Questo manuale d'istruzione è fornito da trovaprezzi.it. Scopri tutte le offerte per Casio FX-82MS-2 o cerca il tuo prodotto tra le migliori offerte di Calcolatrici

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fx-82MS
fx-82SX PLUS
fx-85MS
fx-220 PLUS
fx-300MS
fx-350MS

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User's Guide

CASIO Worldwide Education Website
http://edu.casio.com

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CASIO®

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1. 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.

2. 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 "3. Initializing the Calculator" to return the calculator to its initial default setup.

3. 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.

fx-82MS/85MS/300MS/350MS: [ON] [SHIFT] [MODE] (CLR) [3] (All) [=]
fx-82SX PLUS/220 PLUS: [ON] [CLR] [3] (All) [=]

4. 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.

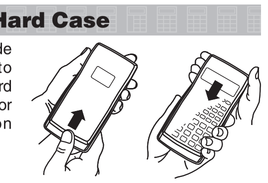
5. Handling Precautions

- **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 (fx-82MS/82SX PLUS/220 PLUS), or three years (fx-85MS/300MS/350MS). 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 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.

6. 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.



7. 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.

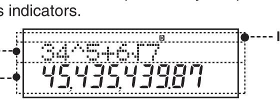
8. Adjusting Display Contrast

1. Press the [MODE] key a number of times until you reach the setup screen shown to the right. (Disp ◄CONT► 1 2)
2. Press [2].
3. Use ◄ and ► to adjust contrast.
4. 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.

9. Reading the Display

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



10. Specifying the Calculation Mode

When you want to perform this type of operation:	Perform this key operation:
General calculations	[MODE] [1] (COMP)
Standard deviation	[MODE] [2] (SD)
Regression calculations (fx-82MS/85MS/300MS/350MS only)	[MODE] [3] (REG)

Note: • The initial default calculation mode is the COMP Mode.
• Mode indicators appear in the upper part of the display. Be sure to check the current calculation mode (COMP, SD, REG) and angle unit setting (Deg, Rad, Gra) before beginning a calculation.

11. Configuring the Calculator Setup

Pressing the [MODE] key more than once displays additional setup screens. Underlined (___) settings are initial defaults.

[1] **Deg** [2] **Rad** [3] **Gra** Specifies degrees, radians or grads as the angle unit for value input and calculation result display. (Deg Rad Gra 1 2 3)

Note: In this manual, the **Deg** symbol next to a sample operation indicates degrees.

[1] **Fix** [2] **Sci** [3] **Norm** Specifies the number of digits for display of a calculation result. (Fix Sci Norm 1 2 3)

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 ÷ 7 = 14.286 (Fix 3)

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 ÷ 7 = 1.4286 × 10^{-1} (Sci 5)

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: 1 ÷ 200 = 5 × 10^{-3} (Norm 1); 0.005 (Norm 2)

(Disp ◄CONT► 1 2 → [1] → ab/c d/c 1 2 ⇄ Dot Comma 1 2)

[1] **ab/c** [2] **d/c** Specifies either mixed fraction (ab/c) or improper fraction (d/c) for display of fractions in calculation results.

[1] **Dot** [2] **Comma** Specifies whether to display a dot or a comma for the calculation result decimal point. A dot is always displayed during input.

■ Initializing Calculator Settings

Perform the following procedure to initialize the calculator, which returns the calculation mode to COMP and returns all other settings, including setup menu settings, to their initial defaults.

fx-82MS/85MS/300MS/350MS: [ON] [SHIFT] [MODE] (CLR) [2] (Mode) [=]
fx-82SX PLUS/220 PLUS: [ON] [CLR] [2] (Mode) [=]

12. Inputting Expressions and Values

✎ 4 × sin30 × (30 + 10 × 3) = 120 **Deg**
4 [×] [sin] 30 [×] [(] 30 [+] 10 [×] 3 [)] [=] → 4×sin30×(30 / 120.

Note: • The memory area used for calculation input can hold 79 "steps". One step is taken up each time you press a number key or arithmetic operator key ([+], [−], [×], [÷]). A [SHIFT] or [ALPHA] (fx-82MS/85MS/300MS/350MS only) key operation does not take up a step, so inputting [SHIFT] [x^3] ($\sqrt[3]{\ }$), for example, takes up only one step.
• Whenever you input the 73rd step of any calculation, the cursor changes from "_" to "■" to let you know memory is running low.

■ Calculation Priority Sequence

When the priority of two expressions is the same, the calculation is performed from left to right.

1st	Function with parentheses: Pol(x, y), Rec(r, θ), RanInt#(a, b)* (*fx-82SX PLUS/220 PLUS only)
2nd	Type A functions: With these functions, the value is entered and then the function key is pressed. (x^3, x^2, x^{-1}, $x!$, ° ' ", $\hat{x}$, $\hat{x}_1$, $\hat{x}_2$, $\hat{y}$, °, r, g)
3rd	Powers and roots: ^(x^y), $\sqrt[x]{\ }$
4th	Fractions
5th	Implied multiplication of π, e (natural logarithm base), memory name, or variable name: 2π, 3e, 5A, πA, etc.
6th	Type B functions: With these functions, the function key is pressed and then the value is entered. ($\sqrt{\ }$, $\sqrt[3]{\ }$, log, ln, e^x, 10^x, sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$, (−))
7th	Implied multiplication of Type B functions: 2$\sqrt{3}$, Alog2, etc.
8th	Permutation (nPr), combination (nCr)
9th	Multiplication, division (×, ÷)
10th	Addition, subtraction (+, −)

■ Correcting and Clearing an Expression

To delete a single character or function:
1234_ → ◄ ◄ [DEL] → 124

To insert a character or function into a calculation:
123_ → ◄ [SHIFT] [DEL] (INS) [4] → 1243
• The cursor changes from "_" to "[ ]".

To clear all of the calculation you are inputting: Press [AC].

13. Basic Calculations

■ Fraction Calculations

✎ $\frac{2}{3} + \frac{1}{2} = 1\frac{1}{6}$ 2 [a b/c] 3 [+] 1 [a b/c] 2 [=] **1⌟1⌟6.**

✎ $4 - 3\frac{1}{2} = \frac{1}{2}$ 4 [−] 3 [a b/c] 1 [a b/c] 2 [=] **1⌟2.**

Note: • Mixing fractions and decimal values in a calculation will cause the result to be displayed as a decimal value. • Fractions in calculation results are displayed after being reduced to their lowest terms.

To switch a calculation result between improper fraction and mixed fraction format: Press [SHIFT] [a b/c] (d/c).

To switch a calculation result between fraction and decimal format: Press [a b/c].

■ Percent Calculations

✎ 150 × 20% = 30 150 [×] 20 [SHIFT] [=] (%) **30.**

✎ Calculate what percentage of 880 is 660. (75%)
660 [÷] 880 [SHIFT] [=] (%) **75.**

✎ Increase 2500 by 15%. (2875)
2500 [×] 15 [SHIFT] [=] (%) [+] **2875.**

✎ Discount 3500 by 25%. (2625)
3500 [×] 25 [SHIFT] [=] (%) [−] **2625.**

✎ If 300 grams are added to a test sample originally weighing 500 grams, what is the percentage increase in weight? (160%)
300 [+] 500 [SHIFT] [=] (%) **160.**

✎ What is the percentage change when a value is increased from 40 to 46? (15%)
46 [−] 40 [SHIFT] [=] (%) **15.**

■ Degree, Minute, Second (Sexagesimal) Calculations

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.) [SHIFT] [° ' "] (←) **2°15°18.**

■ Multi-Statements (fx-82MS/85MS/300MS/350MS only)

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

✎ 3 + 3 : 3 × 3 3 [+] 3 [ALPHA] [Pol(] (:) 3 [×] 3 [=] **6.Disp**
[=] **9.**

■ Using Engineering Notation

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

✎ Transform the value 1234 to engineering notation, shifting the decimal point to the right.
1234 [=] **1234.**
[ENG] **1.234×10³**
[ENG] **1234.×10⁰**

■ Calculation History (Not included on the fx-82SX PLUS)

In the COMP Mode, the calculator remembers up to approximately 150 bytes of data for the newest calculation. You can scroll through calculation history contents using ▲ and ▼.

✎ 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 to a different calculation mode, or whenever you initialize modes and settings.

■ Replay (Not included on the fx-82SX PLUS)

While a calculation result is on the display, you can press ◄ or ► to edit the expression you used for the previous calculation.

✎ <u>4 × 3</u> + 2.5 = 14.5 4 [×] 3 [+] 2.5 [=] **14.5**
<u>4 × 3</u> − 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
3 [×] 4 [=] **12.**
(Continuing) [÷] 30 [=] (Ans÷30 / 0.4)

✎ 123 + 456 = <u>579</u> 123 [+] 456 [=] **579.**
789 − <u>579</u> = 210 (Continuing) 789 [−] [Ans] [=] **210.**

■ Variables (A, B, C, D, E, F, X, Y) (fx-82MS/85MS/300MS/350MS only)

Your calculator has eight preset variables named A, B, C, D, E, F, X, and Y.

✎ To assign the result of 3 + 5 to variable A
3 [+] 5 [SHIFT] [RCL] (STO) [(−)] (A) **8.**

✎ To multiply the contents of variable A by 10
(Continuing) [ALPHA] [(−)] (A) [×] 10 [=] **80.**

✎ To recall the contents of variable A
(Continuing) [RCL] [(−)] (A) **8.**

✎ To clear the contents of variable A
0 [SHIFT] [RCL] (STO) [(−)] (A) **0.**

■ 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
fx-82MS/85MS/300MS/350MS: 0 [SHIFT] [RCL] (STO) [M+] (M) **0.**
fx-82SX PLUS/220 PLUS: 0 [SHIFT] [MR] (Min) **0.**

✎ 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 [SHIFT] [M+] (M−) **15.**

✎ To recall the contents of M
fx-82MS/85MS/300MS/350MS: (Continuing) [RCL] [M+] (M) **35.**
fx-82SX PLUS/220 PLUS: (Continuing) [MR] **35.**

Note: Variable M is used for independent memory.

■ Clearing the Contents of All Memories

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

fx-82MS/85MS/300MS/350MS: [ON] [SHIFT] [MODE] (CLR) [1] (Mcl) [=]
fx-82SX PLUS/220 PLUS: [ON] [CLR] [1] (Mcl) [=]

14. Function Calculations

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

e (fx-82MS/85MS/300MS/350MS only): e is displayed as 2.718281828, but e = 2.71828182845904 is used for internal calculations.

sin, cos, tan, sin⁻¹, cos⁻¹, tan⁻¹: Trigonometric functions. Specify the angle unit before performing calculations. See ✎1.

sinh, cosh, tanh, sinh⁻¹, cosh⁻¹, tanh⁻¹: Hyperbolic functions. The angle unit setting does not affect calculations. See ✎2.

°, r, g: These functions specify the angle unit. ° specifies degrees, r radians, and g grads. Input a function from the menu that appears when you perform the following key operation: [SHIFT] [Ans] (DRG►). See ✎3.

10^x, e^x: Exponential functions. See ✎4.

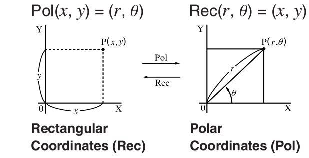
log: Logarithmic function. See ✎5.

ln: Natural logarithm to base e. See ✎6.

x^2, x^3, ^(x^y), $\sqrt{\ }$, $\sqrt[3]{\ }$, $\sqrt[x]{\ }$, x^{-1}: Powers, power roots, and reciprocals. See ✎7.

Pol, Rec: Pol converts rectangular coordinates to polar coordinates, while Rec converts polar coordinates to rectangular coordinates. See ✎8.

Pol(x, y) = (r, θ) Rec(r, θ) = (x, y)



Specify the angle unit before performing calculations.
Calculation result θ is displayed in the range of −180° < θ ≦ 180°.

x!: Factorial function. See ✎9.

Ran#: Generates a 3-digit pseudo random number that is less than 1. See ✎10.

RanInt# (fx-82SX PLUS/220 PLUS only): For input of the function of the form RanInt#(a, b), which generates a random integer within the range of a to b. See ✎11.

***n*P*r*, *n*C*r*:** Permutation (nPr) and combination (nCr) functions. See ✎12.

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, Fix, or Sci). With Norm 1 or Norm 2, the argument is rounded off to 10 digits. See ✎13.

Note: Using functions can slow down a calculation, which may delay display of the result. To interrupt an ongoing calculation before its result appears, press [AC].

■ Examples

✎1 sin 30°= 0.5 **Deg** [sin] 30 [=] **0.5**
$\sin^{-1}$0.5 = 30° **Deg** [SHIFT] [sin] ($\sin^{-1}$) 0.5 [=] **30.**

✎2 sinh 1 = 1.175201194 [hyp] [sin] (sinh) 1 [=] **1.175201194**
$\cosh^{-1}$ 1 = 0 [hyp] [SHIFT] [cos] ($\cosh^{-1}$) 1 [=] **0.**

✎3 π/2 radians = 90°, 50 grads = 45° **Deg**
[(] [SHIFT] [EXP] (π) [÷] 2 [)] [SHIFT] [Ans] (DRG►) [2] (R) [=] **90.**
50 [SHIFT] [Ans] (DRG►) [3] (G) [=] **45.**

✎4 To calculate e^5 × 2 to three significant digits (Sci 3)
[MODE] ····· [2] (Sci) [3] [SHIFT] [ln] (e^x) 5 [×] 2 [=] **2.97×10²**

✎5 log 1000 = 3 [log] 1000 [=] **3.**

✎6 To calculate ln 90 (= $\log_e$ 90) to three significant digits (Sci 3)
[MODE] ····· [2] (Sci) [3] [ln] 90 [=] **4.50×10⁰**

✎7 1.2 × 10³ = 1200 1.2 [×] 10 [^] 3 [=] **1200.**
(5²)³ = 15625 [(] 5 [x^2] [)] [x^3] [=] **15625.**

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$\sqrt[5]{32} = 2$ 5 SHIFT $\sqrt{\ }$ ($\sqrt[x]{\ }$) 32 = **2.**

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

MODE ····· 1 (Fix) 3 $\sqrt{\ }$ 2 × 3 = **4.243**

8 To convert rectangular coordinates ($\sqrt{2}$, $\sqrt{2}$) to polar coordinates **Deg**

fx-82MS/85MS/300MS/350MS:

Pol($\sqrt{\ }$ 2) $\sqrt{\ }$ 2) = **r=2.**

RCL tan (F) **θ=45.**

- Press RCL cos (E) to display the value of r, or RCL tan (F) to display the value of θ.

fx-82SX PLUS/220 PLUS:

Pol($\sqrt{\ }$ 2 (,) $\sqrt{\ }$ 2) = **r=2.**

SHIFT Rec((y,θ) = **θ=45.**

- Press SHIFT Pol((x,r) = to display the value of r, or SHIFT Rec((y,θ) = to display the value of θ.

To convert polar coordinates ($\sqrt{2}$, 45°) to rectangular coordinates **Deg**

fx-82MS/85MS/300MS/350MS:

SHIFT Pol((Rec( ) $\sqrt{\ }$ 2) 45 = **x=1.**

RCL tan (F) **y=1.**

- Press RCL cos (E) to display the value of x, or RCL tan (F) to display the value of y.

fx-82SX PLUS/220 PLUS: Rec($\sqrt{\ }$ 2 (,) 45 = **x=1.**

SHIFT Rec((y,θ) = **y=1.**

- Press SHIFT Pol((x,r) = to display the value of x, or SHIFT Rec((y,θ) = to display the value of y.

9 (5 + 3) ! = 40320 (5 + 3) SHIFT $x!$ (!) = **40320.**

10 To obtain two random three-digit integers

1000 SHIFT · (Ran#) = **459.**

= **48.**

(Actual results will differ.)

11 To generate random integers in the range of 1 to 6 (fx-82SX PLUS/220 PLUS only)

SHIFT 2 (RanInt) 1 SHIFT (,) 6) = **2.**

= **6.**

(Actual results will differ.)

12 To determine the number of permutations and combinations possible when selecting four people from a group of 10

Permutations: 10 SHIFT $_nC_r$ (nPr) 4 = **5040.**

Combinations: 10 $_nC_r$ 4 = **210.**

13 To perform the following calculations when Fix 3 is selected for the number of display digits: 10 ÷ 3 × 3 and Rnd(10 ÷ 3) × 3

MODE ····· 1 (Fix) 3 10 ÷ 3 × 3 = **10.000**

10 ÷ 3 = SHIFT 0 (Rnd) × 3 = **9.999**

15. Statistical Calculations (SD, REG*) *fx-82MS/85MS/300MS/350MS only

To select this type of statistical calculation: (Regression formula shown in parentheses)	**Perform this key operation:**
Single-variable (X)	MODE 2 (SD)
Paired-variable (X, Y), linear regression ($y = A + Bx$)	MODE 3 (REG) 1 (Lin)
Paired-variable (X, Y), logarithmic regression ($y = A + B\ln x$)	MODE 3 (REG) 2 (Log)
Paired-variable (X, Y), e exponential regression ($y = Ae^{Bx}$)	MODE 3 (REG) 3 (Exp)
Paired-variable (X, Y), power regression ($y = Ax^B$)	MODE 3 (REG) ▶ 1 (Pwr)
Paired-variable (X, Y), inverse regression ($y = A + B/x$)	MODE 3 (REG) ▶ 2 (Inv)
Paired-variable (X, Y), quadratic regression ($y = A + Bx + Cx^2$)	MODE 3 (REG) ▶ 3 (Quad)

■ Inputting Data

- In the SD Mode and REG Mode, the M+ key operates as the DT key.
- Always start data input with SHIFT MODE (CLR) 1 (Scl) = (CLR 1 (Scl) = on the fx-82SX PLUS/220 PLUS) to clear statistical memory.
- Input data using the key sequence shown below.
  SD Mode: <x-data> DT
  REG Mode: <x-data> ▶ <y-data> DT
- DT DT inputs the same data twice.
- You can also input multiple entries of the same data using SHIFT ▶ (;) (SHIFT) (;) on the fx-82SX PLUS/220 PLUS).

■ Data Input Precautions

- While inputting data or after inputting data is complete, you can use the ▲ and ▼ keys to scroll through data you have input. If you input multiple entries of the same data using SHIFT ▶ (;) (SHIFT) (;) on the fx-82SX PLUS/220 PLUS) to specify the data frequency (number of data items) as described above, scrolling through data shows both the data item and a separate screen for the data frequency (Freq).
- Input the new value and then press the = key to replace the old value with the new one. This also means that if you want to perform some other operation, you should always press the AC key first to exit data display.
- Pressing the DT key instead of = after changing a value on the display registers the value you input as a new data item, and leaves the old value as it is.
- You can delete a data value displayed using ▲ and ▼ by pressing SHIFT M+ (CL). Deleting a data value causes all values following it to be shifted up.
- The message "Data Full" appears and you will not be able to input any more data if there is no memory left for data storage. If this happens, press the = key to display the screen shown below. Press 2 to exit data input without registering the value you just input. Press 1 if you want to register the value you just input. If you do this, however, you will not be able to display or edit any of the data you have input.

  Edit OFF ESC
  1 2
- After inputting statistical data in the SD Mode or REG Mode, you will be unable to display or edit individual data items any longer after perform either the following operations: changing to another mode; changing the regression type.
- Entering the REG Mode and selecting a regression type (Lin, Log, Exp, Pwr, Inv, Quad) clear variables A through F, X, and Y.
- Do not use variables A through F, X, or Y to store data when performing statistical calculations.

■ Obtaining Statistical Values from Input Data

Supported statistical variables and the keys you should press to recall them are shown below.

fx-82SX PLUS/220 PLUS:

Sum: Σx^2, Σx, **Number of Items:** n, **Mean:** $\bar{x}$, **Population Standard Deviation:** σ_x, **Sample Standard Deviation:** s_x

SHIFT 4 to 9

fx-82MS/85MS/300MS/350MS:

For single-variable statistical calculations, the variables marked with an asterisk (*) are available.

Sum: Σx^{2*}, Σx^*, Σy^2, Σy, Σxy, Σx^3, Σx^2y, Σx^4, **Number of Items:** n^*

Σx^2, Σx, n ..... SHIFT 1 (S-SUM) 1 to 3

Σy^2, Σy, Σxy ..... SHIFT 1 (S-SUM) ▶ 1 to 3

Σx^3, Σx^2y, Σx^4 ..... SHIFT 1 (S-SUM) ▶ ▶ 1 to 3 (Quadratic Regression only)

Mean: $\bar{x}^*$, $\bar{y}$, **Population Standard Deviation:** σ_x^*, σ_y, **Sample Standard Deviation:** s_x^*, s_y

$\bar{x}$, σ_x, s_x ..... SHIFT 2 (S-VAR) 1 to 3

$\bar{y}$, σ_y, s_y ..... SHIFT 2 (S-VAR) ▶ 1 to 3

Regression Coefficients: A, B, **Correlation Coefficient:** r

Regression Coefficients for Quadratic Regression: A, B, C

SHIFT 2 (S-VAR) ▶ ▶ 1 to 3

Estimated Values: $\hat{x}$, $\hat{y}$

Estimated Values for Quadratic Regression: $\hat{x}_1$, $\hat{x}_2$, $\hat{y}$

SHIFT 2 (S-VAR) ▶ ▶ ▶ 1 to 2 (or 3)

- $\hat{x}$, $\hat{x}_1$, $\hat{x}_2$ and $\hat{y}$ are not variables. They are commands of the type that take an argument immediately before them. See "Calculating Estimated Values" for more information.

1 To calculate the mean ($\bar{x}$) and population standard deviation (σ_x) for the following data: 55, 54, 51, 55, 53, 53, 54, 52

MODE 2 (SD)

55 DT 54 DT 51 DT 55 DT 53 DT DT 54 DT 52 DT

fx-82SX PLUS/220 PLUS: SHIFT 7 ($\bar{x}$) = **53.375**

SHIFT 8 (σ_x) = **1.316956719**

fx-82MS/85MS/300MS/350MS:

SHIFT 2 (S-VAR) 1 ($\bar{x}$) **53.375**

SHIFT 2 (S-VAR) 2 (σ_x) **1.316956719**

2 fx-82MS/85MS/300MS/350MS: To calculate the linear regression and logarithmic regression correlation coefficients (r) for the following paired-variable data and determine the regression formula for the strongest correlation: (x, y) = (20, 3150), (110, 7310), (200, 8800), (290, 9310). Specify Fix 3 (three decimal places) for results.

MODE 3 (REG) 1 (Lin) MODE ····· 1 (Fix) 3

20 ▶ 3150 DT 110 ▶ 7310 DT 200 ▶ 8800 DT 290 ▶ 9310 DT

SHIFT 2 (S-VAR) ▶ ▶ 3 (r) = **0.923**

MODE 3 (REG) 2 (Log)

20 ▶ 3150 DT 110 ▶ 7310 DT 200 ▶ 8800 DT 290 ▶ 9310 DT

SHIFT 2 (S-VAR) ▶ ▶ 3 (r) = **0.998**

SHIFT 2 (S-VAR) ▶ ▶ 1 (A) = **–3857.984**

SHIFT 2 (S-VAR) ▶ ▶ 2 (B) = **2357.532**

Logarithmic Regression Formula:
$y = -3857.984 + 2357.532\ln x$

■ Calculating Estimated Values

Based on the regression formula obtained by paired-variable statistical calculation, the estimated value of y can be calculated for a given x-value. The corresponding x-value (two values, x_1 and x_2, in the case of quadratic regression) also can be calculated for a value of y in the regression formula.

3 To determine the estimate value for y when x = 160 in the regression formula produced by logarithmic regression of the data in **2**. Specify Fix 3 for the result. (Perform the following operation after completing the operations in **2**.)

160 SHIFT 2 (S-VAR) ▶ ▶ ▶ 2 ($\hat{y}$) = **8106.898**

Important: Regression coefficient, correlation coefficient, and estimated value calculations can take considerable time when there are a large number of data items.

16. Calculation Ranges, Number of Digits, and Precision

■ Calculation Range and Precision

Calculation Range: $\pm 1 \times 10^{-99}$ to $9.999999999 \times 10^{99}$ 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	
$\sin x$ $\cos x$	DEG	$0 \leqq \lvert x \rvert < 9 \times 10^9$
	RAD	$0 \leqq \lvert x \rvert < 157079632.7$
	GRA	$0 \leqq \lvert x \rvert < 1 \times 10^{10}$
$\tan x$	DEG	Same as $\sin x$, except when $\lvert x \rvert = (2n-1) \times 90$.
	RAD	Same as $\sin x$, except when $\lvert x \rvert = (2n-1) \times \pi/2$.
	GRA	Same as $\sin x$, except when $\lvert x \rvert = (2n-1) \times 100$.
$\sin^{-1}x$ $\cos^{-1}x$		$0 \leqq \lvert x \rvert \leqq 1$
$\tan^{-1}x$		$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{99}$
$\sinh x$ $\cosh x$		$0 \leqq \lvert x \rvert \leqq 230.2585092$
$\sinh^{-1}x$		$0 \leqq \lvert x \rvert \leqq 4.999999999 \times 10^{99}$
$\cosh^{-1}x$		$1 \leqq x \leqq 4.999999999 \times 10^{99}$
$\tanh x$		$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{99}$
$\tanh^{-1}x$		$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{-1}$
$\log x$/$\ln x$		$0 < x \leqq 9.999999999 \times 10^{99}$
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		$\lvert x \rvert < 1 \times 10^{50}$
x^{-1}		$\lvert x \rvert < 1 \times 10^{100}$; $x \neq 0$
$\sqrt[3]{x}$		$\lvert x \rvert < 1 \times 10^{100}$
$x!$		$0 \leqq x \leqq 69$ (x is an integer)
${}_nP_r$		$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n, r are integers) $1 \leqq \{n!/(n-r)!\} < 1 \times 10^{100}$
${}_nC_r$		$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n, r are integers) $1 \leqq n!/r! < 1 \times 10^{100}$ or $1 \leqq n!/(n-r)! < 1 \times 10^{100}$
$\mathrm{Pol}(x, y)$		$\lvert x \rvert, \lvert y \rvert \leqq 9.999999999 \times 10^{99}$ $\sqrt{x^2+y^2} \leqq 9.999999999 \times 10^{99}$
$\mathrm{Rec}(r, \theta)$		$0 \leqq r \leqq 9.999999999 \times 10^{99}$ θ: Same as $\sin x$
°′″		$\lvert a \rvert$, 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.
°′″ ⇄		$\lvert x \rvert < 1 \times 10^{100}$ Decimal ↔ Sexagesimal Conversions $0°0′0″ \leqq \lvert x \rvert \leqq 9999999°59′$
x^y		$x > 0$: $-1 \times 10^{100} < y\log x < 100$ $x = 0$: $y > 0$ $x < 0$: $y = n, \frac{1}{2n+1}$ (n is an integer) However: $-1 \times 10^{100} < y\log \lvert x \rvert < 100$
$\sqrt[x]{y}$		$y > 0$: $x \neq 0$, $-1 \times 10^{100} < 1/x \log y < 100$ $y = 0$: $x > 0$ $y < 0$: $x = 2n+1, \frac{1}{n}$ ($n \neq 0$; n is an integer) However: $-1 \times 10^{100} < 1/x \log \lvert y \rvert < 100$
$a^b/_c$		Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
RanInt#(a, b)		$a < b$; $\lvert a \rvert$, $\lvert b \rvert < 1 \times 10^{10}$; $b - a < 1 \times 10^{10}$ (a, b are integers)

- Precision is basically the same as that described under "Calculation Range and Precision", above.
- Calculations that use any of the functions or settings shown below require consecutive internal calculations to be performed, which can cause accumulation of error that occurs with each calculation.
  x^3, $\sqrt[x]{y}$, $\sqrt[3]{\ }$, $x!$, nPr, nCr, °, ^{r}, ^{g} (angle unit: radians); σ_x, s_x, regression coefficient.
- Error is cumulative and tends to be large in the vicinity of a function's singular point and inflection point.
- Accumulation of errors tends to occur during statistical calculations involving data in which there is a large number of decimal places and there is little difference between data items. Input of statistical data is limited to six decimal places.

17. Error Messages

The calculator will display an error message whenever an error occurs for any reason during a calculation.

- 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. (Not included on the fx-82SX PLUS)
- Press AC to return to the calculation screen. Note that this also clears the calculation that contained the error.

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. • The calculation you are performing contains an illegal mathematical operation (such as division by zero).
Action: • Check the input values and reduce the number of digits. • 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. • 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.

Arg ERROR
Cause: Improper use of an argument.
Action: Make necessary corrections.

18. Before Assuming Malfunction of the Calculator...

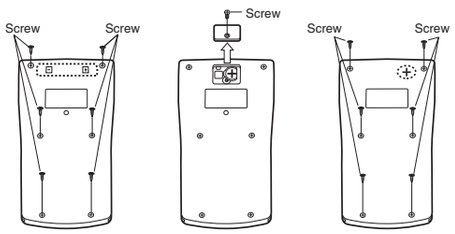
Perform the following steps whenever an error occurs during a calculation or when calculation results are not what you expected. Note that you should make separate copies of important data before performing these steps.

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.
4. Initialize all modes and settings. See "Initializing Calculator Settings".

19. Replacing the Battery

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 (fx-350MS).
2. Remove the cover as shown in the illustration and replace the battery, taking care that its plus (+) and minus (–) ends are facing correctly.



fx-82MS/82SX PLUS/220 PLUS | fx-350MS | fx-85MS/300MS

3. Replace the cover.
4. Initialize the calculator. See "3. Initializing the Calculator".
   - Do not skip the above step!

20. Specifications

Power Requirements:
fx-82MS/82SX PLUS/220 PLUS: AA-size battery R6P (SUM-3) × 1
fx-350MS: Button battery LR44 (GPA76) × 1
fx-85MS/300MS: Built-in solar cell; button battery LR44 (GPA76) × 1

Approximate Battery Life:
fx-82MS/82SX PLUS/220 PLUS: 17,000 hours (continuous display of flashing cursor)
fx-350MS: 9,000 hours (continuous operation)
fx-85MS/300MS: 3 years (based on one hour of operation per day)

Power Consumption:
0.0001 W (fx-82MS/82SX PLUS/220 PLUS/350MS)

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

Dimensions (H×W×D)/**Approximate Weight** (including the battery)

fx-82MS	18.6 × 85 × 156 mm 3/4″ × 3 3/8″ × 6 1/8″	115 g (4.1 oz)
fx-82SX PLUS fx-220 PLUS	19.5 × 78 × 155 mm 3/4″ × 3 1/8″ × 6 1/8″	115 g (4.1 oz)
fx-85MS fx-300MS fx-350MS	12.2 × 85 × 155 mm 1/2″ × 3 3/8″ × 6 1/8″	100 g (3.5 oz)

Manufacturer:
CASIO COMPUTER CO., LTD.
6-2, Hon-machi 1-chome
Shibuya-ku, Tokyo 151-8543, Japan

Responsible within the European Union:
CASIO EUROPE GmbH
Casio-Platz 1
22848 Norderstedt, Germany

This mark applies in EU countries only.

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