ENGLISH

SHARP

SCIENTIFIC CALCULATOR

MODEL **EL-531WH**

OPERATION MANUAL

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INTRODUCTION

Thank you for purchasing the SHARP Scientific Calculator Model EL-531WH.
About the **calculation examples (including some formulas and tables)**, refer to the reverse side of this English manual. **Refer to the number on the right of each title on the manual for use.**
After reading this manual, store it in a convenient location for future reference.

Operational Notes

- Do not carry the calculator around in your back pocket, as it may break when you sit down. The display is made of glass and is particularly fragile.
- Keep the calculator away from extreme heat such as on a car dashboard or near a heater, and avoid exposing it to excessively humid or dusty environments.
- Since this product is not waterproof, do not use it or store it where fluids, for example water, can splash onto it. Raindrops, water spray, juice, coffee, steam, perspiration, etc. will also cause malfunction.
- Clean with a soft, dry cloth. Do not use solvents or a wet cloth.
- Do not drop it or apply excessive force.
- Never dispose of batteries in a fire.
- Keep batteries out of the reach of children.
- This product, including accessories, may change due to upgrading without prior notice.

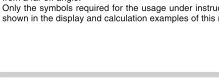
NOTICE

- SHARP strongly recommends that separate permanent written records be kept of all important data. Data may be lost or altered in virtually any electronic memory product under certain circumstances. Therefore, SHARP assumes no responsibility for data lost or otherwise rendered unusable whether as a result of improper use, repairs, defects, battery replacement, use after the specified battery life has expired, or any other cause.
- SHARP will not be liable nor responsible for any incidental or consequential economic or property damage caused by misuse and/or malfunctions of this product and its peripherals, unless such liability is acknowledged by law.

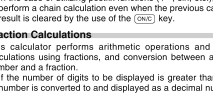
♦ Press the RESET switch (on the back), with the tip of a ballpoint pen or similar object, only in the following cases. Do not use an object with a breakable or sharp tip. Note that pressing the RESET switch erases all data stored in memory.
- When using for the first time
- After replacing the batteries
- To clear all memory contents
- When an abnormal condition occurs and all keys are inoperative.

If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available.

Hard Case



DISPLAY



- During actual use, not all symbols are displayed at the same time.
- Certain inactive symbols may appear visible when viewed from a far off angle.
- Only the symbols required for the usage under instruction are shown in the display and calculation examples of this manual.

←/→ : Appears when the entire equation cannot be displayed. Press ◀ / ▶ to see the remaining (hidden) section.

▲/▼ : Indicates that data can be visible above/below the screen. These indications may appear when menu, multi-line playback, and statistics data are displayed. Press ▲ / ▼ to scroll up/down the view.

2ndF : Appears when 2ndF is pressed, indicating that the functions shown in orange are enabled.

HYP : Indicates that hyp has been pressed and the hyperbolic functions are enabled. If 2ndF arc/hyp are pressed, the symbols "**2ndF HYP**" appear, indicating that inverse hyperbolic functions are enabled.

ALPHA: Indicates that ALPHA (STAT.VAR), STO or RCL has been pressed, and entry (recall) of memory contents and recall of statistics can be performed.

FIX/SCI/ENG: Indicates the notation used to display a value and changes by SET UP menu.

DEG/RAD/GRAD: Indicates angular units and changes each time DRG has been pressed.

STAT : Appears when statistics mode is selected.

M : Indicates that a numerical value is stored in the independent memory.

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual

In this manual, key operations are described as follows:

e^x r / ln	To specify e^x : 2ndF e^{x} To specify ln : ln To specify F : ALPHA F

Functions that are printed in orange above the key require 2ndF to be pressed first before the key. When you specify the memory, press ALPHA first. Numbers for input value are not shown as keys, but as ordinary numbers.

Power On and Off

Press ON/C to turn the calculator on, and 2ndF OFF to turn it off.

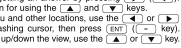
Clearing the Entry and Memories

Clearing methods are described in the table as follows:

Clearing operation	Entry (Display)	M*1	A-F, X, Y*2 ANS*3	STAT*4 STAT.VAR*5
ON/C	○	×	×	×
2ndF CA	○	×	○	○
2ndF M-CLR 0 0 *6	○	○	○	○
2ndF M-CLR 1 0 *7	○	○	○	○
RESET switch	○	○	○	○

○ : Clear × : Retain
*1 Independent memory M.
*2 Temporary memory A-F, X and Y.
*3 Last answer memory.
*4 Statistical data (entered data).
*5 $\bar{x}$, sx, σx, n, Σx, Σx^2, $\bar{y}$, sy, σy, Σy, Σy^2, Σxy, r, a, b, c.
*6 All variables are cleared. See 'About the Memory clear key' for details.
*7 This key combination functions the same as the RESET switch. See 'About the Memory clear key' for details.

[About the Memory clear key]
Press 2ndF M-CLR to display the menu.



- To clear all variables (M, A-F, X, Y, ANS, STAT.VAR), press 0 0 or 0 ENT.
- To RESET the calculator, press 1 0 or 1 ENT. The RESET operation will erase all data stored in memory, and restore the calculator's default setting.

Entering and Correcting the Equation

[Cursor keys]
- Press ◀ or ▶ to move the cursor. You can also return to the equation after getting an answer by pressing ▶ (◀). See the next section for using the ▲ and ▼ keys.
- In the SET UP menu and other locations, use the ◀ or ▶ key to move the flashing cursor, then press ENT (= key). If you need to scroll up/down the view, use the ▲ or ▼ key.

[Insert mode and Overwrite mode in the Equation display]
- This calculator has two editing modes: insert mode (default), and overwrite mode. Pressing 2ndF INS switches between the two modes. A triangular cursor indicates that an entry will be inserted at the cursor, while the rectangular cursor indicates to overwrite preexisting data as you make entries.
- To insert a number in the insert mode, move the cursor to the place immediately after where you wish to insert, then make a desired entry. In the overwrite mode, data under the cursor will be overwritten by the number you enter.
- This mode setting will be retained until the next RESET operation is executed.

[Deletion key]
- To delete a number/function, move the cursor to the number/function you wish to delete, then press DEL. If the cursor is located at the right end of an equation, the DEL key will function as a back space key.

Multi-line Playback function [1]

This calculator is equipped with a function to recall previous equations in the normal mode. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing ▲ will display the previous equation and the answer. Further pressing ▲ will display preceding equations (after returning to the previous equation, press ▼ to view equations in order). In addition, 2ndF ▲ can be used to jump to the oldest equation.
- To edit an equation after recalling it, press ▶ ((◀)).
- To edit the displayed equation, press ▶ (◀) immediately after obtaining a calculation answer.
- The multi-line memory is cleared by the following operations: 2ndF CA, 2ndF OFF (including the Automatic Power Off feature), mode change, memory clear (2ndF M-CLR), RESET, 2ndF RANDOM, ALPHA (RCL), ANS, constant calculation, chain calculation, angle unit conversion, coordinate conversion, N-base conversion, numerical value storage to the temporary memories and independent memory, and input/deletion of statistical data.

Priority Levels in Calculation

This calculator performs operations according to the following priority:
① Fractions (1⌟4, etc.) ② Functions preceded by their argument (x^{-1}, x^3, $n!$, etc.) ③ Y^x, $\sqrt[x]{\ }$ ④ Implied multiplication of a memory value (2Y, etc.) ⑤ Functions followed by their argument (sin, cos, etc.) ⑥ Implied multiplication of a constant (2sin30, etc.) ⑦ ÷/C, ×P, ⑧ ×, ÷ ⑨ +, − ⑩ AND ⑪ OR, XOR, XNOR ⑫ =, M+, M−, ⇒M, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →r0, →xy and other calculation ending instructions
- If parentheses are used, parenthesized calculations have precedence over any other calculations.

INITIAL SET UP

Mode Selection

Normal mode (NORMAL): MODE 0
Used to perform arithmetic operations and function calculations.

Statistics mode (STAT): MODE 1
Used to perform statistical calculations.

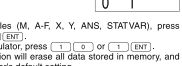
When executing mode selection, temporary memories, statistical variables, statistical data and last answer memory will be cleared even when reselecting the same mode.

SET UP menu

Press SET UP to display the SET UP menu.

- A menu item can be selected by:
  - moving the flashing cursor by using ▶ / ◀, then press ENT (= key), or
  - pressing the number key corresponding to the menu item number.
- If ▲ or ▼ is displayed on the screen, press ▲ or ▼ to view the previous/next menu screen.
- Press ON/C to exit the SET UP menu.

[Selecting the Display Notation and Decimal Places]
The calculator has four display notation systems (Floating point, Fixed decimal point, Scientific notation and Engineering notation) for displaying calculation results.
- When the FIX, SCI, or ENG symbol is displayed, the number of decimal places (TAB) can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.
- If a floating point number does not fit in the specified range, the calculator will display the result using the scientific notation (exponential notation) system. See 'Setting the Floating Point Numbers System in Scientific Notation' for details.
- Press SET UP, followed by 0, to display the following submenu:



[Setting the Floating Point Numbers System in Scientific Notation]
The calculator has two settings for displaying a floating point number: NORM1 (default setting) and NORM2. In each display setting, a number is automatically displayed in scientific notation outside a preset range:
- NORM1: $0.000000001 \leq |x| \leq 9999999999$
- NORM2: $0.01 \leq |x| \leq 9999999999$

1000000÷3=	
[Floating point (NORM1)]	ON/C 1000000 ÷ 3 = 33'333.33333
→[Fixed decimal point]	SET UP 0 0 33'333.33333
[TAB set to 2]	SET UP 1 2 33'333.33
→[SCIentific notation]	SET UP 0 1 3.33×10^{04}
→[ENGineering notation]	SET UP 0 2 33.33×10^{03}
→[Floating point (NORM1)]	SET UP 0 3 33'333.33333
3÷1000=	
[Floating point (NORM1)]	ON/C 3 ÷ 1000 = 0.003
→[Floating point (NORM2)]	SET UP 0 4 $3.\times10^{-03}$
→[Floating point (NORM1)]	SET UP 0 3 0.003

Determination of the Angular Unit

In this calculator, the following three angular units (degrees, radians, and grads) can be specified.

SCIENTIFIC CALCULATIONS

- Press MODE 0 to select the normal mode.
- In each example, press ON/C to clear the display. And if the FIX, SCI, or ENG indicator is displayed, clear the indicator by selecting 'NORM1' from the SET UP menu.

Arithmetic Operations [2]

- The closing parenthesis) just before = or M+ may be omitted.

Constant Calculations [3]

- In constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplication, the multiplicand becomes a constant.
- When performing calculations using constants, constants will be displayed as K.

Functions [4]

- Refer to the calculation examples of each function.
- Before starting calculations, specify the angular unit.

Random Function

The Random function has four settings for use in the normal or statistics mode. (This function cannot be selected while using the N-Base function.) Press ON/C to exit.
- The generated pseudo-random number series is stored in memory Y. Each random number is based on a number series.

[Random Numbers]
A pseudo-random number, with three significant digits from 0 up to 0.999, can be generated by pressing 2ndF RANDOM 0 ENT. To generate the next random number, press ENT.

[Random Dice]
To simulate a die-rolling, a random integer between 1 and 6 can be generated by pressing 2ndF RANDOM 1 ENT. To generate the next random dice number, press ENT.

[Random Coin]
To simulate a coin flip, 0 (head) or 1 (tail) can be randomly generated by pressing 2ndF RANDOM 2 ENT. To generate the next random coin number, press ENT.

[Random Integer]
An integer between 0 and 99 can be generated randomly by pressing 2ndF RANDOM 3 ENT. To generate the next random integer number, press ENT.

Angular Unit Conversions [5]

Each time 2ndF DRG▶ are pressed, the angular unit changes in sequence.

Memory Calculations [6]

This calculator has 8 temporary memories (A-F, X and Y), one independent memory (M) and one last answer memory (ANS). The independent memory and temporary memories are only available in the normal mode.

[Temporary memories (A-F, X and Y)]
Press STO and a corresponding variable key to store a value in memory.
Press RCL and a corresponding variable key to recall a value from the memory.
To place a variable in an equation, press ALPHA, followed by a desired variable key.

[Independent memory (M)]
In addition to all the features of temporary memories, a value can be added or to subtracted from an existing memory value.
Press ON/C STO M to clear the independent memory (M).

[Last answer memory (ANS)]
The calculation result obtained by pressing = or any other calculation ending instruction is automatically stored in the last answer memory.

Note:
- Calculation results from the functions indicated below are automatically stored in memories X or Y. For this reason, when using these functions, be careful with the use of memories X and Y.
  - Random function .....Y memory
  - →r0, →xy.....X memory (r or x), Y memory (θ or y)
- Temporary memories and last answer memory are cleared even when the same mode is reselected.
- Use of RCL or ALPHA will recall the value stored in memory using up to 14 digits.

Chain Calculations [7]

- This calculator allows the previous calculation result to be used in the following calculation.
- The previous calculation result will not be recalled after entering multiple instructions.
- In the case of utilizing postfix functions ($\sqrt{\ }^{-1}$, sin, etc.), you can perform a chain calculation even when the previous calculation result is cleared by the use of the ON/C key.

Fraction Calculations [8]

This calculator performs arithmetic operations and memory calculations using fractions, and conversion between a decimal number and a fraction.
- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number.

Binary, Pental, Octal, Decimal, and Hexadecimal Operations (N-Base) [9]

This calculator can perform conversions between numbers expressed in binary, pental, octal, decimal and hexadecimal systems. It can also perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, pental, octal, decimal, and hexadecimal numbers. In addition, the calculator can carry out the logical operations AND, OR, NOT, NEG, XOR and XNOR on binary, pental, octal and hexadecimal numbers.
Conversion to each system is performed by the following keys:

2ndF ▶BIN : Converts to the binary system. "^{b}" appears.
2ndF ▶PEN : Converts to the pental system. "^{P}" appears.
2ndF ▶OCT : Converts to the octal system. "^{o}" appears.
2ndF ▶HEX : Converts to the hexadecimal system. "^{H}" appears.
2ndF ▶DEC : Converts to the decimal system. "^{b}", "^{P}", "^{o}", and "^{H}" disappear from the display.

Conversion is performed on the displayed value when these keys are pressed.

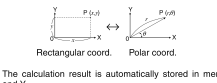
Note: In this calculator, the hexadecimal numbers A − F are entered by pressing x^{-1} (A), $\sqrt{\ }$ (B), x^2 (C), x^3 (D), log (E), and 10^x (F), and displayed as follows:

A → ^{A}, B → ^{B}, C → ^{C}, D → ^{d}, E → ^{E}, F → ^{F}

In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered. When a decimal number having a fractional part is converted into a binary, pental, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated. In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement.

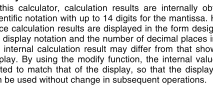
Time, Decimal and Sexagesimal Calculations [10]

Conversion between decimal and sexagesimal numbers can be performed. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Notation for sexagesimal is as follows:



Coordinate Conversions [11]

- Before performing a calculation, select the angular unit.



- The calculation result is automatically stored in memories X and Y.
  Value of r or x: X memory
  Value of θ or y: Y memory

Modify Function [12]

In this calculator, calculation results are internally obtained in scientific notation with up to 14 digits for the mantissa. However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display. By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

STATISTICAL CALCULATIONS [13]

Statistical calculations are performed in the statistics mode. Press MODE 1 to select the statistics mode. This calculator performs the seven statistical calculations indicated below. After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice.
When changing to the statistical sub-mode, press the corresponding number key after performing the operation to select the statistics mode (press MODE 1).

0 (SD) : Single-variable statistics
1 (LINE) : Linear regression calculation
2 (QUAD) : Quadratic regression calculation
3 (EXP) : Exponential regression calculation
4 (LOG) : Logarithmic regression calculation
5 (PWR) : Power regression calculation
6 (INV) : Inverse regression calculation

The following statistics can be obtained for each statistical calculation (refer to the table below):

Single-variable statistical calculation
Statistics of ①

Linear regression calculation
Statistics of ① and ② and, in addition, estimate of y for a given x (estimate y') and estimate of x for a given y (estimate x')

Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation
Statistics of ① and ②. In addition, estimate of y for a given x and estimate of x for a given y. (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients a and b, from converted data rather than entered data.)

Quadratic regression calculation
Statistics of ① and ② and coefficients a, b, c in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient (r) can be obtained.) When there are two x values, press 2ndF ←→.
When performing calculations using a, b and c, only one numeric value can be used.

①	$\bar{x}$	Mean of samples (x data)
	sx	Sample standard deviation (x data)
	σx	Population standard deviation (x data)
	n	Number of samples
	Σx	Sum of samples (x data)
	Σx^2	Sum of squares of samples (x data)
②	$\bar{y}$	Mean of samples (y data)
	sy	Sample standard deviation (y data)
	σy	Population standard deviation (y data)
	Σy	Sum of samples (y data)
	Σy^2	Sum of squares of samples (y data)
	Σxy	Sum of products of samples (x, y)
	r	Correlation coefficient
	a	Coefficient of regression equation
	b	Coefficient of regression equation
	c	Coefficient of quadratic regression equation

- Use ALPHA and RCL to perform a STAT variable calculation.

Data Entry and Correction [14]

Entered data are kept in memory until 2ndF CA are pressed or mode selection. Before entering new data, clear the memory contents.

[Data Entry]
Single-variable data
Data DATA
Data (×,÷) *frequency* DATA (To enter multiples of the same data)

Two-variable data
Data x (×,÷) *Data* y DATA
Data x (×,÷) *Data* y (×,÷) *frequency* DATA (To enter multiples of the same data x and y.)
- Up to 100 data items can be entered. With the single-variable data, a data item without frequency assignment is counted as one data item, while an item assigned with frequency is stored as a set of two data items. With the two-variable data, a set of data items without frequency assignment is counted as two data items, while a set of items assigned with frequency is stored as a set of three data items.

[Data Correction]
Correction prior to pressing DATA immediately after a data entry:
Delete incorrect data with ON/C, then enter the correct data.
Correction after pressing DATA:
Use ▲ / ▼ to display the data previously entered.
Press ▼ to display data items in ascending (oldest first) order. To reverse the display order to descending (latest first), press the ▲ key.
Each item is displayed with 'Xn=', 'Yn=', or 'Wn=' (n is the sequential number of the data set).
Display the data item to modify, input the correct value, then press DATA. Using (×,÷), you can correct the values of the data set all at once.
- When ▲ or ▼ appears, more data items can be browsed by pressing ▲ or ▼.
- To delete a data set, display an item of the data set to delete, then press 2ndF CD. The data set will be deleted.
- To add a new data set, press ON/C and input the values, then press DATA.

Statistical Calculation Formulas [15]

Type	Regression formula
Linear	$y = a + bx$
Exponential	$y = a \cdot e^{bx}$
Logarithmic	$y = a + b \cdot \ln x$
Power	$y = a \cdot x^{b}$
Inverse	$y = a + b\frac{1}{x}$
Quadratic	$y = a + bx + cx^2$

In the statistical calculation formulas, an error will occur when:
- The absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100}.
- The denominator is zero.
- An attempt is made to take the square root of a negative number.
- No solution exists in the quadratic regression calculation.

ERROR AND CALCULATION RANGES

Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. When an error occurs, pressing ◀ (or ▶) automatically moves the cursor back to the place in the equation where the error occurred. Edit the equation or press ON/C to clear the equation.

Error Codes and Error Types

Syntax error (Error 1):
- An attempt was made to perform an invalid operation.
  Ex. 2 (cos) =

Calculation error (Error 2):
- The absolute value of an intermediate or final calculation result equals or exceeds 10^{100}.
- An attempt was made to divide by 0 (or an intermediate calculation resulted in zero).
- The calculation ranges were exceeded while performing calculations.

Depth error (Error 3):
- The available number of buffers was exceeded. (There are 10 buffers* for numeric values and 24 buffers for calculation instructions).
  *5 buffers in STAT mode.
- Data items exceeded 100 in the statistics mode.

Equation too long (Error 4):
- The equation exceeded its maximum input buffer (142 characters). An equation must be shorter than 142 characters.

Calculation Ranges [16]

- **Within the ranges specified, this calculator is accurate to ±1 of the least significant digit of the mantissa. However, a calculation error increases in continuous calculations due to accumulation of each calculation error. (This is the same for y^x, $\sqrt[x]{\ }$, $n!$, e^x, $\ln$, etc., where continuous calculations are performed internally.) Additionally, a calculation error will accumulate and become larger in the vicinity of inflection points and singular points of functions.**
- Calculation ranges
  $\pm10^{-99} - \pm9.999999999\times10^{99}$ and 0.

If the absolute value of an entry or a final or intermediate result of a calculation is less than 10^{-99}, the value is considered to be 0 in calculations and in the display.

BATTERY REPLACEMENT

Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:
- Make sure the new batteries are the correct type.
- When installing, orient each battery properly as indicated in the calculator.
- Batteries are factory-installed before shipment, and may be exhausted before they reach the service life stated in the specifications.

Notes on erasure of memory contents
When the battery is replaced, the memory contents are erased. Erasure can also occur if the calculator is defective or when it is repaired. Make a note of all important memory contents in case accidental erasure occurs.

When to Replace the Batteries

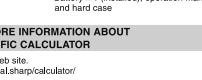
If the display has poor contrast, the batteries require replacement.

Cautions

- Fluid from a leaking battery accidentally entering an eye could result in serious injury. Should this occur, wash with clean water and immediately consult a doctor.
- Should fluid from a leaking battery come in contact with your skin or clothes, immediately wash with clean water.
- If the product is not to be used for some time, to avoid damage to the unit from leaking batteries, remove them and store in a safe place.
- Do not leave exhausted batteries inside the product.
- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be caused by incorrect handling.
- Do not throw batteries into a fire as they may explode.

Replacement Procedure

1. Turn the power off by pressing 2ndF OFF.
2. Remove two screws. (Fig. 1)
3. Slide the battery cover slightly and lift it to remove.
4. Remove the used battery.
5. Install one new battery. First insert the "⊖" side toward the spring. (Fig. 2)
6. Replace the cover and screws.
7. Press the RESET switch (on the back).
8. Make sure that the display appears as shown below. If the display does not appear as shown, remove the battery, reinstall it, and check the display once again.



Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, statistical calculations, etc.
Internal calculations:	Mantissas of up to 14 digits
Pending operations:	24 calculations 10 numeric values (5 numeric values in STAT mode)
Power source:	1.5V ⎓ (DC): Heavy duty manganese battery (size AA or R6) × 1
Operating time:	Approx. 17000 hours when continuously displaying 55555. at 25°C (77°F). Varies according to use and other factors.
Operating temperature:	0°C – 40°C (32°F – 104°F)
External dimensions:	79.6 mm (W) × 154.5 mm (D) × 18.2 mm (H) 3-1/8" (W) × 6-3/32" (D) × 23/32" (H)
Weight:	Approx. 106 g (0.24 lb) (Including battery)
Accessories:	Battery × 1 (installed), operation manual and hard case

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计算例子
CONTOH-CONTOH PENGHITUNGAN
CONTOH-CONTOH PERHITUNGAN
نمونه محاسبات

ENGLISH

[1] ▲ ▼

①3(5+2)=	ON/C 3 (5 + 2) =	*21.*
②3×5+2=	3 × 5 + 2 =	*17.*
③3×5+3√2=	3 × 5 + 3 × 2 =	*21.*
→ ①	2nd[▲]	*21.*
→ ②	▼	*17.*
→ ③	▼	*21.*
→ ②	▲	*17.*

[2] + − × ÷ ( ) +/− Exp

45+285÷3=	ON/C 45 + 285 ÷ 3 =	*140.*
18+6 / 15−8	(18 + 6) ÷ (15 − 8) =	*3.428571429*
42×(−5)+120=	42 × +/− 5 + 120 = *1 (5 +/−)) *1	*−90.*
(5×10³)÷(4×10⁻³)=	5 Exp 3 ÷ 4 Exp +/− 3 =	*1'250'000.*

[3]

34+57=	34 + 57 =	*91.*
45+57=	45 + =	*102.*
79−59=	79 − 59 =	*20.*
56−59=	56 − =	*−3.*
56+8=	56 + 8 =	*7.*
92+8=	92 + =	*11.5*
68×25=	68 × 25 =	*1'700.*
68×40=	40 =	*2'720.*

[4] sin cos tan sin⁻¹ cos⁻¹ tan⁻¹ π DRG hyp arc hyp / ln log eˣ 10ˣ x⁻¹ x² x³ xʸ ʸ√x ∛x n! nPr nCr %

sin60[°]=	ON/C sin 60 =	*0.866025403*
cos$\frac{\pi}{4}$[rad]=	DRG cos (π ÷ 4) =	*0.707106781*
tan⁻¹1=[g]	DRG 2nd[tan⁻¹] 1 = DRG	*50.*
(cosh 1.5 + sinh 1.5)² =	ON/C (hyp cos 1.5 + hyp sin 1.5) x² =	*20.08553692*
tanh$^{-1}\frac{5}{7}$=	2nd[arc hyp] tan (5 ÷ 7) =	*0.895879734*
ln 20 =	ln 20 =	*2.995732274*
log 50 =	log 50 =	*1.698970004*
e^3 =	2nd[eˣ] 3 =	*20.08553692*
$10^{1.7}$ =	2nd[10ˣ] 1.7 =	*50.11872336*
$1\frac{1}{7}$ᵉ	6 2nd[x⁻¹] + 7 2nd[x⁻¹] =	*0.309523809*
$8^{-2}-3^{4}\times5^{2}$ =	8 yˣ +/− 2 − 3 yˣ 4 × 5 x² =	*−2'024.984375*
$(12^{3})^{\frac{1}{4}}$=	12 yˣ 3 yˣ 4 2nd[x^1/y] =	*6.447419591*
$8^{\frac{1}{3}}$ =	8 x^1/y =	*512.*
$\sqrt{49}-\sqrt[4]{81}$ =	√ 49 − 4 2nd[⁴√x] 81 =	*4.*
$\sqrt[3]{27}$ =	2nd[∛x] 27 =	*3.*
4! =	4 2nd[n!] =	*24.*
$_{10}P_3$ =	10 2nd[nPr] 3 =	*720.*
$_5C_2$ =	5 2nd[nCr] 2 =	*10.*
500×25%=	500 × 25 2nd[%]	*125.*
120÷400=?	120 ÷ 400 2nd[%]	*30.*
500+(500×25%)=	500 + 25 2nd[%]	*625.*
400−(400×30%)=	400 − 30 2nd[%]	*280.*

[5] DRG▶

90°↔ [rad]	ON/C 90 2nd[DRG▶]	*1.570796327*
→ [g]	2nd[DRG▶]	*100.*
→ [°]	2nd[DRG▶]	*90.*
sin⁻¹0.8 = [°]	2nd[sin⁻¹] 0.8 =	*53.13010235*
→ [rad]	2nd[DRG▶]	*0.927295218*
→ [g]	2nd[DRG▶]	*59.0334706*
→ [°]	2nd[DRG▶]	*53.13010235*

[6] ALPHA RCL STO M+ M− ANS

A=56	ON/C 56 STO A	*56.*
B=68	68 STO B	*68.*
A÷2+B×4=	ALPHA A ÷ 2 + ALPHA B × 4 =	*300.*
24÷(8×2)=	ON/C 8 × 2 STO M	*16.*
(8×2)×5=	24 ÷ ALPHA M =	*1.5*
	ALPHA M × 5 =	*80.*
$150\div3\rightarrow M$	ON/C STO M	*0.*
+)$250\rightarrow M$	150 × 3 M+	*450.*
−)$M\times5\%$	250 M+	*250.*
M	RCL M × 5 2nd[%]	*35.*
	2nd[M−] RCL M	*665.*
$1= ¥110	110 STO Y	*110.*
¥26,510=$?	26510 ÷ RCL Y =	*241.*
$2,750=¥?	2750 × RCL Y =	*302'500.*
r = 3cm	3 STO Y	*3.*
πr^2 = ?	π ALPHA Y x² =	*28.27433388*
(r → Y)		
$\frac{24}{4+6}$	24 ÷ (4 + 6) =	*2.4*
2.4→(A)	2.4 STO A	
3×(A)+60÷(A)=	3 × ALPHA ANS + 60 ÷ ALPHA ANS =	*32.2*

[7]

6+4=ANS	ON/C 6 + 4 =	*10.*
ANS+5	+ 5 =	*15.*
8×2=ANS	8 × 2 =	*16.*
ANS²	x² =	*256.*
44+37=ANS	44 + 37 =	*81.*
√ANS=	√ =	*9.*

[8] $a\frac{b}{c}$ d/c

$3\frac{1}{2}+\frac{4}{3}=[a\frac{b}{c}]$	ON/C 3 $a\frac{b}{c}$ 1 $a\frac{b}{c}$ 2 ÷ 4 $a\frac{b}{c}$ 3 =	*4 ┌ 5 ┌ 6*
→[a.xxx]	$a\frac{b}{c}$	*4.833333333*
→[d/c]	2nd[d/c]	*29 ┌ 6*
$10^{\frac{2}{3}}$ =	2nd[10ˣ] 2 $a\frac{b}{c}$ 3 =	*4.641588834*
$(\frac{7}{5})^5$=	7 $a\frac{b}{c}$ 5 yˣ 5 =	*16807 ┌ 3125*
$(\frac{1}{8})^{\frac{1}{3}}$ =	1 $a\frac{b}{c}$ 8 yˣ 1 $a\frac{b}{c}$ 3 =	*1 ┌ 2*
$\sqrt{\frac{64}{225}}$ =	√ 64 $a\frac{b}{c}$ 225 =	*8 ┌ 15*
$2\frac{3}{4}$ᵉ =	(2 yˣ 3 + $a\frac{b}{c}$ (3 yˣ 4) =	*8 ┌ 81*
$\frac{1.2}{2.3}$ =	1.2 $a\frac{b}{c}$ 2.3 =	*12 ┌ 23*
$\frac{1°2'3"}{2}$ =	1 DMS 2 DMS 3 $a\frac{b}{c}$ 2 =	*0°31'1.5"*
$\frac{1\times10^3}{2\times10^3}$ =	1 Exp 3 $a\frac{b}{c}$ 2 Exp 3 =	*1 ┌ 2*
A = 7	ON/C 7 STO A	*7.*
$\frac{4}{A}$ =	4 $a\frac{b}{c}$ ALPHA A =	*4 ┌ 7*
$1.25+\frac{2}{5}$= [a.xxx]	1.25 + 2 $a\frac{b}{c}$ 5 =	*1.65*
→[$a\frac{b}{c}$]	$a\frac{b}{c}$	*1 ┌ 13 ┌ 20*
1.65	ON/C 1.65 =	*1.65*
→[$a\frac{b}{c}$]	$a\frac{b}{c}$	*1 ┌ 13 ┌ 20*
→[d/c]	2nd[d/c]	*33 ┌ 20*
→[a.xxx]	$a\frac{b}{c}$	*1.65*

* $4\ \lrcorner\ 5\ \lrcorner\ 6 = 4\frac{5}{6}$

[9] ⬅BIN ⬅PEN ⬅OCT ⬅HEX ⬅DEC NEG NOT AND OR XOR XNOR

DEC(25)→BIN	ON/C 2nd[⬅DEC] 25 2nd[⬅BIN]	*11001* b
HEX(1AC)	2nd[⬅HEX] 1AC	
→BIN	2nd[⬅BIN]	*110101100* b
→PEN	2nd[⬅PEN]	*3203* p
→OCT	2nd[⬅OCT]	*654* o
→DEC	2nd[⬅DEC]	*428.*
BIN(1010−100)	2nd[⬅BIN] (1010 − 100)	
×11 =	× 11 =	*10010* b
BIN(111)→NEG	NEG 111 =	*1111111001* b
HEX(1FF)+	2nd[⬅HEX] 1FF 2nd[⬅OCT] +	
OCT(512)=	512 =	*1511* o
HEX(?)	2nd[⬅HEX]	*349* H
2FEC−	ON/C STO M 2nd[⬅HEX] 2FEC −	
2C9E=(A)	2C9E M+	*34E* H
+)2000−	2000 −	
1901=(B)	1901 M+	*6FF* H
(C)	RCL M	*A4d* H
1011 AND	ON/C 2nd[⬅BIN] 1011 AND	
101 = (BIN)	101 =	*1* b
5A OR C3 = (HEX)	2nd[⬅HEX] 5A OR C3 =	*db* H
NOT 10110 = (BIN)	2nd[⬅BIN] NOT 10110 =	*1111101001* b
24 XOR 4 = (OCT)	2nd[⬅OCT] 24 XOR 4 =	*20* o
B3 XNOR	2nd[⬅HEX] B3 XNOR	
2D = (HEX)	2D =	*FFFFFFFF61* H
→DEC	2nd[⬅DEC]	*−159.*

[10] D'M'S ↔DEG

12°39'18.05"	ON/C 12 D'M'S 39 D'M'S 18.05	
→[10]	2nd[↔DEG]	*12.65501389*
123.678	123.678 2nd[↔DEG]	*123°40'40.8"*
→[60]		
3h30m45s +	3 D'M'S 30 D'M'S 45 + 6 D'M'S	
6h45m36s = [60]	45 D'M'S 36 =	*10°16'21"*
1234°56'12" +	1234 D'M'S 56 D'M'S 12 +	
0°0'34.567" = [60]	0 D'M'S 0 D'M'S 34.567 =	*1234°56'47"*
3h45m −	3 D'M'S 45 − 1.69 =	
1.69h = [60]	2nd[↔DEG]	*2°3'36"*
sin62°12'24" = [10]	sin 62 D'M'S 12 D'M'S 24 =	*0.884635235*

[11] →r(θ) →x,y ▸ ⟷

$\begin{cases} x=6 \\ y=4 \end{cases} \rightarrow \begin{cases} r= \\ \theta=[°] \end{cases}$	ON/C 6 2nd[▸] 4 2nd[→r(,)] [r]	*7.211102551*
	2nd[⟷] [θ]	*33.69006753*
	2nd[⟷] [r]	*7.211102551*
$\begin{cases} r=14 \\ \theta=36[°] \end{cases} \rightarrow \begin{cases} x= \\ y= \end{cases}$	14 2nd[▸] 36 2nd[→x,y] [x]	*11.32623792*
	2nd[⟷] [y]	*8.228993532*
	2nd[⟷] [x]	*11.32623792*

[12] MDF SET UP

5÷9=ANS	ON/C SET UP 0 0 SET UP 1 1	
ANS×9=	5 ÷ 9 =	*0.6*
[FIX,TAB=1]	× 9 = *1	*5.0*
	5 ÷ 9 = 2nd[MDF]	*0.6*
	× 9 = *2	*5.4*
	SET UP 0 3	

*1 5.55555555555555×10⁻¹⁶×9
*2 0.6×9

[13] DATA {x,y} $\bar{x}$ Sx σx n Σx Σx² $\bar{y}$ Sy σy Σy Σy² Σxy r a b c $\hat{x}$ $\hat{y}$ ⟷

DATA		
95	MODE 1 0	*0.*
80	95 DATA	*1.*
80	80 DATA	*2.*
75	DATA	*3.*
75	75 {x,y} 3 DATA	*4.*
75	50 DATA	*5.*
50		
$\bar{x}$=	RCL $\bar{x}$	*75.71428571*
σx=	RCL σx	*12.37179148*
n=	RCL n	*7.*
Σx=	RCL Σx	*530.*
Σx²=	RCL Σx²	*41'200.*
sx=	RCL Sx	*13.3630621*
sx²=	x² =	*178.5714286*

$\frac{(95-\bar{x})}{sx}\times10+50$= (95 − ALPHA $\bar{x}$) ÷ ALPHA Sx × 10 + 50 = *64.43210706*

x	y	
2	5	MODE 1 *0.*
2	5	2 {x,y} 5 DATA *1.*
2	5	DATA *2.*
12	24	12 {x,y} 24 DATA *3.*
21	40	21 {x,y} 40 {x,y} 3 DATA *4.*
21	40	15 {x,y} 25 DATA *5.*
21	40	RCL a *1.050261097*
15	25	RCL b *1.826044386*
		RCL r *0.995176343*
		RCL Sx *8.541216597*
		RCL Sy *15.67223812*
x=3 → y'=?	3 2nd[y']	*6.528394256*
y=46 → x'=?	46 2nd[x']	*24.61590706*

x	y	
12	41	MODE 2 *0.*
8	13	12 {x,y} 41 DATA *1.*
5	2	8 {x,y} 13 DATA *2.*
23	200	5 {x,y} 2 DATA *3.*
15	71	23 {x,y} 200 DATA *4.*
		15 {x,y} 71 DATA *5.*
		RCL a *5.357506761*
		RCL b *−3.120289663*
		RCL c *0.503334057*
x=10→y'=?	10 2nd[y']	*24.4880159*
y=22→x'=?	22 2nd[x']	*9.63201409*
	2nd[⟷]	*−3.432772026*
	2nd[⟷]	*9.63201409*

[14] DATA ▲ ▼

DATA		
30	MODE 1 0	*0.*
40	30 DATA	*1.*
40	40 {x,y} 2 DATA	*2.*
50	50 DATA	*3.*
↓		
DATA		
30	▼ ▼ ▼	
45	45 {x,y} 3 DATA	*X2 = 45.*
45	▼	*N2 = 3.*
45		
60	▼ 60 DATA	*X3 = 60.*

[15]

$$\bar{x}=\frac{\Sigma x_i}{n} \qquad \sigma x=\sqrt{\frac{\Sigma x^2-n\bar{x}^2}{n}}$$
$$sx=\sqrt{\frac{\Sigma x^2-n\bar{x}^2}{n-1}} \qquad \Sigma x=x_1+x_2+\cdots+x_n \quad \Sigma x^2=x_1^2+x_2^2+\cdots+x_n^2$$

$$\bar{y}=\frac{\Sigma y_i}{n} \qquad \sigma y=\sqrt{\frac{\Sigma y^2-n\bar{y}^2}{n}}$$
$$sy=\sqrt{\frac{\Sigma y^2-n\bar{y}^2}{n-1}} \qquad \Sigma xy=x_1y_1+x_2y_2+\cdots+x_ny_n \quad \Sigma y=y_1+y_2+\cdots+y_n \quad \Sigma y^2=y_1^2+y_2^2+\cdots+y_n^2$$

[16]

Function Funktion Fonction Función Função Funzioni Functie Függvény Funkce Funktion Funktio Funkcija Функция Funktion ฟังก์ชัน الدالة 函数 Fungsi Fungsi وظيفة	Dynamic range zulässiger Bereich Plage dynamique Rango dinámico Gama dinâmica Campi dinamici Rekencapaciteit Megengedett számítási tartomány Dynamický rozsah Definitionsområde Dynaaminen ala Динамический диапазон Dynamikområde พิสัยในการคำนวณ النطاق الديناميكي 取值范围 Julat dinamik Kisaran dinamis محدوده حرکتی
sin x, cos x, tan x	DEG: $\lvert x\rvert < 10^{10}$ ($\tan x : \lvert x\rvert \neq 90\ (2n-1)$)° RAD: $\lvert x\rvert < \frac{\pi}{180}\times10^{10}$ ($\tan x : \lvert x\rvert \neq \frac{\pi}{2}(2n-1)$)° GRAD: $\lvert x\rvert < \frac{10}{9}\times10^{10}$ ($\tan x : \lvert x\rvert \neq 100\ (2n-1)$)°
$\sin^{-1}x$, $\cos^{-1}x$	$\lvert x\rvert \leq 1$
$\tan^{-1}x$, $\sqrt[3]{x}$	$\lvert x\rvert < 10^{100}$
ln x, log x	$10^{-99} \leq x < 10^{100}$
y^x	• $y>0$: $-10^{100} < x \log y < 100$ • $y=0$: $0 < x < 10^{100}$ • $y<0$: $x=n$ ($0<\lvert x\rvert<1: \frac{1}{x}=2n-1,\ x\neq0$)°, $-10^{100} < x \log \lvert y\rvert < 100$
$\sqrt[x]{y}$	• $y>0$: $-10^{100} < \frac{1}{x}\log y < 100$ ($x\neq0$) • $y=0$: $0 < x < 10^{100}$ • $y<0$: $x=2n-1$ ($0<\lvert x\rvert<1: \frac{1}{x}=n,\ x\neq0$)°, $-10^{100} < \frac{1}{x}\log \lvert y\rvert < 100$
e^x	$-10^{100} < x \leq 230.2585092$
10^x	$-10^{100} < x < 100$
sinh x, cosh x, tanh x	$\lvert x\rvert \leq 230.2585092$
$\sinh^{-1}x$	$\lvert x\rvert < 10^{50}$
$\cosh^{-1}x$	$1 \leq x < 10^{50}$
$\tanh^{-1}x$	$\lvert x\rvert < 1$
x^2	$\lvert x\rvert < 10^{50}$
x^3	$\lvert x\rvert < 2.15443469\times10^{33}$
$\sqrt{x}$	$0 \leq x < 10^{100}$
x^{-1}	$\lvert x\rvert < 10^{100}$ ($x\neq0$)
n!	$0 \leq n \leq 69$*
nPr	$0 \leq r \leq n \leq 9999999999$* $\frac{n!}{(n-r)!} < 10^{100}$
nCr	$0 \leq r \leq n \leq 9999999999$* $\frac{n!}{(n-r)!} < 10^{100}$
↔DEG, D'M'S	$0°0'0.00001" \leq \lvert x\rvert < 10000°$
$x, y \rightarrow r, \theta$	$\sqrt{x^2+y^2} < 10^{100}$
$r, \theta \rightarrow x, y$	$0 \leq r < 10^{100}$ DEG: $\lvert\theta\rvert < 10^{10}$ RAD: $\lvert\theta\rvert < \frac{\pi}{180}\times10^{10}$ GRAD: $\lvert\theta\rvert < \frac{10}{9}\times10^{10}$
DRG▶	DEG→RAD, GRAD→DEG: $\lvert x\rvert < 10^{100}$ RAD→GRAD: $\lvert x\rvert < \frac{\pi}{2}\times10^{99}$
→DEC →BIN →PEN →OCT →HEX AND OR XOR XNOR	DEC : $\lvert x\rvert \leq 9999999999$ BIN : 1000000000 $\leq x \leq$ 1111111111 $0 \leq x \leq$ 111111111 PEN : 2222222223 $\leq x \leq$ 4444444444 $0 \leq x \leq$ 2222222222 OCT : 4000000000 $\leq x \leq$ 7777777777 $0 \leq x \leq$ 3777777777 HEX : FDABF41C01 $\leq x \leq$ FFFFFFFFFF $0 \leq x \leq$ 2540BE3FF
NOT	BIN : 1000000000 $\leq x \leq$ 1111111111 $0 \leq x \leq$ 111111111 PEN : 2222222223 $\leq x \leq$ 4444444444 $0 \leq x \leq$ 2222222222 OCT : 4000000001 $\leq x \leq$ 7777777777 $0 \leq x \leq$ 3777777777 HEX : FDABF41C01 $\leq x \leq$ FFFFFFFFFF $0 \leq x \leq$ 2540BE3FE
NEG	BIN : 1000000001 $\leq x \leq$ 1111111111 $0 \leq x \leq$ 111111111 PEN : 2222222223 $\leq x \leq$ 4444444444 $0 \leq x \leq$ 2222222222 OCT : 4000000001 $\leq x \leq$ 7777777777 $0 \leq x \leq$ 3777777777 HEX : FDABF41C01 $\leq x \leq$ FFFFFFFFFF $0 \leq x \leq$ 2540BE3FE

* n, r: integer / ganze Zahlen / entier / entero / inteiro / intero / geheel getal / egész számok / celé číslo / heltal / kokonaisluku / целые / heltal / จำนวนเต็ม / عدد صحيح / 整数 / integer / bilangan bulat / عدد صحيح

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