E

fx-55 PLUS

User's Guide

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Contents

Important Information

- The displays and illustrations (such as key markings) shown in this User's Guide are for illustrative purposes only, and may differ somewhat from the actual items they represent.
- The contents of this manual are subject to change without notice.
- In no event shall CASIO Computer Co., Ltd. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of this product and items that come with it. Moreover, CASIO Computer Co., Ltd. shall not be liable for any claim of any kind whatsoever by any other party arising out of the use of this product and the items that come with it.
- Be sure to keep all user documentation handy for future reference.

Sample Operations

Sample operations in this manual are indicated by a ✎ icon. Unless specifically stated, all sample operations assume that the calculator is in its initial default setup. Use the procedure under "Initializing the Calculator" to return the calculator to its initial default setup.
For information about the MathO and LineO marks that are shown in the sample operations, see "Configuring the Calculator Setup".

Initializing the Calculator

Perform the following procedure when you want to initialize the calculator and return the setup to their initial default settings. Note that this operation also clears all data currently in calculator memory.

CLR 3 (All) = (Yes)

Safety Precautions

Battery

- Keep batteries out of the reach of small children.
- Use only the type of battery specified for this calculator in this manual.

Handling Precautions

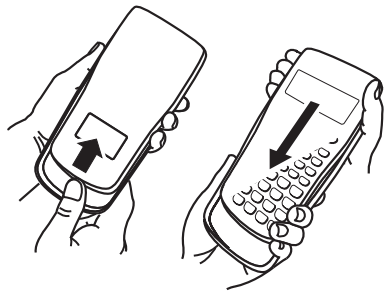
- **Even if the calculator is operating normally, replace the battery at least once every three years (LR44 (GPA76)).**
  A dead battery can leak, causing damage to and malfunction of the calculator. Never leave a dead battery in the calculator. Do not try using the calculator while the battery is completely dead.
- **The battery that comes with the calculator discharges slightly during shipment and storage. Because of this, it may require replacement sooner than the normal expected battery life.**
- **Do not use an oxyride battery* or any other type of nickel-based primary battery with this product. Incompatibility between such batteries and product specifications can result in shorter battery life and product malfunction.**
- **Avoid use and storage of the calculator in areas subjected to temperature extremes, and large amounts of humidity and dust.**

- **Do not subject the calculator to excessive impact, pressure, or bending.**
- **Never try to take the calculator apart.**
- **Use a soft, dry cloth to clean the exterior of the calculator.**
- **Whenever discarding the calculator or batteries, be sure to do so in accordance with the laws and regulations in your particular area.**

* Company and product names used in this manual may be registered trademarks or trademarks of their respective owners.

Removing the Hard Case

Before using the calculator, slide its hard case downwards to remove it, and then affix the hard case to the back of the calculator as shown in the illustration nearby.



Turning Power On and Off

Press [ON] to turn on the calculator.
Press [SHIFT] [AC] (OFF) to turn off the calculator.

Auto Power Off
Your calculator will turn off automatically if you do not perform any operation for about 10 minutes. If this happens, press the [ON] key to turn the calculator back on.

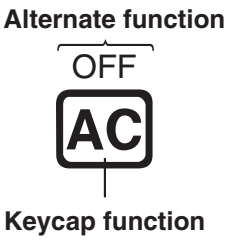
Adjusting Display Contrast

Display the CONTRAST screen by performing the following key operation: [SETUP] [8] (◄CONT►). Next, use ◄ and ► to adjust contrast. After the setting is the way you want, press [AC].

Important: If adjusting display contrast does not improve display readability, it probably means that battery power is low. Replace the battery.

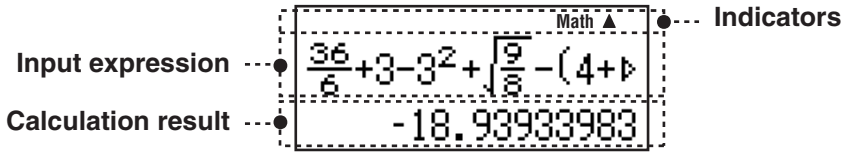
Key Markings

Pressing the [SHIFT] key followed by a second key performs the alternate function of the second key. The alternate function is indicated by the text printed above the key.



Reading the Display

The display of the calculator shows expressions you input, calculation results, and various indicators.



- If a ▷ indicator appears on the right side of the input expression, it means the displayed calculation continues to the right. Use ▶ and ◀ to scroll the input expression display.

Display indicators

This indicator:	Means this:
S	The keypad has been shifted by pressing the [SHIFT] key. The keypad will unshift and this indicator will disappear when you press a key.
M	There is a value stored in independent memory.
FIX	A fixed number of decimal places is in effect.
Math	Appears when natural calculation formula input (using the same format as a formula is written) is enabled. Also appears when LineO is selected as the display format.
▼▲	Calculation history memory data is available and can be replayed, or there is more data above/below the current screen.
⇩	Appears when "Manual" is selected for the "Simp" setting on the setup menu, and indicates that the fraction result of a calculation can be simplified.

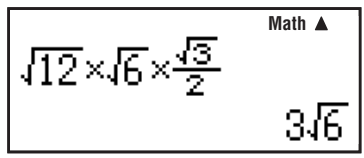
Important: For some type of calculation that takes a long time to execute, the display may show only the above indicators (without any value) while it performs the calculation internally.

Configuring the Calculator Setup

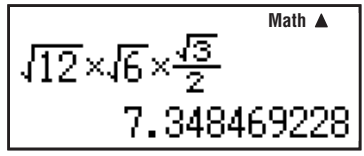
Press [SETUP] to display the setup menu. Press the number key for the item you want to configure. To close the setup menu without changing any setting, press [AC] or [SETUP].
Underlined (___) settings are initial defaults.

[1] MathO **[2] LineO** Specifies the display format.

MathO displays input and calculation results using the same format as they are written on paper.



LineO displays input the same way as MathO, but calculation results are displayed in decimal form.



Note: In this manual, the MathO symbol next to a sample operation indicates MathO, while the LineO symbol indicates LineO.

3 Fix 4 Norm Specifies the number of digits for display of a calculation result.

Fix: The value you specify (from 0 to 9) controls the number of decimal places for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.

Example: LineO 100 ÷ 7 = 14.286 (Fix 3)
14.29 (Fix 2)

Norm: Selecting one of the two available settings (Norm 1, **Norm 2**) determines the range in which results will be displayed in non-exponential format. Outside the specified range, results are displayed using exponential format.

Norm 1: $10^{-2} > |x|, |x| \geqq 10^{10}$ Norm 2: $10^{-9} > |x|, |x| \geqq 10^{10}$

Example: LineO $1 \div 200 = 5 \times 10^{-3}$ (Norm 1)
0.005 (Norm 2)

5 ab/c 6 d/c Specifies either mixed fraction (ab/c) or improper fraction (d/c) for display of fractions in calculation results.

7 Simp 1 Auto ; 2 Manual Specifies automatic or manual simplification of fractions. When manual is specified, fraction calculation results are always displayed as improper fractions, even if the fraction display format setting is ab/c.

Even if the result of a calculation can be displayed as a fraction when automatic simplification is used, performing the same calculation with manual simplification may produce a non-fraction (decimal) result.

Example: $2\frac{2}{3} \times 5\frac{1}{8}$

SETUP 7 (Simp) 1 (Auto)
2 ▶ 2 ▼ 3 ▶ × 5 ▶ 1 ▼ 8 = → $\frac{41}{3}$

SETUP 7 (Simp) 2 (Manual)
2 ▶ 2 ▼ 3 ▶ × 5 ▶ 1 ▼ 8 = → $\frac{328}{24}$

8 ◄CONT► Adjusts display contrast. See “Adjusting Display Contrast” for details.

Initializing Calculator Settings

Perform the following procedure to initialize the calculator, which returns all settings, including setup menu settings, to their initial defaults.

CLR 1 (Setup) = (Yes)

Inputting Expressions and Values

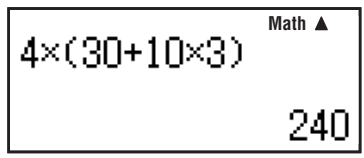
Basic Input Rules

Calculations can be input in the same form as they are written. When you press = the priority sequence of the input calculation will be evaluated automatically and the result will appear on the display.

$4 \times (30 + 10 \times 3) = 240$

4 [×] [(] 30 [+] 10 [×] 3 [)] [=]

*1 *2

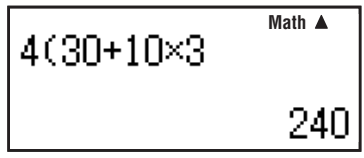


*1 A multiplication symbol (×) can be omitted when it occurs immediately before an opening parenthesis, immediately before Rnd or RanInt# function that includes parentheses, immediately before the Ran# (random number) function, or immediately before independent memory (M) or π.

*2 The closing parenthesis immediately before the [=] operation can be omitted.

Input example omitting [×]*1 and [)]*2 operations in the above example.

4 [(] 30 [+] 10 [×] 3 [=]



Note: • If the calculation becomes longer than the screen width during input, the screen will scroll automatically to the right and the ◄ indicator will appear on the display. When this happens, you can scroll back to the left by using [◄] and [►] to move the cursor. • Pressing [►] while the cursor is at the end of the input calculation will cause it to jump to the beginning, while pressing [◄] while the cursor is at the beginning will cause it to jump to the end. • You can input up to 99 bytes for a calculation. Each numeral, symbol, or function normally uses one byte. Some functions require three to 13 bytes. • The cursor will change shape to ■ when there are 10 bytes or less of allowed input remaining. If this happens, end calculation input and then press [=].

Calculation Priority Sequence

The priority sequence of input calculations is evaluated in accordance with the rules below. When the priority of two expressions is the same, the calculation is performed from left to right.

1st	Parenthetical expressions
2nd	Function with parentheses: Rnd(, RanInt#(
3rd	Functions that come after the input value (x^2, x^{-1}, °’ ”, %), powers ($x^{\blacksquare}$), square root ($\sqrt{\blacksquare}$)
4th	Fractions
5th	Negative sign (–) **Note:** When squaring a negative value (such as –2), the value being squared must be enclosed in parentheses ([(] [(–)] 2 [)] [x^2] [=]). Since x^2 has a higher priority than the negative sign, inputting [(–)] 2 [x^2] [=] would result in the squaring of 2 and then appending a negative sign to the result. Always keep the priority sequence in mind, and enclose negative values in parentheses when required.
6th	Multiplication where the multiplication sign is omitted
7th	Multiplication (×), division (÷), remainder calculations (÷R)
8th	Addition, subtraction (+, –)

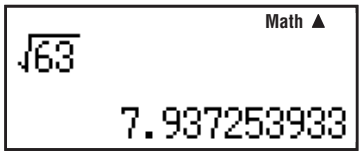
Inputting a Calculation Formula

Your calculator lets you input calculator formulas using the same format as they appear in your textbook (natural format). Fractions and special functions (x^2, $x^{\blacksquare}$, $\sqrt{\blacksquare}$, x^{-1}, $10^{\blacksquare}$) are also displayed in a natural format.

$\sqrt{63}$

LineO

√ 63 =



MathO

√ 63 =

Important: • Certain types of expressions can cause the height of a calculation formula to be greater than one display line. The maximum allowable height of a calculation formula is two display screens (31 dots × 2). Further input will become impossible if the height of the calculation you are inputting exceeds the allowable limit. • Nesting of functions and parentheses is allowed. Further input will become impossible if you nest too many functions and/or parentheses. If this happens, divide the calculation into multiple parts and calculate each part separately.

Note: When you press = and obtain a calculation result, part of the expression you input may be cut off. If you need to view the entire input expression again, press AC and then use ◀ and ▶ to scroll the input expression.

Using Values and Expressions as Arguments

A value or an expression that you have already input can be used as the argument of a function. After you have input $\frac{7}{6}$, for example, you can make it the argument of $\sqrt{\ }$, resulting in $\sqrt{\frac{7}{6}}$.

To input $1 + \frac{7}{6}$ and then change it to $1 + \sqrt{\frac{7}{6}}$

1 + 7 ▼ 6

◀ ◀ ◀ ◀ SHIFT DEL (INS)

√

As shown above, the value or expression to the right of the cursor after SHIFT DEL (INS) are pressed becomes the argument of the function that is specified next. The range encompassed as the argument is everything up to the first open parenthesis to the right, if there is one, or everything up to the first function to the right ($\sqrt{2}$, 10^2, etc.)

This capability can be used with the following functions: ▼, $10^{\blacksquare}$, $\sqrt{\blacksquare}$, $x^{\blacksquare}$.

Correcting and Clearing an Expression

To delete a single character or function: Move the cursor so it is directly to the right of the character or function you want to delete, and then press [DEL].
To insert a character or function into a calculation: Use [◀] and [▶] to move the cursor to the location where you want to insert the character or function and then input it.
To clear all of the calculation you are inputting: Press [AC].

Toggling Calculation Results

Each press of [F↔D] will toggle the currently displayed calculation result between its fraction form and decimal form, its $\sqrt{\ }$ form and decimal form, or its π form and decimal form.

$\pi \div 6 = \frac{1}{6}\pi = 0.5235987756$

[π] [÷] 6 [=] **0.5235987756** [F↔D] **$\frac{1}{6}\pi$**

$(\sqrt{2}+2)\times\sqrt{3} = \sqrt{6}+2\sqrt{3} = 5.913591358$ MathO

[(] [√] 2 [▶] [+] 2 [)] [×] [√] 3 [=] **$\sqrt{6}+2\sqrt{3}$** [F↔D] **5.913591358**

Important: • Depending on the type of calculation result that is on the display when you press the [F↔D] key, the conversion process may take some time to perform. • With certain calculation results, pressing the [F↔D] key will not convert the displayed value. • You cannot switch from decimal form to mixed fraction form if the total number of digits used in the mixed fraction (including integer, numerator, denominator, and separator symbols) is greater than 10.

Note: With MathO, pressing [SHIFT] [=] instead of [=] after inputting a calculation will display the calculation result in decimal form. Pressing [F↔D] after that will switch to the fraction form or π form of the calculation result. The $\sqrt{\ }$ form of the result will not appear in this case.

Basic Calculations

Fraction Calculations

$\frac{2}{3}+\frac{1}{2}=\frac{7}{6}$

2 [a b/c] 3 [▶] [+] 1 [a b/c] 2 [=] **$\frac{7}{6}$**

or [a b/c] 2 [▼] 3 [▶] [+] [a b/c] 1 [▼] 2 [=] **$\frac{7}{6}$**

$4-3\frac{1}{2}=\frac{1}{2}$

4 [−] [Ab/c] 3 [▶] 1 [▼] 2 [=] **$\frac{1}{2}$**

To switch a calculation result between improper fraction and mixed fraction form: Press [$\frac{a}{c}\frac{b}{c}\frac{d}{c}$].

Note: When manual fraction simplification is specified, this operation is disabled and fractions are always displayed as improper fractions.

To switch a calculation result between fraction and decimal form: Press [F↔D].

Percent Calculations

Inputting a value and pressing [%] causes the input value to become a percent.

150 × 20% = 30 — 150 [×] 20 [%] [=] — **30**

Calculate what percentage of 880 is 660. (75%)

660 [÷] 880 [%] [=] — **75**

Increase 2500 by 15%. (2875)

2500 [+] 2500 [×] 15 [%] [=] — **2875**

Discount 3500 by 25%. (2625)

3500 [−] 3500 [×] 25 [%] [=] — **2625**

Percent Conversion

Calculation results can be converted to a percent. While a calculation result is displayed, press [SHIFT] [%] (►%). Percent display can be up to 10 digits long. Pressing [SHIFT] [%] (►%) again returns the calculation result to its original display format.

1 + 2 = 3 = 300%

1 [+] 2 [=] [SHIFT] [%] (►%) — **300%**

[SHIFT] [%] (►%) — **3**

1 ÷ 3 = 0.33 = 33.33% (Fix 2)

[SETUP] [3] (Fix) [2]

1 [÷] 3 [=] [SHIFT] [%] (►%) — **33.33%**

$\frac{4}{5} + \frac{2}{3}$ = 146.6666667%

4 [▤] 5 [►] [+] 2 [▤] 3 [=] [SHIFT] [%] (►%) — **146.6666667%**

$\sqrt{2}$ = 141.4213562%

[√] 2 [=] [SHIFT] [%] (►%) — **141.4213562%**

1°2′3″ = 103.4166667%

1 [°‘‘] 2 [°‘‘] 3 [°‘‘] [=] [SHIFT] [%] (►%) — **103.4166667%**

- When the number of display digits is specified by Fix, the value is converted to a percent and then adjusted to the specified number of digits. The number of display digits setting is not applied to the value stored in Ans memory.
- When MathO is selected as the display format and the calculation result is a fraction, root ($\sqrt{\ }$), or pi (π), the result is converted to a decimal fraction and then to a percent. Pressing [SHIFT] [%] (►%) again displays the decimal fraction value.
- When the calculation result is a sexagesimal value (degrees, minutes, seconds), it is converted to a decimal value and then to a percent.
- Percent conversion cannot be performed on the result of a remainder calculation (÷R).

Degree, Minute, Second (Sexagesimal) Calculations

Performing an addition or subtraction operation between sexagesimal values, or a multiplication or division operation between a sexagesimal value and a decimal value will cause the result to be displayed as a sexagesimal value. You also can convert between sexagesimal and decimal. The following

is the input format for a sexagesimal value: {degrees} [°‘‘‘] {minutes} [°‘‘‘] {seconds} [°‘‘‘].

Note: You must always input something for the degrees and minutes, even if they are zero.

2°20´30˝ + 39´30˝ = 3°00´00˝

2 [°‘‘‘] 20 [°‘‘‘] 30 [°‘‘‘] [+] 0 [°‘‘‘] 39 [°‘‘‘] 30 [°‘‘‘] [=] **3°0´0˝**

Convert 2°15´18˝ to its decimal equivalent.

2 [°‘‘‘] 15 [°‘‘‘] 18 [°‘‘‘] [=] **2°15´18˝**

(Converts sexagesimal to decimal.) [°‘‘‘] **2.255**

(Converts decimal to sexagesimal.) [°‘‘‘] **2°15´18˝**

Calculation History

The calculator remembers up to approximately 200 bytes of data for the newest calculation. You can scroll through calculation history contents using [▲] and [▼].

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1 + 1 = 2	1 [+] 1 [=]	**2**
2 + 2 = 4	2 [+] 2 [=]	**4**
3 + 3 = 6	3 [+] 3 [=]	**6**
	(Scrolls back.) [▲]	**4**
	(Scrolls back again.) [▲]	**2**

Note: Calculation history data is all cleared whenever you press [ON], when you change the display format, or whenever you perform any reset operation.

Replay

While a calculation result is on the display, you can press [◀] or [▶] to edit the expression you used for the previous calculation.

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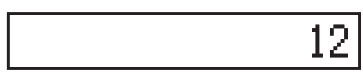
4 × 3 + 2.5 = 14.5 LineO	4 [×] 3 [+] 2.5 [=]	**14.5**
4 × 3 – 7.1 = 4.9	(Continuing) [◀] [DEL] [DEL] [DEL] [DEL] [−] 7.1 [=]	**4.9**

Answer Memory (Ans)

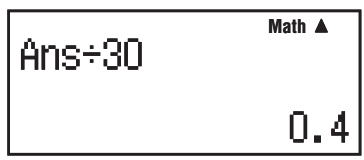
The last calculation result obtained is stored in Ans (answer) memory. Ans memory contents are updated whenever a new calculation result is displayed.

To divide the result of 3 × 4 by 30 LineO

3 [×] 4 [=]



(Continuing) [÷] 30 [=]



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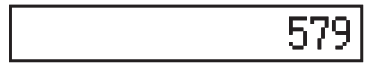
123 + 456 = 579 — 123 [+] 456 [=]



789 – 579 = 210 — (Continuing) 789 [−] [Ans] [=]

Independent Memory (M)

You can add calculation results to or subtract results from independent memory. The "M" appears on the display when there is any value other than zero stored in independent memory.

To clear the contents of M		0 [STO M]	**0**
To assign the result of 2 + 8 to M		2 [+] 8 [STO M]	**10**
To add the result of 10 × 5 to M	(Continuing)	10 [×] 5 [M+]	**50**
To subtract the result of 10 + 5 from M	(Continuing)	10 [+] 5 [M−]	**15**
To recall the contents of M	(Continuing)	[RCL M]	**45**

Note: You also can call M and use it in a calculation you are inputting.

Clearing the Contents of All Memories

Ans memory and independent memory contents are retained even if you press [AC], or turn off the calculator. Perform the following procedure when you want to clear the contents of all memories.

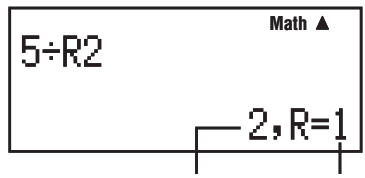
[CLR] [2] (Memory) [=] (Yes)

Remainder Calculations

You can use the ÷R function in order to obtain the quotient and remainder in a division calculation.

To calculate the quotient and remainder of 5 ÷ 2

5 [÷R] 2 [=]



Quotient Remainder

Note: • Only the quotient value of a ÷R calculation is stored in Ans memory. • Assigning a remainder calculation result to independent memory (M) will cause only the quotient value to be assigned. For example, assigning the result of the remainder calculation 5÷R2 (5 [÷R] 2 [STO M]) will result in 2 being assigned to M. Adding a remainder calculation result to or subtracting result from M will add or subtract only the quotient value. • If a ÷R calculation is part of a multi-step calculation, only the quotient is passed on to the next operation. (Example: 10 [+] 17 [÷R] 6 [=] → 10 + 2) • Operation of the [F↔D], and [,,,] keys is disabled while a remainder division result is on the display.

Cases when Remainder Division becomes Non-remainder Division

If either of the following conditions exists when you perform a remainder division operation, the calculation will be treated as normal (non-remainder) division.

- When either the dividend or the divisor is a very large value
  Example: 20000000000 [÷R] 17 [=]
  → Calculated as: 20000000000 ÷ 17
- When the quotient is not a positive integer, or if the remainder is not a positive integer or positive fractional value
  Example: [(–)] 5 [÷R] 2 [=] → Calculated as: –5 ÷ 2

Function Calculations

For actual operations using each function, see the "Examples" section following the list below.

π: π is displayed as 3.141592654, but π = 3.14159265358980 is used for internal calculations. See ✎1.

$10^{\blacksquare}$: Exponential function. See ✎2.

x^2, $x^{\blacksquare}$, $\sqrt{\blacksquare}$, x^{-1}: Powers, square root, and reciprocals. See ✎3.

Note: The following functions cannot be input in consecutive sequence: x^2, $x^{\blacksquare}$, x^{-1}. If you input 2[x^2][x^2], for example, the final [x^2] will be ignored. To input 2^{2^2}, input 2[x^2], press the [◀] key, and then press [x^2].

Ran#: Generates a 3-digit pseudo random number that is less than 1. The result is displayed as a fraction when MathO is selected. See ✎4.

RanInt#: For input of the function of the form RanInt#(a, b), which generates a random integer within the range of a to b. See ✎5.

Rnd: The argument of this function is made a decimal value and then rounded in accordance with the current number of display digits setting (Norm or Fix). With Norm 1 or Norm 2, the argument is rounded off to 10 digits. With Fix, the argument is rounded off to the specified digit. When Fix 3 is the display digits setting, for example, the result of 10 ÷ 3 is displayed as 3.333, while the calculator maintains a value of 3.33333333333333 (15 digits) internally for calculation. In the case of Rnd(10÷3) = 3.333 (with Fix 3), both the displayed value and the calculator's internal value become 3.333. Because of this a series of calculations will produce different results depending on whether Rnd is used (Rnd(10÷3) × 3 = 9.999) or not used (10 ÷ 3 × 3 = 10.000). See ✎6.

Simp: This function simplifies a fraction using the least divisor. You also can specify the divisor, if you want. An error is displayed if a fraction cannot be reduced.

Note: This function is disabled when "Auto" is selected for the Simp setting on the setup menu. See ✎7.

Note: Using functions can slow down a calculation, which may delay display of the result. Do not perform any subsequent operation while waiting for the calculation result to appear. To interrupt an ongoing calculation before its result appears, press [AC].

Examples

1 To calculate $8 \times 2\pi$ to three decimal places (Fix 3)

SETUP 3 (Fix) 3

LineO	8 × 2 π =	**50.265**
MathO	8 × 2 π =	**16π**
	F↔D	**50.265**

2 To calculate $10^5 \times 0.12$ — 10^ 5 ▶ × 0.12 = — **12000**

3 $1.2 \times 10^3 = 1200$ — 1.2 × 10 x^ 3 = — **1200**

$3^{2+2} = 81$ — 3 x^ 2 + 2 = — **81**

$5^2 = 25$ — 5 x² = — **25**

$4^{-1} = 0.25$

LineO	4 x⁻¹ =	**0.25**
MathO	4 x⁻¹ SHIFT =	**0.25**

To calculate $\sqrt{2} \times 3 (= 3\sqrt{2} = 4.242640687...)$ to three decimal places (Fix 3)

SETUP 3 (Fix) 3

LineO	√ 2 ▶ × 3 =	**4.243**
MathO	√ 2 ▶ × 3 =	**$3\sqrt{2}$**
	SHIFT =	**4.243**

4 To obtain three random three-digit integers

1000 Ran# =	**459**
=	**48**
=	**117**

(Results shown here are for illustrative purposes only. Actual results will differ.)

5 To generate random integers in the range of 1 to 6

SHIFT Ran# (RanInt) 1 SHIFT π (,) 6) =	**2**
=	**6**
=	**1**

(Results shown here are for illustrative purposes only. Actual results will differ.)

6 To perform the following calculations when Fix 3 is selected for the number of display digits: $10 \div 3 \times 3$ and $\mathrm{Rnd}(10 \div 3) \times 3$ LineO

SETUP 3 (Fix) 3

10 ÷ 3 × 3 =	**10.000**
Rnd 10 ÷ 3) × 3 =	**9.999**

7 $\frac{75}{90} = \frac{5}{6}$

SETUP 7 (Simp) 2 (Manual) — 75 ⇔ 90 = — **$\frac{75}{90}$**

Displayed when a fraction can be simplified.

Simp = — **F=3, $\frac{25}{30}$**

Factor

Simp = F=5, $\frac{5}{6}$

Simp = $\frac{5}{6}$

When further simplification is not possible, “Simplified” appears momentarily on the display and then the calculation result is displayed.

When a divisor of 3 is specified: $\frac{18}{21} = \frac{6}{7}$

18 ▤ 21 = Simp 3 = F=3, $\frac{6}{7}$

or 18 ▤ 21 ▶ Simp 3 = F=3, $\frac{6}{7}$

Calculation Ranges, Number of Digits, and Precision

The calculation range, number of digits used for internal calculation, and calculation precision depend on the type of calculation you are performing.

Calculation Range and Precision

Calculation Range	$\pm 1 \times 10^{-99}$ to $\pm 9.999999999 \times 10^{99}$ or 0
Number of Digits for Internal Calculation	15 digits
Precision	In general, ±1 at the 10th digit for a single calculation. Precision for exponential display is ±1 at the least significant digit. Errors are cumulative in the case of consecutive calculations.

Function Calculation Input Ranges and Precision

Functions	Input Range
10^x	$-9.999999999 \times 10^{99} \leqq x \leqq 99.99999999$
$\sqrt{x}$	$0 \leqq x < 1 \times 10^{100}$
x^2	$\lvert x \rvert < 1 \times 10^{50}$
x^{-1}	$\lvert x \rvert < 1 \times 10^{100}$; $x \neq 0$
°’ ”	$\lvert a \rvert, b, c < 1 \times 10^{100}$; $0 \leqq b, c$ The display seconds value is subject to an error of ±1 at the second decimal place.
x^y	$x > 0$: $-1 \times 10^{100} < y\log x < 100$ $x = 0$: $y > 0$ $x < 0$: $y = n, \frac{m}{2n+1}$ (m, n are integers) However: $-1 \times 10^{100} < y\log \lvert x \rvert < 100$
$a\,^b/_c$	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).

RanInt#(a, b)	$a < b$; $\|a\|$, $\|b\| < 1 \times 10^{10}$; $b - a < 1 \times 10^{10}$
Simp n	$1 \leqq n \leqq 9999$ (n is an integer)

- Precision is basically the same as that described under “Calculation Range and Precision”, above.
- x^y type function requires 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.
- The range for calculation results that can be displayed in π form is $|x| < 10^6$. Note, however, that internal calculation error can make it impossible to display some calculation results in π form. It also can cause calculation results that should be in decimal form to appear in π form.

Errors

The calculator will display an error message whenever an error occurs for any reason during a calculation. There are two ways to exit an error message display: Pressing ◀ or ▶ to display the location of the error, or pressing AC to clear the message and calculation.

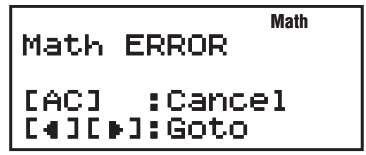
Displaying the Location of an Error

While an error message is displayed, press ◀ or ▶ to return to the calculation screen. The cursor will be positioned at the location where the error occurred, ready for input. Make the necessary corrections to the calculation and execute it again.

When you input 14 ÷ 0 × 2 = by mistake instead of 14 ÷10 × 2 =

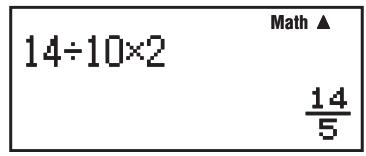
MathO

14 ÷ 0 × 2 =



▶ (or ◀)

◀ 1 =



Clearing the Error Message

While an error message is displayed, press AC to return to the calculation screen. Note that this also clears the calculation that contained the error.

Error Messages

Math ERROR

Cause: • The intermediate or final result of the calculation you are performing exceeds the allowable calculation range. • Your input exceeds the allowable input range (particularly when using functions). • The calculation you are performing contains an illegal mathematical operation (such as division by zero).

Action: • Check the input values, reduce the number of digits, and try again. • When using independent memory as the argument of a function, make sure that the memory value is within the allowable range for the function.

Stack ERROR

Cause: The calculation you are performing has caused the capacity of the numeric stack or the command stack to be exceeded.

Action: • Simplify the calculation expression so it does not exceed the capacity of the stack. • Try splitting the calculation into two or more parts.

Syntax ERROR

Cause: There is a problem with the format of the calculation you are performing.

Action: Make necessary corrections.

Argument ERROR

Cause: A non-integer argument was input for the random number function (RanInt#). Attempting to simplify a non-fraction value (►Simp).

Action: Input only integers for the argument (RanInt#). Input only fractions for the argument (►Simp).

Can't Simplify

Cause: Attempting to simplify a fraction using a divisor that cannot be simplified.

Action: Input a divisor that can be simplified.

Before Assuming Malfunction of the Calculator...

Perform the following steps whenever an error occurs during a calculation or when calculation results are not what you expected. If one step does not correct the problem, move on to the next step.

Note that you should make separate copies of important data before performing these steps.

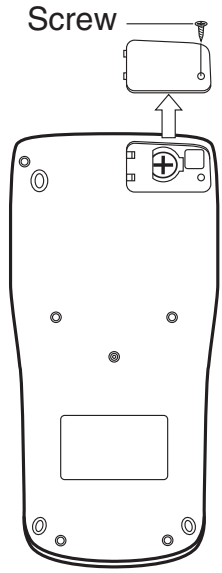
1. Check the calculation expression to make sure that it does not contain any errors.
2. If the above steps do not correct your problem, press the [ON] key. This will cause the calculator to perform a routine that checks whether calculation functions are operating correctly. If the calculator discovers any abnormality, it automatically clears memory contents. For details about initialized settings, see "Configuring the Calculator Setup".
3. Initialize all settings by performing the following operation: [CLR] [1] (Setup) [=] (Yes).

Replacing the Battery

A low battery is indicated by a dim display, even if contrast is adjusted, or by failure of figures to appear on the display immediately after you turn on the calculator. If this happens, replace the battery with a new one.

Important: Removing the battery will cause all of the calculator's memory contents to be deleted.

1. Press [SHIFT] [AC] (OFF) to turn off the calculator.
   - To ensure that you do not accidentally turn on power while replacing the battery, slide the hard case onto the front of the calculator.
2. Remove the cover as shown in the illustration and replace the battery, taking care that its plus (+) and minus (–) ends are facing correctly.
3. Replace the cover.
4. Initialize the calculator: [ON] [CLR] [3] (All) [=] (Yes)
   - Do not skip the above step!



Specifications

Power Requirements:
Built-in solar cell; button battery LR44 (GPA76) × 1

Approximate Battery Life:
3 years (based on one hour of operation per day)

Operating Temperature: 0°C to 40°C (32°F to 104°F)

Dimensions: 11.1 (H) × 80 (W) × 162 (D) mm
$^{3}/_{8}''$ (H) × $3^{1}/_{8}''$ (W) × $6^{3}/_{8}''$ (D)

Approximate Weight: 95 g (3.4 oz) including the battery

Frequently Asked Questions

■ **How can I perform display results the same way I did on a model that does not have Natural Textbook Display?**
Perform the following key operation: [SETUP] [2] (LineO). See "Configuring the Calculator Setup" on page E-4 for more information.

■ **How can I change a fraction form result to decimal form?**
How can I change a fraction form result produced by a division operation to decimal form?
See "Toggling Calculation Results" on page E-8 for the procedure.

■ **What is the difference between Ans memory and independent memory?**
Both types of memory acts like "containers" for temporary storage of a single value.

Ans Memory: Stores the result of the last calculation performed. Use this memory to carry the result of one calculation on to the next.
Independent Memory: Use this memory to totalize the results of multiple calculations.

■ **How can I return the calculator to its initial default settings?**
Perform the following operation: [CLR] [1] (Setup) [=] (Yes)

■ **Is there anything I need to remember to display a fraction calculation result as a mixed fraction?**
On the setup menu, select “Auto” for the “Simp” setting. This will enable the “ab/c” setting on the setup menu. You can toggle display of a fraction between improper fraction and mixed fraction by pressing [a b/c ↔ d/c].
When “Manual” is selected for the “Simp” setting, fractions are always displayed as improper fractions.

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