fx-82ES
fx-83ES
fx-85ES
fx-300ES
fx-350ES

User's Guide

CASIO®

http://world.casio.com/edu/

CE CASIO Europe GmbH
Bornbarch 10, 22848 Norderstedt, Germany

About this Manual

- The **MATH** mark indicates an example that uses Math format, while the **LINE** mark indicates Linear format. For details about input/output formats, see "Specifying the Input/Output Format".
- Keycap markings indicate what a key inputs or what function it performs.
  Example: 1, 2, $+$, $-$, $\sqrt{\square}$, AC, etc.
- Pressing the $SHIFT$ or $ALPHA$ 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.
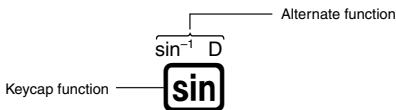
- The following shows what the different colors of the alternate function key text mean.

If key marking text is this color:	It means this:
Yellow	Press $SHIFT$ and then the key to access the applicable function.
Red	Press $ALPHA$ and then the key to input the applicable variable, constant, or symbol.

- The following shows an example of how an alternate function operation is represented in this User's Guide.

  Example: $SHIFT$ $\sin$ $(\sin^{-1})$ 1 $=$

  Indicates the function that is accessed by the key operation ($SHIFT$ $\sin$) before it. Note that this is not part of the actual key operation you perform.

- The following shows an example of how a key operation to select an on-screen menu item is represented in this User's Guide.

  Example: 1 (Setup)

  Indicates the menu item that is selected by the number key operation (1) before it. Note that this is not part of the actual key operation you perform.

The cursor key is marked with four arrows, indicating direction, as shown in the illustration nearby. In this User's Guide, cursor key operation is indicated as Ⓐ, Ⓥ, Ⓐ, and Ⓑ.

- The displays and illustrations (such as key markings) shown in this User's Guide and the separate Appendix 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.

■ Using the Separate Appendix

Whenever you see the symbol **Appendix** in this manual, it means you should refer to the separate Appendix.

Example numbers (like "<#021>") in this User's Guide refer to the corresponding example number in the Appendix.

Specify the angle unit in accordance with the marks in the Appendix:

Deg : Specify Degree for the angle unit.

Rad : Specify Radian for the angle unit.

Initializing the Calculator

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

　　　SHIFT 9 (CLR) 3 (All) ＝ (Yes)

- For information about calculation modes and setup settings, see "Calculation Modes and Calculator Setup".
- For information about memory, see "Using Calculator Memory".

Safety Precautions

Be sure to read the following safety precautions before using this calculator. Keep this manual handy for later reference.

⚠ Caution

This symbol is used to indicate information that can result in personal injury or material damage if ignored.

Battery

- After removing the battery from the calculator, put it in a safe place where it will not get into the hands of small children and accidentally swallowed.
- Keep batteries out of the reach of small children. If accidentally swallowed, consult with a physician immediately.
- Never charge the battery, try to take the battery apart, or allow the battery to become shorted. Never expose the battery to direct heat or dispose of it by incineration.
- Improperly using a battery can cause it to leak and damage nearby items, and can create the risk of fire and personal injury.
  - Always make sure that the battery's positive ⊕ and negative ⊖ ends are facing correctly when you load it into the calculator.
  - Remove the battery if you do not plan to use the calculator for a long time (fx-82ES/fx-83ES/fx-350ES).
  - Use only the type of battery specified for this calculator in this manual.

Disposing of the Calculator

- Never dispose of the calculator by burning it. Doing so can cause certain components to suddenly burst, creating the risk of fire and personal injury.

Handling Precautions

- **Be sure to press the** $\boxed{\text{ON}}$ **key before using the calculator for the first time.**
- **Even if the calculator is operating normally, replace the battery at least once every three years (LR44 (GPA76)), two years (R03 (UM-4)), or one year (LR03 (AM4)).**
  A dead battery can leak, causing damage to and malfunction of the calculator. Never leave a dead battery in the calculator.
- **The battery that comes with this unit discharges slightly during shipment and storage. Because of this, it may require replacement sooner than the normal expected battery life.**
- **Low battery power can cause memory contents to become corrupted or lost completely. Always keep written records of all important data.**
- **Avoid use and storage of the calculator in areas subjected to temperature extremes.**
  Very low temperatures can cause slow display response, total failure of the display, and shortening of battery life. Also avoid leaving the calculator in direct sunlight, near a window, near a heater or anywhere else it might be exposed to very high temperatures. Heat can cause discoloration or deformation of the calculator's case, and damage to internal circuitry.
- **Avoid use and storage of the calculator in areas subjected to large amounts of humidity and dust.**
  Take care never to leave the calculator where it might be splashed by water or exposed to large amounts of humidity or dust. Such conditions can damage internal circuitry.
- **Never drop the calculator or otherwise subject it to strong impact.**
- **Never twist or bend the calculator.**
  Avoid carrying the calculator in the pocket of your trousers or other tight-fitting clothing where it might be subjected to twisting or bending.
- **Never try to take the calculator apart.**
- **Never press the keys of the calculator with a ballpoint pen or other pointed object.**
- **Use a soft, dry cloth to clean the exterior of the calculator.**
  If the calculator becomes very dirty, wipe it off with a cloth moistened in a weak solution of water and a mild neutral household detergent. Wring out all excess liquid before wiping the calculator. Never use thinner, benzene or other volatile agents to clean the calculator. Doing so can remove printed markings and can damage the case.

Before Using the Calculator

■ 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 below.
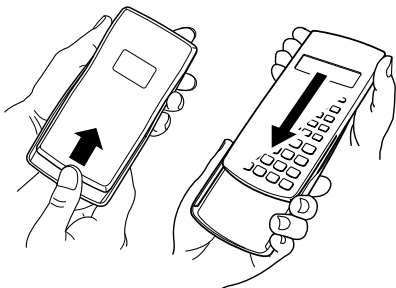
■ Turning Power On and Off

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

■ Adjusting Display Contrast

[SHIFT] [MODE] (SETUP) ⊙ [5] (◄CONT►)
This displays the contrast adjustment screen. Use ◄ and ► to adjust display contrast. After the setting is the way you want, press [AC].

```
CONTRAST

LIGHT            DARK
 [◄]              [►]
```
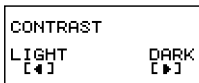
• You can also adjust contrast using ◄ and ► while the mode menu (which appears when you press [MODE]) is on the display.

Important!

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

■ About the Display

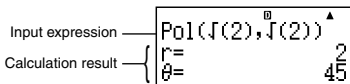Your calculator has a 31-dot × 96-dot LCD screen.

Example:

Input expression —— `Pol(√(2),√(2))`

Calculation result ——
```
r=        2
θ=       45
```

■ Display Indicators

Sample Display:

```
        STAT        D
```

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.
A	The alpha input mode has been entered by pressing the [ALPHA] key. The alpha input mode will be exited and this indicator will disappear when you press a key.
M	There is a value stored in independent memory.
STO	The calculator is standing by for input of a variable name to assign a value to the variable. This indicator appears after you press [SHIFT] [RCL] (STO).
RCL	The calculator is standing by for input of a variable name to recall the variable's value. This indicator appears after you press [RCL].
STAT	The calculator is in the STAT Mode.
D	The default angle unit is degrees.
R	The default angle unit is radians.
G	The default angle unit is grads.
FIX	A fixed number of decimal places is in effect.
SCI	A fixed number of significant digits is in effect.
Math	Math style is selected as the input/output format.
▼▲	Calculation history memory data is available and can be replayed, or there is more data above/below the current screen.
Disp	The display currently shows an intermediate result of a multi-statement calculation.

Important!

- For a very complex calculation or some other 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.

Calculation Modes and Calculator Setup

■ Calculation Modes

When you want to perform this type of operation:	Select this mode:
General calculations	COMP
Statistical and regression calculations	STAT
Generation of a number table based on an expression	TABLE

Specifying the Calculation Mode

(1) Press [MODE] to display the mode menu.

```
1:COMP   2:STAT
3:TABLE
```

(2) Press the number key that corresponds to the mode you want to select.
- To select the STAT Mode, for example, press [2].

■ Configuring the Calculator Setup

Pressing [SHIFT] [MODE] (SETUP) displays the setup menu, which you can use to control how the calculations are executed and displayed. The setup menu has two screens, which you can jump between using ⊙ and ⊚.

```
1:MthIO 2:LineIO        1:ab/c   2:d/c
3:Deg   4:Rad    ⊙      3:STAT  4:Disp
5:Gra   6:Fix    ⇄      5:◄CONT►
7:Sci   8:Norm    ⊚
```

- See "Adjusting Display Contrast" for information about how to use "◄CONT►".

Specifying the Input/Output Format

For this input/output format:	Perform this key operation:
Math	[SHIFT] [MODE] [1] (MthIO)
Linear	[SHIFT] [MODE] [2] (LineIO)

- Math format causes fractions, irrational numbers, and other expressions to be displayed as they are written on paper.
- Linear format causes fractions and other expressions to be displayed in a single line.

$$\frac{4}{5}+\frac{2}{3}$$

$$\frac{22}{15}$$

Math Format

$$4\lrcorner5+2\lrcorner3$$

$$22\lrcorner15$$

Linear Format

Specifying the Default Angle Unit

To specify this as the default angle unit:	Perform this key operation:
Degrees	[SHIFT] [MODE] [3] (Deg)
Radians	[SHIFT] [MODE] [4] (Rad)
Grads	[SHIFT] [MODE] [5] (Gra)

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

Specifying the Number of Display Digits

To specify this:	Perform this key operation:
Number of Decimal Places	[SHIFT] [MODE] [6] (Fix) [0] – [9]
Number of Significant Digits	[SHIFT] [MODE] [7] (Sci) [0] – [9]
Exponential Display Range	[SHIFT] [MODE] [8] (Norm) [1] (Norm1) or [2] (Norm2)

Calculation Result Display Examples

- 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: $100 \div 7 = 14.286$ (Fix3)
  14.29 (Fix2)

- Sci: The value you specify (from 1 to 10) controls the number of significant digits for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.
  Example: $1 \div 7 = 1.4286 \times 10^{-1}$ (Sci5)
  1.429×10^{-1} (Sci4)

- Norm: Selecting one of the two available settings (Norm1, Norm2) determines the range in which results will be displayed in non-exponential format. Outside the specified range, results are displayed using exponential format.

  Norm1: $10^{-2} > |x|$, $|x| \geq 10^{10}$
  Norm2: $10^{-9} > |x|$, $|x| \geq 10^{10}$

  Example: $1 \div 200 = 5 \times 10^{-3}$ (Norm1)
  0.005 (Norm2)

Specifying the Fraction Display Format

To specify this fraction display format:	Perform this key operation:
Mixed	[SHIFT] [MODE] (⌄) [1] (ab/c)
Improper	[SHIFT] [MODE] (⌄) [2] (d/c)

Specifying the Statistical Display Format

Use the following procedure to turn display of the frequency (FREQ) column of the STAT Mode STAT editor screen on or off.

To specify this:	Perform this key operation:
Show FREQ Column	[SHIFT] [MODE] (⌄) [3] (STAT) [1] (ON)
Hide FREQ Column	[SHIFT] [MODE] (⌄) [3] (STAT) [2] (OFF)

Specifying the Decimal Point Display Format

To specify this decimal point display format:	Perform this key operation:
Dot (.)	[SHIFT] [MODE] (⌄) [4] (Disp) [1] (Dot)
Comma (,)	[SHIFT] [MODE] (⌄) [4] (Disp) [2] (Comma)

• The setting you configure here is applied for calculation results only. The decimal point for input values is always a dot (.).

■ Initializing the Calculation Mode and Other Settings

Performing the following procedure initializes the calculation mode and other setup settings as shown below.

[SHIFT] [9] (CLR) [1] (Setup) [=] (Yes)

This setting:	Is initialized to this:
Calculation Mode	COMP
Input/Output Format	MthIO
Angle Unit	Deg
Display Digits	Norm1
Fraction Display Format	d/c
Statistical Display	OFF
Decimal Point	Dot

• To cancel initialization without doing anything, press [AC] (Cancel) instead of [=].

Inputting Expressions and Values

■ Inputting a Calculation Expression Using Standard Format

Your calculator lets you input calculation expressions just as they are written. Then simply press the ⊟ key to execute it. The calculator automatically judges the calculation priority sequence for addition, subtraction, multiplication, and division, functions, and parentheses.

Example: $2(5 + 4) - 2 \times (-3) =$

LINE

⊡ ⊟ ⊞ ⊞ ⊞ ⊟ ⊟
⊞ ⊠ ⊟ ⊞ ⊟

```
2(5+4)-2×-3          ▲

                    24
```

Inputting a Function with Parenthesis

When you input any of the functions shown below, it is automatically input with the open parenthesis (**(**) character. Next, you need to input the argument and the closing parenthesis (**)**).

sin(, cos(, tan(, $\sin^{-1}$(, $\cos^{-1}$(, $\tan^{-1}$(, sinh(, cosh(, tanh(, $\sinh^{-1}$(, $\cosh^{-1}$(, $\tanh^{-1}$(, log(, ln(, $e^{\wedge}$(, $10^{\wedge}$(, $\sqrt{}$(, $^3\sqrt{}$(, Abs(, Pol(, Rec(, Rnd(

Example: sin 30 =

LINE

⊞ ⊞ ⊞ ⊟

```
sin(30)              ▲

                   0.5
```

Pressing ⊞ inputs "sin(".

• Note that the input procedure is different if you want to use Math format. For more information, see "Inputting with Math Format".

Omitting the Multiplication Sign

You can omit the multiplication sign (×) in any of the following cases.
• Before an open parentheses (**(**): $2 \times (5 + 4)$, etc.
• Before a function with parenthesis: $2 \times \sin(30)$, $2 \times \sqrt{}$ (3), etc.
• Before a variable name, constant, or random number:
  $20 \times A$, $2 \times \pi$, etc.

Final Closed Parenthesis

You can omit one or more closed parentheses that come at the end of a calculation, immediately before the ⊟ key is pressed. For details, see "Omitting a Final Closed Parenthesis".

load from Www.Somanuals.com. All Manuals Search And Down

Displaying a Long Expression

The display can show up to 14 characters at a time. Inputting the 15th character causes the expression to shift to the left. At this time, the ◀ indicator appears to the left of the expression, indicating that it runs off the left side of the screen.

Input expression: 1111 + 2222 + 3333 + 444

Displayed portion:

```
            D    Math
◀2222+3333+444|
```

Cursor
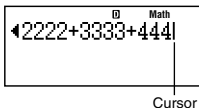
• When the ◀ indicator is displayed, you can scroll left and view the hidden part by pressing the ◀ key. This will cause the ▶ indicator to appear to the right of the expression. At this time, you can use the ▶ key to scroll back.

Number of Input Characters (Bytes)

• You can input up to 99 bytes of data for a single expression. Basically, each key operation uses up one byte. A function that requires two key operations to input (like [SHIFT] [sin] (sin⁻¹)) also uses only one byte. Note, however, that when you are inputting functions with Math format, each item you input uses up more than one byte. For more information, see "Inputting with Math Format".
• Normally the input cursor appears as a straight vertical (|) or horizontal (▬) flashing line on the display screen. When there are 10 or fewer bytes of input remaining in the current expression, the cursor changes shape to ■ to let you know. If the ■ cursor appears, terminate the expression at a convenient point and calculate the result.

■ Correcting an Expression

This section explains how to correct an expression as you are inputting it. The procedure you should use depends on whether you have insert or overwrite selected as the input mode.

About the Insert and Overwrite Input Modes

With the insert mode, the displayed characters shift to the left to make room when you input a new character. With the overwrite mode, any new character you input replaces the character at the current cursor position. The initial default input mode is insert. You can change to the overwrite mode when you need it.

• The cursor is a vertical flashing line (|) when the insert mode is selected. The cursor is a horizontal flashing line (▬) when the overwrite mode is selected.
• The initial default for Linear format input is the insert mode. You can switch to the overwrite mode by pressing [SHIFT] [DEL] (INS).

- With Math format, you can only use the insert mode. Pressing [SHIFT] [DEL] (INS) when the Math format is selected does not switch to the overwrite mode. See "Incorporating a Value into a Function" for more information.
- The calculator automatically changes to the insert mode whenever you change the input/output format from Linear to Math.

Changing the Character or Function You Just Input

Example: To correct the expression 369 × 13 so it becomes 369 × 12

[LINE]

[3] [6] [9] [X] [1] [3]	369×13❘

[DEL]	369×1❘

[2]	369×12❘

Deleting a Character or Function

Example: To correct the expression 369 × × 12 so it becomes 369 × 12

[LINE]

Insert Mode: [3] [6] [9] [X] [X] [1] [2]

	369××12❘

◄ ◄	369××❘12

[DEL]	369×❘12

Overwrite Mode: [3] [6] [9] [X] [X] [1] [2]

	369××12_

◄ ◄ ◄	369×<u>×</u>12

[DEL]	369×<u>1</u>2

Correcting a Calculation

Example: To correct cos(60) so it becomes sin(60)

[LINE]

Insert Mode: [cos] [6] [0] [)]

	cos(60)❘

◀ ◀ ◀ DEL	sin(¦60)
sin	sin(¦60)

Overwrite Mode:

cos 6 0)	cos(60)_
◀ ◀ ◀ ◀	_cos(60)
sin	sin(_60)
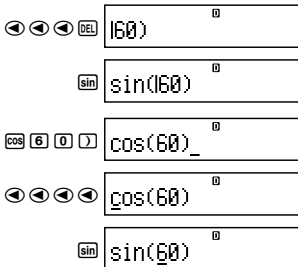
Inserting Input into a Calculation
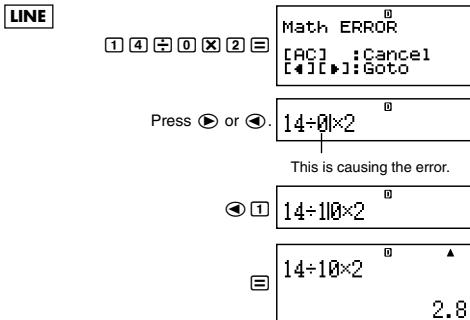
Always use the insert mode for this operation. Use ◀ or ▶ to move the cursor to the location where you want to insert new input, and then input what you want.

■ Displaying the Location of an Error

If an error message (like "Math ERROR" or "Syntax ERROR") appears when you press ▤, press ◀ or ▶. This will display the part of the calculation where the error occurred, with the cursor positioned at the error location. You can then make necessary corrections.

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

Use the insert mode for the following operation.

LINE

1 4 ÷ 0 × 2 ▤	Math ERROR [AC] :Cancel [◀][▶]:Goto
Press ▶ or ◀.	14÷0×2

This is causing the error.

◀ 1	14÷10×2
▤	14÷10×2 2.8

You can also exit the error screen by pressing AC, which clears the calculation.

■ Inputting with Math Format

When inputting with Math format, you can input and display fractions and some functions using the same format as they appear in your textbook.

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.

Functions and Symbols Supported for Math Format Input

- The "Bytes" column shows the number of bytes of memory that are used up by input.

Function/Symbol	Key Operation	Bytes
Improper Fraction	▤	9
Mixed Fraction	SHIFT ▤ (▬⊟)	13
log(a,b) (Logarithm)	log□	6
10^x (Power of 10)	SHIFT log (10▪)	4
e^x (Power of e)	SHIFT ln (e▪)	4
Square Root	√▪	4
Cube Root	SHIFT √▪ (^{3}√▪)	9
Square, Cube	x^2, x^3	4
Reciprocal	x^{-1}	5
Power	$x^▪$	4
Power Root	SHIFT $x^▪$ (▪√□)	9
Absolute Value	Abs	4
Parentheses	(or)	1

Math Format Input Examples

- The following operations are all performed while Math format is selected.
- Pay close attention to the location and size of the cursor on the display when you input using Math format.

Example 1: To input $2^3 + 1$

MATH

2 $x^▪$ 3 $2^{3|}$ □   Math

$$\odot \boxplus \boxed{1} \quad \boxed{2^3+1|}^{\,\square \;\text{Math}}$$

Example 2: To input $1 + \sqrt{2} + 3$

MATH

$$\boxed{1} \boxplus \boxed{\sqrt{}} \boxed{2} \quad \boxed{1+\sqrt{2}|}^{\,\square \;\text{Math}}$$

$$\odot \boxplus \boxed{3} \quad \boxed{1+\sqrt{2}+3|}^{\,\square \;\text{Math}}$$

Example 3: To input $(1 + \dfrac{2}{5})^2 \times 2 =$

MATH

$$\boxed{(} \boxed{1} \boxplus \boxed{\square} \boxed{2} \odot \boxed{5} \odot \boxed{)} \qquad \boxed{\left(1+\frac{2}{5}\right)^2 \times 2 \atop \qquad\qquad \frac{98}{25}}^{\,\square \;\text{Math} \blacktriangle}$$
$$\boxed{x^2} \boxed{\times} \boxed{2} \boxed{=}$$

- When you press $\boxed{=}$ and obtain a calculation result using Math format, part of the expression you input can be cut off as shown in the Example 3 screen shot. If you need to view the entire input expression again, press $\boxed{AC}$ and then press $\boxed{\blacktriangleright}$.

Incorporating a Value into a Function

When using Math format, you can incorporate part of an input expression (a value, an expression within parentheses, etc.) into a function.

Example: To incorporate the expression inside of the parentheses of $1 + (2 + 3) + 4$ into the $\sqrt{}$ function

MATH

Move the cursor to here. $\qquad \boxed{1+|(2+3)+4}^{\,\square \;\text{Math}}$

$$\boxed{\text{SHIFT}} \boxed{\text{DEL}}\,(\text{INS}) \quad \boxed{1+\blacktriangleright(2+3)+4}^{\,\square \;\text{Math}}$$

This changes the shape of the cursor as shown here.

$$\boxed{\sqrt{}} \quad \boxed{1+\sqrt{(2+3)}+4}^{\,\square \;\text{Math}}$$

This incorporates the expression in the parentheses into the function $\sqrt{}$.

- If the cursor is located left of a particular value or fraction (instead of an open parentheses), that value or fraction will be incorporated into the function specified here.
- If the cursor is located left of function, the entire function is incorporated into the function specified here.

load from Www.Somanuals.com. All Manuals Search And Down

The following examples show the other functions that can be used in the above procedure, and the required key operations to use them.

Original Expression: $1 + |(2+3)+4$

Function	Key Operation	Resulting Expression
Fraction	$\boxed{\Xi}$	$1 + \frac{|(2+3)}{\Box} + 4$
log(a,b)	$\boxed{\log_{\blacksquare}\Box}$	$1 + \log_{|\Box}((2+3)) + 4$
Power Root	$\boxed{\text{SHIFT}}\,\boxed{x^{\blacksquare}}\,(^{\blacksquare}\!\sqrt{\Box})$	$1 + {}^{|\Box}\!\sqrt{(2+3)} + 4$

You can also incorporate values into the following functions.
$\boxed{\text{SHIFT}}\,\boxed{\log}\,(10^{\blacksquare}),\ \boxed{\text{SHIFT}}\,\boxed{\ln}\,(e^{\blacksquare}),\ \boxed{\sqrt{\blacksquare}},\ \boxed{x^2},\ \boxed{\text{SHIFT}}\,\boxed{\sqrt{\blacksquare}}\,(^3\!\sqrt{\blacksquare}),\ \boxed{\text{Abs}}$

Displaying Calculation Results in a Form that Includes $\sqrt{2}$, π, etc. (Irrational Number Form)

When "MthIO" is selected for the input/output format, you can specify whether calculation results should be displayed in a form that includes expressions like $\sqrt{2}$ and π (irrational number form).
- Pressing $\boxed{\equiv}$ after inputting a calculation displays the result using irrational number form.
- Pressing $\boxed{\text{SHIFT}}\,\boxed{\equiv}$ after inputting a calculation displays the result using decimal values.

Note
- When "LineIO" is selected for the input/output format, calculation results are always displayed using decimal values (no irrational number form) regardless of whether you press $\boxed{\equiv}$ or $\boxed{\text{SHIFT}}\,\boxed{\equiv}$.
- π form (form that includes π within irrational number display) display conditions are the same as those for S-D conversion. For details, see "Using S-D Transformation".
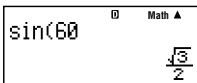
Example 1: $\sqrt{2} + \sqrt{8} = 3\sqrt{2}$

MATH

① $\boxed{\sqrt{\blacksquare}}\,\boxed{2}\,\boxed{\blacktriangleright}\,\boxed{+}\,\boxed{\sqrt{\blacksquare}}\,\boxed{8}\,\boxed{\equiv}$

$$\sqrt{2} + \sqrt{8}$$
$$3\sqrt{2}$$

② $\boxed{\sqrt{\blacksquare}}\,\boxed{2}\,\boxed{\blacktriangleright}\,\boxed{+}\,\boxed{\sqrt{\blacksquare}}\,\boxed{8}\,\boxed{\text{SHIFT}}\,\boxed{\equiv}$

$$\sqrt{2} + \sqrt{8}$$
$$4.242640687$$

Example 2: $\sin(60) = \dfrac{\sqrt{3}}{2}$ (Angle Unit: Deg)

MATH
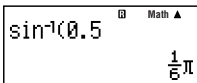
               sin 6 0 =

```
                    ⫿      Math ▲
 sin(60

                        √3
                        ──
                        2
```

Example 3: $\sin^{-1}(0.5) = \dfrac{1}{6}\pi$ (Angle Unit: Rad)

MATH

      SHIFT sin (sin⁻¹) 0 . 5 =

```
                    ⫿      Math ▲
 sin⁻¹(0.5

                        1
                        ─π
                        6
```

- The following are the calculations for which $\sqrt{}$ form (form that includes $\sqrt{}$ within irrational number display) results can be displayed.
   a. Arithmetic calculations of values with square root symbol ($\sqrt{}$), x^2, x^3, x^{-1}
   b. Trigonometric function calculations

The following are the input value ranges for which $\sqrt{}$ form is always used for display of trigonometric calculation results.

Angle Unit Setting	Angle Value Input	Input Value Range for $\sqrt{}$ Form Calculation Result
Deg	Units of 15°	$\lvert x \rvert < 9 \times 10^9$
Rad	Multiples of $\dfrac{1}{12}\pi$ radians	$\lvert x \rvert < 20\pi$
Gra	Multiples of $\dfrac{50}{3}$ grads	$\lvert x \rvert < 10000$

Calculation results may be displayed in decimal form for input values outside of the above ranges.

■ $\sqrt{}$ Form Calculation Range

Results that include square root symbols can have up to two terms (an integer term is also counted as a term).
$\sqrt{}$ form calculation results use display formats like those shown below.

$$\pm a\sqrt{b}, \ \pm d \pm a\sqrt{b}, \ \pm \dfrac{a\sqrt{b}}{c} \pm \dfrac{d\sqrt{e}}{f}$$

The following shows the range for each of the coefficients (a, b, c, d, e, f).

         $1 \le a < 100, \ 1 < b < 1000, \ 1 \le c < 100$
         $0 \le d < 100, \ 0 \le e < 1000, \ 1 \le f < 100$

load from Www.Somanuals.com. All Manuals Search And Down

Example:

$2\sqrt{3} \times 4 = 8\sqrt{3}$	$\sqrt{}$ form
$35\sqrt{2} \times 3 = 148.492424$ $(= \underset{\sim\sim\sim}{105}\sqrt{2})$	decimal form
$\dfrac{\underset{\sim\sim\sim}{150}\sqrt{2}}{25} = 8.485281374$	
$2 \times (3 - 2\sqrt{5}) = 6 - 4\sqrt{5}$	$\sqrt{}$ form
$23 \times (5 - 2\sqrt{5}) = 35.32566285$ $(= \underset{\sim\sim\sim}{115} - 46\sqrt{5})$	decimal form
$10\sqrt{2} + 15 \times 3\sqrt{3} = 45\sqrt{3} + 10\sqrt{2}$	$\sqrt{}$ form
$15 \times (10\sqrt{2} + 3\sqrt{3}) = 290.0743207$ $(= 45\sqrt{3} + \underset{\sim\sim\sim}{150}\sqrt{2})$	decimal form
$\sqrt{2} + \sqrt{3} + \sqrt{8} = \sqrt{3} + 3\sqrt{2}$	$\sqrt{}$ form
$\underset{\sim\sim\sim\sim}{\sqrt{2} + \sqrt{3} + \sqrt{6}} = 5.595754113$	decimal form

The underlined areas in the above examples indicate what caused decimal form to be used.

Reasons why the results of the examples are displayed in decimal form

- Value outside of the allowable range
- More than two terms in the calculation result

• Calculation results displayed in $\sqrt{}$ form are reduced to a common denominator.

$$\frac{a\sqrt{b}}{c} + \frac{d\sqrt{e}}{f} \rightarrow \frac{a'\sqrt{b} + d'\sqrt{e}}{c'}$$

• c' is the least common multiple of c and f.
• Since calculation results are reduced to a common denominator, they are displayed in $\sqrt{}$ form even if coefficients (a', c', and d') are outside the corresponding ranges of coefficients (a, c, and d).

Example: $\dfrac{\sqrt{3}}{11} + \dfrac{\sqrt{2}}{10} = \dfrac{10\sqrt{3} + 11\sqrt{2}}{110}$

• The result is displayed in decimal form even when any intermediate result has three or more terms.

Example: $(1 + \sqrt{2} + \sqrt{3})(1 - \sqrt{2} - \sqrt{3})(= -4 - 2\sqrt{6})$
$= -8.898979486$

• If a term is encountered during the calculation cannot be displayed as a root ($\sqrt{}$) form or a fraction, the calculation result is displayed in decimal form.

Example: $\log 3 + \sqrt{2} = 1.891334817$

Basic Calculations (COMP)

This section explains how to perform arithmetic, fraction, percent, and sexagesimal calculations.

All calculations in this section are performed in the COMP Mode (MODE 1).

■ Arithmetic Calculations

Use the ⊞, ⊟, ☒, and ⊞ keys to perform arithmetic calculations.

Example: $7 \times 8 - 4 \times 5 = 36$

LINE

7 ☒ 8 ⊟ 4 ☒ 5 ⊟

```
7×8-4×5        ▲

            36
```

• The calculator automatically judges the calculation priority sequence. For more information, see "Calculation Priority Sequence".

Number of Decimal Places and Number of Significant Digits

You can specify a fixed number of decimal places and significant digits for the calculation result.

Example: $1 \div 6 =$

LINE

Initial default setting (Norm1)

```
1÷6           ▲

    0.1666666667
```

3 decimal places (Fix3)

```
1÷6       FIX ▲

          0.167
```

3 significant digits (Sci3)

```
1÷6       SCI ▲

       1.67×ₘ¹
```

• For more information, see "Specifying the Number of Display Digits".

Omitting a Final Closed Parenthesis

You can omit any closed parenthesis ()) immediately preceding operation of the ⊟ key at the end of a calculation.
This is true only in the case of Linear format.

Example: $(2 + 3) \times (4 - 1) = 15$

LINE

⬚ ⬚ 2 ⊞ 3 ⬚ ⨯
⬚ 4 ⊟ 1 ⬚

```
(2+3)×(4-1                    ▲

                            15
```

■ Fraction Calculations

How you should input fractions depends on the input/output format that is currently selected.

	Improper Fraction	**Mixed Fraction**
Math Format	$\dfrac{7}{3}$	$2\dfrac{1}{3}$
	(▤ 7 ⬇ 3)	(SHIFT ▤ (=⬚) 2 ▶ 1 ⬇ 3)
Linear Format	7 ⏌ 3 Numerator Denominator	2 ⏌ 1 ⏌ 3 Integer Part | Denominator Numerator
	(7 ▤ 3)	(2 ▤ 1 ▤ 3)

- Under initial default settings, fractions are displayed as improper fractions.
- Fraction calculation results are always reduced before being displayed.

Appendix

<#001> $\dfrac{2}{3} + \dfrac{1}{2} = \dfrac{7}{6}$

<#002> $3\dfrac{1}{4} + 1\dfrac{2}{3} = 4\dfrac{11}{12}$ (Fraction Display Format: ab/c)

$\qquad 4 - 3\dfrac{1}{2} = \dfrac{1}{2}$ (Fraction Display Format: ab/c)

- If the total number of digits used for a mixed fraction (including integer, numerator, denominator, and separator symbols) is greater than 10, the value is automatically displayed in decimal format.
- The result of a calculation that involves both fraction and decimal values is displayed in decimal format.

Switching between Improper Fraction and Mixed Fraction Format

Pressing the SHIFT S⇔D ($a\dfrac{b}{c} \Leftrightarrow \dfrac{d}{c}$) key toggles the display fraction between mixed fraction and improper fraction format.

Switching between Fraction and Decimal Format

- The format of the fraction depends on the currently selected fraction display format setting (improper fraction or mixed fraction).
- You cannot switch from decimal format to mixed fraction format if the total number of digits used in the mixed fraction (including integer, numerator, denominator, and separator symbols) is greater than 10.
- For details about the $\boxed{\text{S⇔D}}$ key, see "Using S-D Transformation".

■ Percent Calculations

Inputting a value and pressing $\boxed{\text{SHIFT}}$ $\boxed{(}$ (%) causes the input value to become a percent.

Appendix

<#003> $2\% = 0.02$ $\left(\dfrac{2}{100}\right)$

<#004> $150 \times 20\% = 30$ $\left(150 \times \dfrac{20}{100}\right)$

<#005> Calculate what percentage of 880 is 660.   (75%)
<#006> Increase 2500 by 15%.   (2875)
<#007> Discount 3500 by 25%.   (2625)
<#008> Discount the sum of 168, 98, and 734 by 20%.   (800)
<#009> 300 grams are added to a test sample originally weighing 500 grams, producing a final test sample of 800 grams. What percent of 500 grams is 800 grams?   (160%)
<#010> What is the percentage change when a value is increased from 40 to 46? How about to 48?   (15%, 20%)

■ Degree, Minute, Second (Sexagesimal) Calculations

You can perform calculations using sexagesimal values, and convert values between sexagesimal and decimal.

Inputting Sexagesimal Values

The following is the syntax for inputting a sexagesimal value.

{Degrees} $\boxed{\cdots}$ {Minutes} $\boxed{\cdots}$ {Seconds} $\boxed{\cdots}$

Appendix   <#011> Input 2°0′30″.

- Note that you must always input something for the degrees and minutes, even if they are zero.

Sexagesimal Calculations

- Performing the following types of sexagesimal calculations produces a sexagesimal result.
  - Addition or subtraction of two sexagesimal values
  - Multiplication or division of a sexagesimal value and a decimal value

Appendix <#012> $2°20´30″ + 39´30″ = 3°00´00″$

Converting Values between Sexagesimal and Decimal

Pressing ▦ while a calculation result is displayed toggles the value between sexagesimal and decimal.

Appendix <#013> Convert 2.255 to its sexagesimal equivalent.

Using Multi-statements in Calculations

You can use the colon character (:) to connect two or more expressions and execute them in sequence from left to right when you press ▣.

Example: To create a multi-statement that performs the following two calculations: $3 + 3$ and 3×3

LINE

3 ⊞ 3 [ALPHA] [x^3] (:) 3 ✕ 3

```
3+3:3×3|
```

▣

```
3+3              ▲Disp

               6
```

"Disp" indicates this is an intermediate result of a multi-statement.

▣

```
3×3                ▲

               9
```

Using Calculation History Memory and Replay (COMP)

Calculation history memory maintains a record of each calculation expression you input and execute, and its result.

> You can use calculation history memory in the COMP Mode (MODE 1) only.

Recalling Calculation History Memory Contents

Press ▲ to back-step through calculation history memory contents. Calculation history memory shows both calculation expressions and results.

Example:

LINE

1 + 1 =
2 + 2 =
3 + 3 =

```
            D        ▲
3+3


            6
```

▲

```
            D       ▼▲
2+2


            4
```

▲

```
            D        ▼
1+1


            2
```

- Note that calculation history memory contents are cleared whenever you turn off the calculator, press the ON key, change to the calculation mode or the input/output format, or perform any reset operation.
- Calculation history memory is limited. When the calculation you are performing causes calculation history memory to become full, the oldest calculation is deleted automatically to make room for the new calculation.

Replay Function

While a calculation result is on the display, you can press AC and then ◀ or ▶ to edit the expression you used for the previous calculation. If you are using Linear format, you can display the expression by pressing ◀ or ▶, without pressing AC first.

Appendix <#014>

Using Calculator Memory

Memory Name	Description
Answer Memory	Stores the last calculation result obtained.
Independent Memory	Calculation results can be added to or subtracted from independent memory. The "M" display indicator indicates data in independent memory.
Variables	Six variables named A, B, C, D, X, and Y can be used for storage of individual values.

This section uses the COMP Mode ([MODE] [1]) to demonstrate how you can use memory.

■ Answer Memory (Ans)

Answer Memory Overview

- Answer Memory contents are updated whenever you execute a calculation using any one of the following keys: [=], [SHIFT] [=], [M+], [SHIFT] [M+] (M–), [RCL], [SHIFT] [RCL] (STO). Answer Memory can hold up to 15 digits.
- Answer Memory contents are not change if an error occurs during the current calculation.
- Answer Memory contents are maintained even if you press the [AC] key, change the calculation mode, or turn off the calculator.

Using Answer Memory to Perform a Series of Calculations

Example: To divide the result of 3×4 by 30

LINE

[3] [X] [4] [=]

```
3×4
              12
```

(Continuing) [÷] [3] [0] [=]

```
Ans÷30
             0.4
```

Pressing [÷] automatically inputs "Ans" command.

- With the above procedure, you need to perform the second calculation immediately after the first one. If you need to recall Answer Memory contents after pressing [AC], press the [Ans] key.

Inputting Answer Memory Contents into an Expression

Example: To perform the calculations shown below:

123 + 456 = 579   789 − 579 = 210

LINE

1 2 3 + 4 5 6 =

```
123+456
              579
```

7 8 9 − Ans =

```
789-Ans
              210
```

■ Independent Memory (M)

You can add calculation results to or subtract results from independent memory. The "M" appears on the display when independent memory contains a value.

Independent Memory Overview
• The following is a summary of the different operations you can perform using independent memory.

To do this:	Perform this key operation:
Add the displayed value or result of the expression to independent memory	M+
Subtract the displayed value or result of the expression from independent memory	SHIFT M+ (M−)
Recall current independent memory contents	RCL M+ (M)

• You can also insert the M variable into a calculation, which tells the calculator to use the current independent memory contents at that location. The following is the key operation for inserting the M variable.

　　ALPHA M+ (M)

• The "M" indicator appears in the upper left of the display when there is any value other than zero stored in independent memory.
• Independent memory contents are maintained even if you press the AC key, change the calculation mode, or turn off the calculator.

Calculation Examples Using Independent Memory

• If the "M" indicator is on the display, perform the procedure under
  "Clearing Independent Memory" before performing this example.

Example:

$23 + 9 = 32$	2 3 + 9 M+
$53 - 6 = 47$	5 3 − 6 M+
$-)45 \times 2 = 90$	4 5 × 2 SHIFT M+ (M−)
$99 \div 3 = 33$	9 9 ÷ 3 M+
(Total) 22	RCL M+ (M)

Clearing Independent Memory

Press 0 SHIFT RCL (STO) M+. This clears independent memory and
causes the "M" indicator to disappear from the display.

■ Variables (A, B, C, D, X, Y)

Variable Overview

• You can assign a specific value or a calculation result to a variable.
  Example: To assign the result of $3 + 5$ to variable A.
    3 + 5 SHIFT RCL (STO) (−) (A)

• Use the following procedure when you want to check the contents
  of a variable.
  Example: To recall the contents of variable A
    RCL (−) (A)

• The following shows how you can include variables inside of an
  expression.
  Example: To multiply the contents of variable A by the contents of
           variable B
    ALPHA (−) (A) × ALPHA ···· (B) =

• Variable contents are maintained even if you press the AC key,
  change the calculation mode, or turn off the calculator.

Appendix <#015>

Clearing the Contents of a Specific Variable

Press 0 SHIFT RCL (STO) and then press the key for the name of the
variable whose contents you want to clear. To clear the contents of
variable A, for example, press 0 SHIFT RCL (STO) (−) (A).

■ Clearing the Contents of All Memories

Use the following procedure to clear the contents of Answer Memory,
independent memory, and all of the variables.
Press SHIFT 9 (CLR) 2 (Memory) = (Yes).

• To cancel the clear operation without doing anything, press
  AC (Cancel) instead of =.

Function Calculations

This section explains how to use the calculator's built-in functions.

> The functions available to you depends on the calculation mode you are in. The explanations in this section are mainly about the functions that are available in all calculation modes. All of the examples in this section show operation in the COMP Mode (`MODE` `1`).

- Certain function calculations may take some time to display calculation results. Before performing an operation, be sure to wait until execution of the current operation is complete. You can interrupt an ongoing operation by pressing `AC`.

■ Pi (π) and Natural Logarithm Base e

You can input pi (π) or natural logarithm base e into a calculation. The following shows the required key operations and the values this calculator uses for pi (π) and e.

$\pi = 3.14159265358980$ (`SHIFT` `×10³` (π))
$e = 2.71828182845904$ (`ALPHA` `×10³` (e))

■ Trigonometric and Inverse Trigonometric Functions

- The angle unit required by trigonometric and inverse trigonometric functions is one specified as the calculator's default angle unit. Before performing a calculation, be sure to specify the default angle unit you want to use. See "Specifying the Default Angle Unit" for more information.

Appendix <#016> sin 30 = 0.5, sin⁻¹0.5 = 30

■ Hyperbolic and Inverse Hyperbolic Functions

Pressing the `hyp` key displays a menu of functions. Press the number key that corresponds to the function you want to input.

Appendix <#017> sinh 1 = 1.175201194, cosh⁻¹ 1 = 0

■ Converting an Input Value to the Calculator's Default Angle Unit

After inputting a value, press [SHIFT] [Ans] (DRG▶) to display the angle unit specification menu shown below. Press the number key that corresponds to the angle unit of the input value. The calculator will automatically convert it to the calculator's default angle unit.
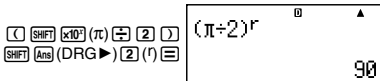
```
1:°      2:ʳ
3:ᵍ
```
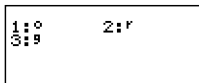
Example: To convert the following values to degrees:

$$\frac{\pi}{2} \text{ radians} = 90°, 50 \text{ grads} = 45°$$

The following procedure assumes that the calculator's default angle unit is degrees.

LINE

[(] [SHIFT] [×10ˣ] (π) [÷] [2] [)]
[SHIFT] [Ans] (DRG▶) [2] (ʳ) [=]

```
(π÷2)ʳ
                    90
```

[5] [0] [SHIFT] [Ans] (DRG▶)
[3] (ᵍ) [=]

```
50ᵍ
                    45
```

Appendix

<#018> cos (π radians) = –1, cos (100 grads) = 0
<#019> cos⁻¹ (–1) = 180
       cos⁻¹ (–1) = π
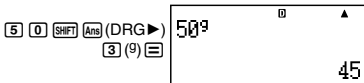
■ Exponential Functions and Logarithmic Functions

- For the logarithmic function "log(", you can specify base m using the syntax "log (m, n)".
  If you input only a single value, a base of 10 is used for the calculation.
- "ln(" is a natural logarithm function with base e.
- You can also use the [log☐] key when inputting an expression with the form of "log$_m n$" while using Math format. For details, see
  Appendix <#020>. Note that you must input the base (base m) when using the [log☐] key for input.

Appendix <#021> to <#023>

*1 A base of 10 (common logarithm) is used if no base is specified.

■ Power Functions and Power Root Functions

$$X^2, X^3, X^{-1}, X^\blacksquare, \sqrt{\ }(, \sqrt[3]{\ }(, \sqrt[\blacksquare]{\ }($$

Appendix <#024> to <#028>

■ Rectangular-Polar Coordinate Conversion

Rectangular Coordinates (Rec)   **Polar Coordinates (Pol)**
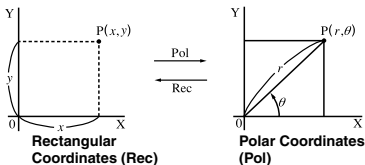
- Coordinate conversion can be performed in the COMP and STAT calculation modes.

Converting to Polar Coordinates (Pol)
Pol(X, Y)   X: Specifies the rectangular coordinate X value
             Y: Specifies the rectangular coordinate Y value

- Calculation result θ is displayed in the range of $-180° < \theta \leqq 180°$.
- Calculation result θ is displayed using the calculator's default angle unit.
- Calculation result r is assigned to variable X, while θ is assigned to Y.

Converting to Rectangular Coordinates (Rec)
Rec(r, θ) r : Specifies r value of polar coordinate
          θ : Specifies θ value of polar coordinate

- Input value θ is treated as an angle value, in accordance with the calculator's default angle unit setting.
- Calculation result x is assigned to variable X, while y is assigned to Y.
- If you perform coordinate conversion inside of an expression instead of a stand-alone operation, the calculation is performed using only the first value (either the r-value or the X-value) produced by the conversion.
  Example: Pol ($\sqrt{2}, \sqrt{2}$) + 5 = 2 + 5 = 7

Appendix <#029> to <#030>

■ **Other Functions**

This section explains how to use the functions shown below.

> **!, Abs(, Ran#,** n**P**r**,** n**C**r**, Rnd(**

Factorial (!)
This function obtains the factorials of a value that is zero or a positive integer.

Appendix <#031> $(5 + 3)! = 40320$

Absolute Value Calculation (Abs)
When you are performing a real number calculation, this function simply obtains the absolute value.

Appendix <#032> Abs $(2 − 7) = 5$

Random Number (Ran#)
This function generates a 3-digit pseudo random number that is less than 1.

Appendix

<#033> Generate three 3-digit random numbers.

The random 3 digit decimal values are converted to 3-digit integer values by multiplying by 1000.

Note that the values shown here are examples only. Values actually generated by your calculator will be different.

Permutation (n**P**r**) and Combination (**n**C**r**)**
These functions make it possible to perform permutation and combination calculations.

n and r must be integers in the range of $0 \leq r \leq n < 1 \times 10^{10}$.

Appendix

<#034> How many four-person permutations and combinations are possible for a group of 10 people?

Rounding Function (Rnd)
This function rounds the value or the result of the expression in the function's argument to the number of significant digits specified by the number of display digits setting.

Display Digits Setting: Norm1 or Norm2
The mantissa is rounded to 10 digits.

Display Digits Setting: Fix or Sci

The value is rounded to the specified number of digits.

Example: $200 \div 7 \times 14 = 400$

LINE

2 0 0 ÷ 7 × 1 4 =

```
            🔲        ▲
200÷7×14

              400
```

(Specifies three decimal places.)

SHIFT MODE 6 (Fix) 3

```
            🔲  FIX    ▲
200÷7×14

          400.000
```

(Calculation is performed internally using 15 digits.)

2 0 0 ÷ 7 =

```
            🔲  FIX    ▲
200÷7

           28.571
```

× 1 4 =

```
            🔲  FIX    ▲
Ans×14

          400.000
```

The following performs the same calculation with rounding.

2 0 0 ÷ 7 =

```
            🔲  FIX    ▲
200÷7

           28.571
```

(Round the value to the specified number of digits.)

SHIFT 0 (Rnd) =

```
            🔲  FIX    ▲
Rnd(Ans

           28.571
```

(Check rounded result.)

× 1 4 =

```
            🔲  FIX    ▲
Ans×14

          399.994
```

Transforming Displayed Values

You can use the procedures in this section to transform a displayed value to engineering notation, or to transform between standard form and decimal form.

■ Using Engineering Notation

A simple key operation transforms a displayed value to engineering notation.

Appendix

<#035> Transform the value 1,234 to engineering notation, shifting the decimal point to the right.

<#036> Transform the value 123 to engineering notation, shifting the decimal point to the left.

■ Using S-D Transformation

You can use S-D transformation to transform a value between its decimal (D) form and its standard (S) form (fraction, π).

Formats Supported for S-D Transformation

S-D transformation can be used to transform a displayed decimal calculation result to one of the forms described below. Performing S-D transformation again converts back to the original decimal value.

Note

- When you transform from decimal form to standard form, the calculator automatically decides the standard form to use. You cannot specify the standard form.

  Fraction: The current fraction display format setting determines whether the result is an improper fraction or mixed fraction.

  π: The following are the π forms that are supported.
  This is true only in the case of Math format.
  $n\pi$ (n is an integer.)
  $\dfrac{d}{c}\pi$ or $a\dfrac{b}{c}\pi$ (depending on fraction display format setting)

- Transformation to a fractional π form is limited to inverse trigonometric function results and values that are normally expressed in radians.

- After obtaining a calculation result in $\sqrt{}$ form, you can convert it to decimal form by pressing the [S⇔D] key. When the original calculation result is in decimal form, it cannot be converted to $\sqrt{}$ form.

Examples of S-D Transformation

Note that S-D transformation can take some time to perform.

Example: Fraction → Decimal

MATH

$\boxed{=}\ \boxed{5}\ \boxed{\vee}\ \boxed{6}\ \boxed{=}$

$$\frac{5}{6}$$
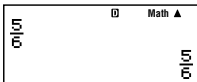
- Each press of the $\boxed{\text{S⇔D}}$ key toggles between the two forms.

$\boxed{\text{S⇔D}}$ 0.8333333333

$\boxed{\text{S⇔D}}$ $\frac{5}{6}$

Appendix

<#037> π Fraction → Decimal

<#038> $\sqrt{}$ → Decimal

Statistical Calculation   (STAT)

All calculations in this section are performed in the STAT Mode
($\boxed{\text{MODE}}$ $\boxed{2}$).

Selecting a Statistical Calculation Type

In the STAT Mode, display the statistical calculation type selection
screen.

■ Statistical Calculation Types

Key	Menu Item	Statistical Calculation
$\boxed{1}$	1-VAR	Single-variable
$\boxed{2}$	A+BX	Linear regression
$\boxed{3}$	_+CX²	Quadratic regression
$\boxed{4}$	In X	Logarithmic regression
$\boxed{5}$	e^X	e exponential regression
$\boxed{6}$	A•B^X	ab exponential regression
$\boxed{7}$	A•X^B	Power regression
$\boxed{8}$	1/X	Inverse regression

■ Inputting Sample Data

Displaying the STAT Editor Screen

The STAT editor screen appears after you enter the STAT Mode from another mode. Use the STAT menu to select a statistical calculation type. To display the STAT editor screen from another STAT Mode screen, press [SHIFT] [1] (STAT) [2] (Data).

STAT Editor Screen

There are two STAT editor screen formats, depending on the type of statistical calculation you selected.
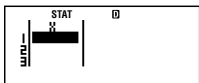
Single-variable Statistics
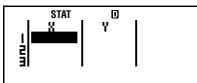
Paired-variable Statistics

- The first line of the STAT editor screen shows the value for the first sample or the values for their first pair of samples.

FREQ (Frequency) Column

If you turn on the Statistical Display item on the calculator's setup screen, a column labeled "FREQ" will also be included on the STAT editor screen.

You can use the FREQ column to specify the frequency (the number of times the same sample appears in the group of data) of each sample value.

Rules for Inputting Sample Data on the STAT Editor Screen

- Data you input is inserted into the cell where the cursor is located. Use the cursor keys to move the cursor between cells.
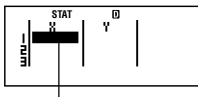
Cursor

- The values and expressions you can input on the STAT editor screen are the same as those you can input in the COMP Mode with Linear format.
- Pressing [AC] while inputting data clears your current input.
- After inputting a value, press [=]. This registers the value and displays up to six of its digits in the currently selected cell.

Example: To input the value 123.45 in cell X1
(Move the cursor to cell X1.)

1 2 3 . 4 5

The value you input appears
in the formula area.
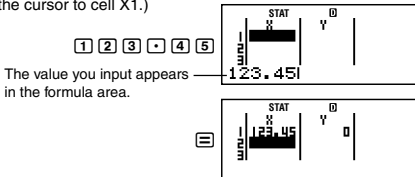
Registering a value causes the cursor to move down one cell.

STAT Editor Screen Input Precautions

• The number of lines in STAT editor screen (the number of sample data values you can input) depends on the type of statistical data you selected, and on the Statistical Display setting of the calculator's setup screen.

Statistical Display Statistic Type	OFF (No FREQ column)	ON (FREQ column)
Single-variable	80 lines	40 lines
Paired-variable	40 lines	26 lines

• The following types of input are not allowed on the STAT editor screen.
  • M+, SHIFT M+ (M–) operations
  • Assignment to variables (STO)

Precautions Concerning Sample Data Storage

Sample data you input is deleted automatically whenever you change to another mode from the STAT Mode or change the Statistical Display setting (which causes the FREQ column to be shown or hidden) on the calculator's setup screen.

Editing Sample Data

Replacing the Data in a Cell

(1) On the STAT editor screen, move the cursor to the cell you want to edit.

(2) Input the new data value or expression, and then press =.

Important!

• Note that you must totally replace the existing data of the cell with new input. You cannot edit parts of the existing data.

Deleting a Line

(1) On the STAT editor screen, move the cursor to the line you want to delete.

(2) Press DEL.

Inserting a Line
(1) On the STAT editor screen, move the cursor to the line that will be under the line you will insert.
(2) Press [SHIFT] [1] (STAT) [3] (Edit).
(3) Press [1] (Ins).

Important!
• Note that the insert operation will not work if the maximum number of lines allowed for the STAT editor screen are already used.

Deleting All STAT Editor Contents
(1) Press [SHIFT] [1] (STAT) [3] (Edit).
(2) Press [2] (Del-A).
  • This clears all of the sample data on the STAT editor screen.

Note
• Note that you can perform the procedures under "Inserting a Line" and "Deleting All STAT Editor Contents" only when the STAT editor screen is on the display.

■ STAT Calculation Screen

The STAT calculation screen is for performing statistical calculations with the data you input with the STAT editor screen. Pressing the [AC] key while the STAT editor screen is displayed switches to the STAT calculation screen.

The STAT calculation screen also uses Linear format, regardless of the current input/output format setting on the calculator's setup screen.

■ Using the STAT Menu

While the STAT editor screen or STAT calculation screen is on the display, press [SHIFT] [1] (STAT) to display the STAT menu.

The content to the STAT menu depends on whether the currently selected statistical operation type uses a single variable or paired variables.

```
1:Type    2:Data
3:Edit    4:Sum
5:Var     6:MinMax
```
Single-variable Statistics

```
1:Type    2:Data
3:Edit    4:Sum
5:Var     6:MinMax
7:Reg
```
Paired-variable Statistics

STAT Menu Items

Common Items

Select this menu item:	When you want to do this:
1 Type	Display the statistical calculation type selection screen
2 Data	Display the STAT editor screen
3 Edit	Display the Edit sub-menu for editing STAT editor screen contents
4 Sum	Display the Sum sub-menu of commands for calculating sums
5 Var	Display the Var sub-menu of commands for calculating the mean, standard deviation, etc.
6 MinMax	Display the MinMax sub-menu of commands for obtaining maximum and minimum values

Paired-variable Menu Item

Select this menu item:	When you want to do this:
7 Reg	Display the Reg sub-menu of commands for regression calculations • For details see "Commands when Linear Regression Calculation (A+BX) Is Selected" and "Commands when Quadratic Regression Calculation (_+CX^2) Is Selected".

Single-variable (1-VAR) Statistical Calculation Commands

The following are the commands that appear on the sub-menus that appear when you select 4 (Sum), 5 (Var), or 6 (MinMax) on the STAT menu while a single-variable statistical calculation type is selected.

See **Appendix** <#039> for information about the calculation formula used for each command.

Sum Sub-menu (SHIFT 1 (STAT) 4 (Sum))

Select this menu item:	When you want to obtain this:
1 Σx^2	Sum of squares of the sample data
2 Σx	Sum of the sample data

Var Sub-menu (SHIFT 1 (STAT) 5 (Var))

Select this menu item:	When you want to obtain this:
1 n	Number of samples
2 $\bar{x}$	Mean of the sample data
3 $x\sigma n$	Population standard deviation
4 $x\sigma n-1$	Sample standard deviation

MinMax Sub-menu (SHIFT 1 (STAT) 6 (MinMax))

Select this menu item:	When you want to obtain this:
1 minX	Minimum value
2 maxX	Maximum value

Appendix Single-variable Statistical Calculation

<#040> Select single-variable (1-VAR) and input the following data:
  {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}   (FREQ: ON)
<#041> Edit the data to the following, using insert and delete:
  {0, 1, 2, 3, 4, 5, 6, 7, 9, 10}   (FREQ: ON)
<#042> Edit the FREQ data to the following:
  {1, 2, 1, 2, 2, 2, 3, 4, 2, 1}   (FREQ: ON)
• Examples <#043> through <#045> all use the same data as Example <#042>.
<#043> Calculate sum of squares of the sample data and sum of the sample data.
<#044> Calculate number of samples, mean, and population standard deviation.
<#045> Calculate minimum value and maximum value.

Commands when Linear Regression Calculation (A+BX) Is Selected

With linear regression, regression is performed in accordance with the following model equation.

$$y = A + BX$$

The following are the commands that appear on the sub-menus that appear when you select 4 (Sum), 5 (Var), 6 (MinMax), or 7 (Reg) on the STAT menu while linear regression is selected as the statistical calculation type.

See **Appendix** <#046> for information about the calculation formula used for each command.

Sum Sub-menu ($\boxed{\text{SHIFT}}$ $\boxed{1}$ (STAT) $\boxed{4}$ (Sum))

Select this menu item:	When you want to obtain this:
$\boxed{1}$ Σx^2	Sum of squares of the X-data
$\boxed{2}$ Σx	Sum of the X-data
$\boxed{3}$ Σy^2	Sum of squares of the Y-data
$\boxed{4}$ Σy	Sum of the Y-data
$\boxed{5}$ Σxy	Sum of products of the X-data and Y-data
$\boxed{6}$ Σx^3	Sum of cubes of the X-data
$\boxed{7}$ $\Sigma x^2 y$	Sum of (X-data squares × Y-data)
$\boxed{8}$ Σx^4	Sum of biquadrate of the X-data

Var Sub-menu ($\boxed{\text{SHIFT}}$ $\boxed{1}$ (STAT) $\boxed{5}$ (Var))

Select this menu item:	When you want to obtain this:
$\boxed{1}$ n	Number of samples
$\boxed{2}$ $\bar{x}$	Mean of the X-data
$\boxed{3}$ $x\sigma n$	Population standard deviation of the X-data
$\boxed{4}$ $x\sigma n-1$	Sample standard deviation of the X-data
$\boxed{5}$ $\bar{y}$	Mean of the Y-data
$\boxed{6}$ $y\sigma n$	Population standard deviation of the Y-data
$\boxed{7}$ $y\sigma n-1$	Sample standard deviation of the Y-data

MinMax Sub-menu ($\boxed{\text{SHIFT}}$ $\boxed{1}$ (STAT) $\boxed{6}$ (MinMax))

Select this menu item:	When you want to obtain this:
$\boxed{1}$ minX	Minimum value of the X-data
$\boxed{2}$ maxX	Maximum value of the X-data
$\boxed{3}$ minY	Minimum value of the Y-data
$\boxed{4}$ maxY	Maximum value of the Y-data

Reg Sub-menu ($\boxed{\text{SHIFT}}$ $\boxed{1}$ (STAT) $\boxed{7}$ (Reg))

Select this menu item:	When you want to obtain this:
$\boxed{1}$ A	Regression coefficient constant term A
$\boxed{2}$ B	Regression coefficient B
$\boxed{3}$ r	Correlation coefficient r
$\boxed{4}$ $\hat{x}$	Estimated value of x
$\boxed{5}$ $\hat{y}$	Estimated value of y

Appendix Linear Regression Calculation: <#047> to <#050>

- Examples <#048> through <#050> all use the data input in Example <#047>.

  *1 Estimated Value $(y = -3 \rightarrow \hat{x} = ?)$

  *2 Estimated Value $(x = 2 \rightarrow \hat{y} = ?)$

Commands when Quadratic Regression Calculation ($\_+CX^2$) Is Selected

With quadratic regression, regression is performed in accordance with the following model equation.

$$y = A + BX + CX^2$$

See **Appendix** <#051> for information about the calculation formula used for each command.

Reg Sub-menu ([SHIFT] [1] (STAT) [7] (Reg))

Select this menu item:	When you want to obtain this:
[1] A	Regression coefficient constant term A
[2] B	Linear coefficient B of the regression coefficients
[3] C	Quadratic coefficient C of the regression coefficients
[4] $\hat{x}$1	Estimated value of x1
[5] $\hat{x}$2	Estimated value of x2
[6] $\hat{y}$	Estimated value of y

- Sum sub-menu (sums), Var sub-menu (number of samples, mean, standard deviation), and MinMax sub-menu (maximum value, minimum value) operations are the same those for linear regression calculations.

Appendix Quadratic Regression Calculation: <#052> to <#054>

- Examples <#052> through <#054> all use the data input in Example <#047>.

Comments for Other Types of Regression

For details about the calculation formula of the command included in each regression type, refer to the indicated calculation formulas (**Appendix** <#055> to <#059>).

Statistical Calculation Type	Model Equation	Calculation Formula
Logarithmic Regression (ln X)	$y = A + B\ln X$	<#055>
e Exponential Regression (e^X)	$y = Ae^{BX}$	<#056>
ab Exponential Regression (A•B^X)	$y = AB^X$	<#057>
Power Regression (A•X^B)	$y = AX^B$	<#058>
Inverse Regression (1/X)	$y = A + \dfrac{B}{X}$	<#059>

Appendix Comparison of Regression Curves

• The following example uses the data input in Example <#047>.
<#060> Compare the correlation coefficient for logarithmic, e exponential, ab exponential, power, and inverse regression.

(FREQ: OFF)

Appendix Other Types of Regression Calculation: <#061> to <#065>

Command Usage Tips

• The commands included in the Reg sub-menu can take a long time to execute in logarithmic, e exponential, ab exponential, or power regression calculation when there are a large number of data samples.

Generating a Number Table from a Function (TABLE)

All calculations in this section are performed in the TABLE Mode (MODE 3).

■ Configuring a Number Table Generation Function
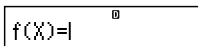
The procedure below configures the number table generation function with the following settings.

Function: $f(x) = x^2 + \dfrac{1}{2}$

Start Value: 1, End Value: 5, Step Value: 1
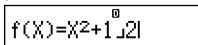
LINE

(1) Press MODE 3 (TABLE).

```
f(X)=|          ▯
```

(2) Input the function.

```
f(X)=X²+1⌟2|     ▯
```
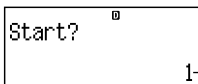
(3) After making sure the function is the way you want, press ▤.
  • This displays the start value input screen.

```
Start?           ▯

              1
```
Indicates the initial default start value of 1.

  • If the initial value is not 1, press 1 to specify the initial start value for this example.

(4) After specifying the start value, press ▤.
  • This displays the end value input screen.

```
End?             ▯

              5
```
Indicates the initial default end value of 5.

  • Specify the end value.

(5) After specifying the end value, press ▤.
  • This displays the step value input screen.

```
Step?            ▯

              1
```
Indicates the initial default step value of 1.

  • Specify the step value.
  • For details about specifying the start, end, and step values, see "Start, End, and Step Value Rules".

(6) After specifying the step value, press ▤.

```
   X   | F(X)         ▯
 1     | 1.5
 2     | 4.5
 3     | 9.5
              1
```

  • Pressing the AC key returns to the function editor screen.

■ Supported Function Types

  • Except for the X variable, other variables (A, B, C, D, Y) and independent memory (M) are all treated as values (the current variable assigned to the variable or stored in independent memory).

- Only variable X can be used as the variable of a function.
- The coordinate conversion (Pol, Rec) functions cannot be used for a number table generation function.
- Note that the number table generation operation causes the contents of variable X to be changed.

■ Start, End, and Step Value Rules

- Linear format is always used for value input.
- You can specify either values or calculation expressions (which must produce a numeric result) for Start, End, and Step.
- Specifying an End value that is less than the Start value causes an error, so the number table is not generated.
- The specified Start, End, and Step values should produce a maximum of 30 x-values for the number table being generated. Executing a number generation table using a Start, End, and Step value combination that produces more than 30 x-values causes an error.

Note

- Certain functions and Start, End, Step value combinations can cause number table generation to take a long time.

■ Number Table Screen

The number table screen shows x-values calculated using the specified Start, End, and Step values, as well as the values obtained when each x-value is substituted in the function $f(x)$.
- Note that you can use the number table screen for viewing values only. Table contents cannot be edited.
- Pressing the [AC] key returns to the function editor screen.

■ TABLE Mode Precautions

Note that changing the input/output format settings (Math format or Linear format) on the calculator's setup screen while in the TABLE Mode clears the number table generation function.

Technical Information

■ Calculation Priority Sequence

The calculator performs calculations according to a calculation priority sequence.
• Basically, calculations are performed from left to right.
• Expressions within parentheses have the highest priority.
• The following shows the priority sequence for each individual command.

1. Function with parentheses:
   Pol(, Rec(
   sin(, cos(, tan(, sin^{-1}(, cos^{-1}(, tan^{-1}(, sinh(, cosh(, tanh(, sinh^{-1}(, cosh^{-1}(, tanh^{-1}(
   log(, ln(, e^(, 10^(, $\sqrt{\ }$(, $^3\sqrt{\ }$(
   Abs(
   Rnd(
2. Functions preceded by values, powers, power roots:
   x^2, x^3, x^{-1}, $x!$, ° ' ", °, ^{r}, ^{g}, ^(, $^x\sqrt{\ }$(
   Percent %
3. Fractions: a^b/c
4. Prefix symbol: (−) (negative sign)
5. Statistical estimated value calculation: $\hat{x}$, $\hat{y}$, $\hat{x}_1$, $\hat{x}_2$
6. Permutations, combinations: nPr, nCr
7. Multiplication and division: ×, ÷
   Multiplication where sign is omitted: Multiplication sign omitted immediately before π, e, variables (2π, 5A, πA, etc.), functions with parentheses (2$\sqrt{\ }$(3), Asin(30), etc.)
8. Addition and subtraction: +, −

If a calculation contains a negative value, you may need to enclose the negative value in parentheses. If you want to square the value −2, for example, you need to input: (−2)^2. This is because x^2 is a function preceded by a value (Priority 2, above), whose priority is greater than the negative sign, which is a prefix symbol (Priority 4).

Example:

(−) 2 x^2 =	−2^2 = −4
((−) 2) x^2 =	(−2)^2 = 4

Multiplication and division, and multiplication where the sign is omitted are the same priority (Priority 7), so these operations are performed from left to right when both types are mixed in the same calculation. Enclosing an operation within parentheses causes it to be performed first, so the use of parentheses can result in different calculation results.

Example:

1 ÷ 2 SHIFT ×10^x (π) =	1 ÷ 2π = 1.570796327
1 ÷ (2 SHIFT ×10^x (π)) =	1 ÷ (2π) = 0.1591549431

■ Stack Limitations

This calculator uses memory areas called *stacks* to temporarily store lower calculation priority sequence values, commands, and functions. The *numeric stack* has 10 levels and the *command stack* has 24 levels, as shown in the illustration below.

$$2 \times ((3 + 4 \times (5 + 4) \div 3) \div 5) + 8 =$$

Numeric Stack

①	**2**
②	**3**
③	**4**
④	**5**
⑤	**4**
⋮	

Command Stack

1	×
2	(
3	(
4	+
5	×
6	(
7	+
⋮	

A Stack ERROR occurs when the calculation you are performing causes the capacity of either stack to be exceeded.

■ Calculation Ranges, Number of Digits, and Precision

The calculation range, number of digits used for internal calculation, and calculation precision depends 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
$\sin x$	DEG	$0 \leqq |x| < 9 \times 10^9$
	RAD	$0 \leqq |x| < 157079632.7$
	GRA	$0 \leqq |x| < 1 \times 10^{10}$
$\cos x$	DEG	$0 \leqq |x| < 9 \times 10^9$
	RAD	$0 \leqq |x| < 157079632.7$
	GRA	$0 \leqq |x| < 1 \times 10^{10}$

Functions		Input Range
$\tan x$	DEG	Same as $\sin x$, except when $|x| = (2n-1) \times 90$.
	RAD	Same as $\sin x$, except when $|x| = (2n-1) \times \pi/2$.
	GRA	Same as $\sin x$, except when $|x| = (2n-1) \times 100$.
$\sin^{-1}x$ $\cos^{-1}x$		$0 \leqq |x| \leqq 1$
$\tan^{-1}x$		$0 \leqq |x| \leqq 9.999999999 \times 10^{99}$
$\sinh x$ $\cosh x$		$0 \leqq |x| \leqq 230.2585092$
$\sinh^{-1}x$		$0 \leqq |x| \leqq 4.999999999 \times 10^{99}$
$\cosh^{-1}x$		$1 \leqq x \leqq 4.999999999 \times 10^{99}$
$\tanh x$		$0 \leqq |x| \leqq 9.999999999 \times 10^{99}$
$\tanh^{-1}x$		$0 \leqq |x| \leqq 9.999999999 \times 10^{-1}$
$\log x/\ln x$		$0 < x \leqq 9.999999999 \times 10^{99}$
10^x		$-9.999999999 \times 10^{99} \leqq x \leqq 99.99999999$
e^x		$-9.999999999 \times 10^{99} \leqq x \leqq 230.2585092$
$\sqrt{x}$		$0 \leqq x < 1 \times 10^{100}$
x^2		$|x| < 1 \times 10^{50}$
$1/x$		$|x| < 1 \times 10^{100}; x \neq 0$
$\sqrt[3]{x}$		$|x| < 1 \times 10^{100}$
$x!$		$0 \leqq x \leqq 69$ (x is an integer)
nPr		$0 \leqq n < 1 \times 10^{10}, 0 \leqq r \leqq n$ (n, r are integers) $1 \leqq \{n!/(n-r)!\} < 1 \times 10^{100}$
nCr		$0 \leqq n < 1 \times 10^{10}, 0 \leqq r \leqq n$ (n, r are integers) $1 \leqq n!/r! < 1 \times 10^{100}$ or $1 \leqq n!/(n-r)! < 1 \times 10^{100}$
Pol(x, y)		$|x|, |y| \leqq 9.999999999 \times 10^{99}$ $\sqrt{x^2+y^2} \leqq 9.999999999 \times 10^{99}$
Rec(r, θ)		$0 \leqq r \leqq 9.999999999 \times 10^{99}$ θ: Same as $\sin x$
° ' "		$|a|, b, c < 1 \times 10^{100}$ $0 \leqq b, c$
$\overleftarrow{\text{° ' "}}$		$|x| < 1 \times 10^{100}$ Decimal $\leftrightarrow$ Sexagesimal Conversions $0°0'0'' \leqq |x| \leqq 9999999°59'59''$
$\wedge(x^y)$		$x>0$: $-1 \times 10^{100} < y\log x < 100$ $x=0$: $y>0$ $x<0$: $y=n, \dfrac{m}{2n+1}$ (m, n are integers) However: $-1 \times 10^{100} < y\log |x| < 100$
$\sqrt[x]{y}$		$y>0$: $x \neq 0, -1 \times 10^{100} < 1/x \log y < 100$ $y=0$: $x>0$ $y<0$: $x=2n+1, \dfrac{2n+1}{m}$ ($m \neq 0$; m, n are integers) However: $-1 \times 10^{100} < 1/x \log |y| < 100$
a^{b}/c		Total of integer, numerator, and denominator must be 10 digits or less (including division marks).

- Precision is basically the same as that described under "Calculation Range and Precision", above.
- $\land(x^y)$, $^x\sqrt{y}$, $^3\sqrt{}$, $x!$, 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.

■ Error Messages

The calculator will display an error message when a result exceeds the calculation range, when you attempt an illegal input, or whenever any other similar problem occurs.

When an error message appears...

The following are general operations you can use when any error message appears.
- Pressing ◀ or ▶ displays to the calculation expression editing screen you were using before the error message appeared, with the cursor located at the position of the error. For more information, see "Displaying the Location of an Error".
- Pressing AC clears the calculation expression you input before the error message appeared. You can then re-input and re-execute the calculation, if you want. Note that in this case, the original calculation will not be retained in calculation history memory.

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 or a variable as the argument of a function, make sure that the memory or variable 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.

Insufficient MEM Error

- **Cause**
  - There is not enough memory to perform your calculation.
- **Action**
  - Narrow the table calculation range by changing the Start, End, and Step values, and try again.

■ 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) Make sure that you are using the correct mode for the type of calculation you are trying to perform.

(3) 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 initializes the calculation mode and clears memory contents. For details about initialized settings, see "Initializing the Calculation Mode and Other Settings" under "Calculation Modes and Calculator Setup".

(4) Initialize all modes and settings by performing the following operation: [SHIFT] [9] (CLR) [1] (Setup) [=] (Yes).

Reference

■ Power Requirements and Battery Replacement

fx-85ES/fx-300ES

Your calculator uses a TWO WAY POWER system that combines a solar cell with button battery (LR44 (GPA76)).

Normally, calculators equipped with a solar cell alone can operate only when relatively bright light is present. The TWO WAY POWER system, however, lets you continue to use the calculator as long as there is enough light to read the display.

Replacing the Battery

Dim display figures when available lighting is dim or failure of anything to appear on the display immediately when you turn on the calculator indicates that button battery power is low. Note that you will not be able to use the calculator if its button battery is dead. When any of these symptoms occur, replace the button battery.

Even if the calculator is operating normally, replace the battery at least once every three years.

Important!

- Removing the button battery from the calculator causes independent memory contents and values assigned to variables to be cleared.

Screw —

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 On the back of the calculator, remove the screw and the battery cover.
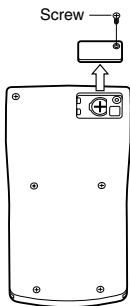
③ Remove the old battery.

④ Wipe a new battery with a dry cloth, and then load it into the calculator with its positive ⊕ side facing upwards (so you can see it).

⑤ Replace the battery cover and secure it in place with its screw.

⑥ Perform the following key operation:
  [ON] [SHIFT] [9] (CLR) [3] (All) [=] (Yes).
  - Make sure you perform the above key operation. Do not skip it.

fx-82ES/fx-83ES/fx-350ES

fx-82ES/fx-83ES: This calculator is powered by a single AAA-size battery (R03 (UM-4)).

fx-350ES: This calculator is powered by a single AAA-size battery (LR03 (AM4)).

Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures becomes dim.

Even if the calculator is operating normally, replace the battery at least once every two years (R03 (UM-4)) or one year (LR03 (AM4)).

Important!

- Removing the battery from the calculator causes independent memory contents and values assigned to variables to be cleared.

1 Press SHIFT AC (OFF) to turn off the calculator.

2 On the back of the calculator, remove the screws and the back cover.

3 Remove the old battery.

4 Load a new battery into the calculator with its positive ⊕ and negative ⊖ ends facing correctly.

5 Replace the back cover and secure it in place with its screws.

6 Perform the following key operation:
ON SHIFT 9 (CLR) 3 (All) = (Yes).
   • Make sure you perform the above key operation. Do not skip it.
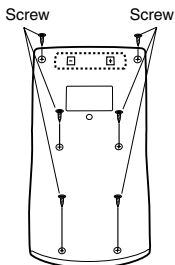
Auto Power Off

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

Specifications

fx-82ES/fx-83ES

Power Requirements:
AAA-size battery: R03 (UM-4) × 1

Battery Life: Approximately 6,000 hours (continuous operation)
Approximately 17,000 hours (continuous display of flashing cursor)

Power Consumption: 0.0002 W

Operating Temperature: 0°C to 40°C

Dimensions: 13.7 (H) × 80 (W) × 161 (D) mm
$^9/_{16}$″ (H) × 3$^1/_8$″ (W) × 6$^5/_{16}$″ (D)

Approximate Weight: 110 g (3.9 oz) including the battery

Bundled Items: Hard Case

fx-350ES

Power Requirements:
AAA-size battery: LR03 (AM4) × 1

Battery Life: Approximately 8,700 hours (continuous operation)

Power Consumption: 0.0002 W

Operating Temperature: 0°C to 40°C

Dimensions: 13.7 (H) × 80 (W) × 161 (D) mm
$^9/_{16}$″ (H) × 3$^1/_8$″ (W) × 6$^5/_{16}$″ (D)

Approximate Weight: 110 g (3.9 oz) including the battery

Bundled Items: Hard Case

fx-85ES/fx-300ES

Power Requirements:
Solar Cell: Built into the front of the calculator
Button Battery: LR44 (GPA76) × 1

Battery Life: Approximately 3 years (Based on one hour of operation per day.)

Operating Temperature: 0°C to 40°C

Dimensions: 12.2 (H) × 80 (W) × 161 (D) mm
$^1/_2$″ (H) × 3$^1/_8$″ (W) × 6$^5/_{16}$″ (D)

Approximate Weight: 105 g (3.7 oz) including the battery

Bundled Items: Hard Case

CASIO®

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com