON/CA to reset the calculator.

Power ON: When ON/CA (Power ON/Clear All) is pressed.

Power OFF: When Shift OFF are pressed.

■ Auto Power Off Function:

When the calculator is not used for about **7 minutes**, the calculator will automatically power off.

MODE Selection

Press MODE to start the calculation mode selection.

When pressing \leftarrow , \rightarrow or MODE , you can access the next (or previous) mode selection page.

Operation	Mode		LCD Indicator
MODE 1	COMP	Normal Calculation	
MODE 2	SD	Statistical Calculation	SD
MODE 3	REG	Regression Calculation	REG
MODE MODE 1	Deg	Degree	D
MODE MODE 2	Rad	Radian	R
MODE MODE 3	Gra	Gradient	G
MODE \leftarrow \leftarrow 1	Fix	Fixed-decimal Setting	FIX
MODE \leftarrow \leftarrow 2	Sci	Scientific Notation	SCI
MODE \leftarrow \leftarrow 3	Norm	Exponential Notation	
MODE \leftarrow 1	Disp ^{*1}	Display Setup Selection	

*1 Display Setup Selection options

First page : Press 1 [ab/c] or 2 [d/c] to specify mixed fraction or improper fraction display.

\rightarrow : Press 1 [Dot] or 2 [Comma] to specify decimal point or 3 digits separator symbols.

Display Formats Setting

F-715SG can display a result up to 10 digits. Results exceed the digit limit will be automatically displayed by exponential notation format. You can enter a value in floating-decimal, fixed-decimal, or scientific notation format and display format setting only affects the calculation results. **(Example #1)**

Before Using the Calculator

■ Check the current Calculation Mode

Be sure to check the status indicators that indicate the current calculation mode (SD, REG... etc), display formats setting and angle unit setting (Deg, Rad, Gra) before starting a calculation.

■ Return Calculation Mode to the initial setup

You can return the calculation mode to the initial default by pressing $\overset{\text{Alpha}}{\square} \overset{\text{CLR}}{\square} \square 2 \square (\text{Mode}) \square = \overset{\text{ON/CA}}{\square}$

Calculation Mode : COMP

Angle Unit : Deg

Exponential Display Format : Norm 1

Fraction Display Format : a b/c

Decimal Point Character : Dot

and this action will not clear the variable memories.

■ Initialize the Calculator

When you are not sure the current calculator setting, you are recommended to initialize the calculator (calculation mode "COMP", angle unit "Degree", and clear replay and variable memories), and LCD contrast by performing the following key operations: $\overset{\text{Alpha}}{\square} \overset{\text{CLR}}{\square} \square 3 \square (\text{All}) \square = \overset{\text{ON/CA}}{\square}$

INPUTTING EXPRESSIONS AND VALUES

Input Capacity

F-715SG allows you to input a single calculation up to 79 steps.

Starting from the 73rd step, the cursor changes from [_] to [■] that notifying the memory is running low. In case you need to input a single calculation with more than 79 steps, you should separate your calculation into two or more segments.





Input Editing



New input begins on the left of the upper (entry) line. As the entries are more than 12 digits, the line will scroll to the right consecutively.

Press ◀, ▶ to scroll the cursor within the upper (entry) line and you can perform input editing as needed.

(Example #2)

- After deleting an input by **DEL** or clearing the input by **CE/C**,  icon will be shown on the display.
- Press   to resume up to 79 **DEL** deleted input or to undo the cleared segment and back to the previous display.
- If pressed **DEL** ... **CE/C** to delete character(s) then clear the display, the calculator will prioritize the undo from resuming the latest **CE/C** cleared characters, and followed with the deleted characters continuously.
- After inserting a new data or executing a calculation command, or pressing , the calculator cannot perform the "Undo" function.

Replay, Copy and Multi-statements

Replay

- Replay memory capacity is 256 bytes that can store calculation expressions and results.
- After the calculation is executed, the calculation expression and its result will be stored in the replay memory automatically.
- Pressing ▲ (or ▼) can replay the performed calculation expressions and results.
- Replay memory is cleared when you.
 - i) Initialize calculator setting by $\overset{\text{Alpha}}{\text{ON}} \overset{\text{CLR}}{\text{CLR}} \text{2} \text{=}$ $\overset{\text{ON/CA}}{\text{ON/CA}}$ (or $\text{3} \text{=}$ $\overset{\text{ON/CA}}{\text{ON/CA}}$).
 - ii) Change from one calculation mode to another.
 - iii) Press $\overset{\text{ON/CA}}{\text{ON/CA}}$ key.
 - iv) Turn off the calculator by $\overset{\text{Shift}}{\text{OFF}} \text{OFF}$.

Copy

- Press $\overset{\text{Shift}}{\text{ON/CA}} \overset{\text{Copy}}{\text{ON/CA}}$ after replaying the previous calculation expressions (statements).

Multi-statements

- You can put two or more calculation expressions together by using a colon : ON/CA .
- The first executed statement will have [Disp] indicator; and the [Disp] icon will disappeared after the last statement is being executed. **(Example #3)**

INPUT RANGE AND ERROR MESSAGE

Calculation Accuracy, Input Ranges

- **Internal digits:** Up to 16
Accuracy*: ± 1 at the 10th digit for a single calculation.
 ± 1 at the last significant digit for exponential display.
- **Output ranges:** $\pm 1 \times 10^{-99}$ to $\pm 9.999999999 \times 10^{99}$
- Precision is basically the same as that described under "Calculation Range and Precision", above.
- $^{x}(xy)$, $^{x}\sqrt{y}$, $\sqrt[3]{}$, $x!$, nPr , nCr type functions require consecutive internal calculation, which can cause accumulation of errors that occur with each calculation.
- Error is cumulative and tends to be large in the vicinity of a function's singular point and inflection point.

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 the command stack has 24 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.

Order of Operations

- 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:

$$(-) \quad 2 \quad x^2 \quad =$$

$$-2^2 = -4$$

$$(\quad (-) \quad 2 \quad) \quad x^2 \quad =$$

$$(-2)^2 = 4$$

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 ON/CA will clear the error, remove all replay memory and return to initial display of the latest mode.
- Press CE/C will clear the error message and return to the display of the latest mode.
- Press \leftarrow or \rightarrow to display the calculation with the cursor positioned under the error and you can correct it accordingly.

Error Message	Cause	Action
Math ERROR	<ul style="list-style-type: none">• Calculation result is outside the allowable calculation range• An attempt to perform a calculation using a value that exceeds the allowable input range.• An attempt to perform an illogical operation (division by zero, etc.)	Check your input values and make sure they are all within the allowable ranges. Pay special attention to values in any memory areas you are using.
Stack ERROR	The capacity of the numeric stack or operator stack is exceeded.	Simplify the calculation. The numeric stack has 10 levels and the operator stack has 24 levels. Divide your calculation into two or more separate parts.
Syntax ERROR	An attempt to perform an illegal mathematical operation.	Press \leftarrow or \rightarrow to display the calculation with the cursor located at the location of the error and make required corrections.

BASIC CALCULATIONS

- Press MODE 1 to enter COMP mode as you want to perform basic calculations.
- During the busy calculation, the calculator will display the message [PROCESSING].

Arithmetic Calculations

$+$ $-$ \times \div

- To calculate the negative values (excludes the negative exponent), you have to enclose them with parentheses.
 - This Calculator supports 24-level of parenthetical expression.
 - You can omit the close parentheses $)$ as the calculation ends with $=$ or $M+$. **(Example #4)**
- ! When the number of $)$ is more than $($, [Syntax ERROR] will be shown.

Memory Calculations

Ans M^- $M+$ M STO RCL

Memory Variables (Example #5)

- There are 17 memory variables (0 through 9, A through D, M, X, and Y) which store data, results, or dedicated values.
- To store values into memory by pressing STO + Memory variable.
- To recall memory values, press RCL + Memory variable.
- Memory content can be cleared by simply pressing STO 0 + Memory variable.

Independent Memory (Example #6)

- Independent memory M uses the same memory area as variable M. It is convenient for calculating cumulative total by just pressing $M+$ (add to memory) or M^- (subtract from memory); and the memory contents are retained even when the calculator is turned off.
- To clear independent memory (M), input 0 STO M
- When you want to clear all memory values, press Alpha CLR 1 (MCl) $=$ ON/CA

Answer Memory (Example #6)

- The input values or the most recent calculation result will be automatically stored into Answer Memory whenever you press $\boxed{=}$, $\boxed{M+}$, $\boxed{\text{Shift}} \boxed{M-}$, $\boxed{\text{STO}}$ followed by a memory variable, or just recall a memory variable by $\boxed{\text{RCL}}$.
 - You can recall and use the latest stored Answer Memory by pressing $\boxed{\text{Ans}}$.
- ! Answer Memory is not updated as an error operation had been performed. Answer memory contents can be maintained even if pressing $\boxed{\text{ON/CA}}$, changing the calculation mode, or turning off the calculator.

Fraction Operations

$\boxed{a \ b/c}$ $\boxed{d/c}$

The Calculator support Fraction Calculation and the conversions between Fraction, Decimal point, Mixed fraction and Improper fraction. **(Example #7)**

- Result will be displayed in decimal format automatically whenever the total digits of a fractional value (integer + numerator + denominator + separator marks) exceeds 10.
 - As a fraction calculation is mixed with decimal value, the result will be displayed by decimal format.
- ! You can specify the fraction calculation result (when the result greater than one) display format by either mixed fraction or improper fraction.

Simply press $\boxed{\text{MODE}} \leftarrow \boxed{[\text{Disp}]} \boxed{1}$, then press the corresponding setting you need:

$\boxed{1}$ a b/c : Mixed fraction

$\boxed{2}$ d/c : Improper fraction




Percentage Calculations (Example #8)



$\boxed{\%}$

Degree-Minutes-Seconds Calculations



$\boxed{\text{DMS}}$ $\boxed{\text{DMS}}$

You can use degrees (hours), minutes and seconds key to perform a sexagesimal (base-60 notational system) calculation or convert the sexagesimal value into decimal value. **(Example #9)**

You can change the number of decimal point, the number of significant digits, or the exponential notation criteria by pressing   

Press 1 (Fixed Decimal Setting) : [Fix 0 ~ 9?] appears, specify the number of decimal places by pressing  ~ .

Press 2 (Scientific Notation) : [Sci 0 ~ 9?] appears, specify the number of significant digits by pressing  ~ .

Press 3 (Exponential Notation) : [Norm 1 ~ 2?] appears. Specify the exponential notation format by pressing  or .

■ Norm 1 : Exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than two decimal point.

■ Norm 2 : Exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than nine decimal point.

FUNCTIONAL SCIENTIFIC CALCULATIONS

- Press MODE 1 to enter COMP mode for performing functional scientific calculations.
- During the busy calculation, the calculator will display the message [PROCESSING].
- $\pi = 3.141592653589793$
- $e = 2.718281828459045$

Square, Root, Cube, Cube Root, Power, Power Root, Reciprocal and Pi (Example #10)

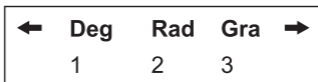
Logarithm, Natural Logarithm, Antilogarithm and Log_ab (Example #11)

\log \ln 10^x e^x \log_a^b

Angle Unit Conversion

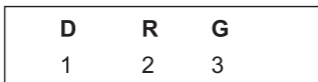
DRG DRG

The calculator default angle unit setting is "Degree". If you need to change into "Radian" or "Gradient", you can press MODE a number of times until you reach the setup screen:



Then press the corresponding number key 1 , 2 , or 3 for the angle unit you need. Then the display will show the **D**, **R**, or **G** indicator accordingly.

To convert an angle unit between "Degree", "Radian" and "Gradient", you can press Shift DRG and the following display menu will be shown:



Then, press 1 , 2 , or 3 will convert the displayed value into the selected angle unit.

Trigonometry Calculations

- Before using the trigonometric functions (except hyperbolic calculations), select the appropriate angle unit (Deg/ Rad/ Gra) by .
- $90^{\circ} = \frac{\pi}{2}$ Radians = 100 Gradients. **(Example #12)**

Permutation, Combination, Factorials and Random Number Generation

- Permutation : $nPr = \frac{n!}{(n-r)!}$ **(Example #13)**
- Combination : $nCr = \frac{n!}{r!(n-r)!}$ **(Example #13)**
- Factorial : $x! = x(x-1)(x-2)\dots(2)(1)$ **(Example #13)**

Random Number Generation (Example #14)

: To generate a random number between 0.000 and 0.999.

: To generate a random number between two specified positive integers. The entry is divided by " , " .

* The value is show in Ex. #14 only a sample, results will differ each time.

Least Common Multiple and Greatest Common Divisor

- LCM: Calculate the least common multiple among (maximum) three positive integers.
- GCD: Calculate the greatest common divisor among (maximum) three positive integers. **(Example #15)**

Quotient & Remainder

- "Quotient" (Q) is the result of a division problem, "Remainder" (r) is the value left in an integer division problem.
- The calculated quotient value (Q) and remainder value (r) will be stored into memory variables "C" and "D" automatically assigned. **(Example #16)**
- ! Only Quotient Value (Q) can continue to be used for the next calculation or being stored into memory variables.

Coordinate Conversion

Pol() Rec()

- With polar coordinates, you can calculate and display θ within $-180^\circ < \theta \leq 180^\circ$ range. (Same as Radian and Gradient)
- After conversion, results will automatically assigned to memory variables X and Y. (**Example #17**)

STATISTICAL CALCULATIONS

[SD] [REG]

- To enter the standard deviation mode by pressing MODE (2), [SD] indicator lights up. If press MODE (3), you can enter the regression mode selection menu. [REG] indicator will be turned on.
- Before starting, be sure to clear the statistic memory by pressing Alpha CLR (1) (=).
- Perform the data input (**Precautions!**).
 - In SD mode, store the displayed data by pressing [Data], pressing [Data] [Data] will input the same data twice.
 - In REG mode, store the x-data and y-data in the form of:
x-data (,) y-data [Data], pressing [Data] [Data] will input the same data twice.
 - Use Alpha ; for same data multiple entries.
For example in SD mode, the data 20 has 8 times will press 20 Shift ; 8 [Data].
 - Press \blacktriangle or \blacktriangledown key during or after data input can display the data value (x) and data frequency (Freq). Follow with the above example, press \blacktriangledown will display [x1 = 20], and press \blacktriangledown will display [Freq1= 8].
 - To edit the stored data, input the new value during the display of that data value (x) after pressing \blacktriangle or \blacktriangledown key, and then press (=) to confirm the edit. But, if you press [Data] instead of (=), a new data value will be stored.

- Press α CD can delete the data during the display of that data value (x) after \blacktriangle or \blacktriangledown key is pressed; and the sequence of the data which following the deleted data will be shifted up automatically.
 - Press CE/C or ON/CA key to exit the data value and frequency display, then you can perform other calculation operations.
 - Input data are stored in calculation memory. As the memory full, [Data Full] will be displayed and you cannot input or perform any calculation.
 - After changing into another mode or regression type (Lin, Log, Exp, Pwr, Inv, Quad), input data will be cleared.
- After finishing data entries, you can recall or calculate the statistical values.

Standard Deviation

- Press MODE 2 to enter SD mode.
- Before starting, be sure to clear the statistical memory by pressing α CLR 1 = .
- You can recall the following statistical value after input all data.

Value (Symbol)	
Summation of x (Σx)	Mean of x (\bar{x})
Sum of Square (Σx^2)	Maximum value of x (maxX)
Number of data sample (n)	Minimum value of x (minX)
Population Standard Deviation of x ($x_{\sigma n}$)	Median value (med)
Sample Standard Deviation of x ($x_{\sigma n-1}$)	

(Example #18)

Regression Calculations

■ Press MODE 3 to enter REG mode:

■ Press 1 , 2 or 3 for [Lin] = Linear regression, [Log] = Logarithmic regression, [Exp] = Exponential regression.

press MODE or \rightarrow to enter another regression options:

You can press 1 , 2 or 3 for [Pwr] = Power regression,

[Inv] = Inverse regression, [Quad] = Quadratic regression.

(Example #19)

Logarithmic, Exponential, Power, and Inverse Regression Formulas

- Logarithmic Regression : $y = A + B \ln x$
- Exponential Regression : $y = Ae^{Bx}$ ($\ln y = \ln A + Bx$)
- Power Regression : $y = Ax^B$ ($\ln y = \ln A + B \ln x$)
- Inverse Regression : $y = A + Bx^{-1}$

(Example #20)

BATTERY REPLACEMENT







When the display characters are dim even a darker LCD contrast had been adjusted **OR** the following Low battery message appears on the display, replace the battery immediately.

D
L O W B A T T E R Y

Please replace the lithium battery by the following procedures:

1. Press Shift OFF to power off the calculator.
2. Remove the screw which securely fix the battery cover in place.
3. Slide the battery cover slightly and lift it.
4. Remove the old battery with a ball pen or similar sharp object ON/CA .
5. Load the new battery with the positive "+" side facing up.
6. Replace the battery cover, screw, and press the ON/CA , Alpha , CLR 3 = to initialize the calculator.

Caution: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries 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 the  and      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 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, either bring or mail the device together with the guarantee to the service representative of a 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 Cautions!

- 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 as the battery is low can cause improper operation and 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 cell and a single lithium battery (LR44 x 1)
Power Consumption	: D.C. 1.5V / 0.1mW
Battery Life	: Approximately 3 years (Base on 1 hour of operation per day)
Auto Power Off	: Approx. 7 minutes
Usable Temperature	: 0 ~ 40°C (32F ~ 104F)
Size	: 165 (L) x 80 (W) x 14 (H) mm (body) 168 (L) x 86.3 (W) x 17.8 (H) mm (with case) 6-1/2" (L) x 3-5/32" (W) x 35-64" (H) (body) 6-39/64" (L) x 3-25/64" (W) x 45/64" (H) (with case)
Weight	: 89 g (3 oz) 124 g (4.2 oz) (include cover)

* Specifications are subject to change without notice.

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