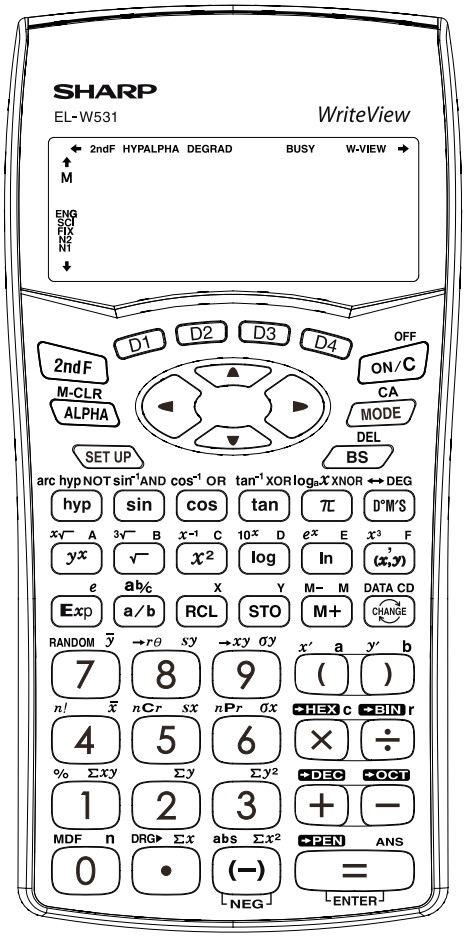
SCIENTIFIC CALCULATOR OPERATION GUIDE

<Write View>



SHARP

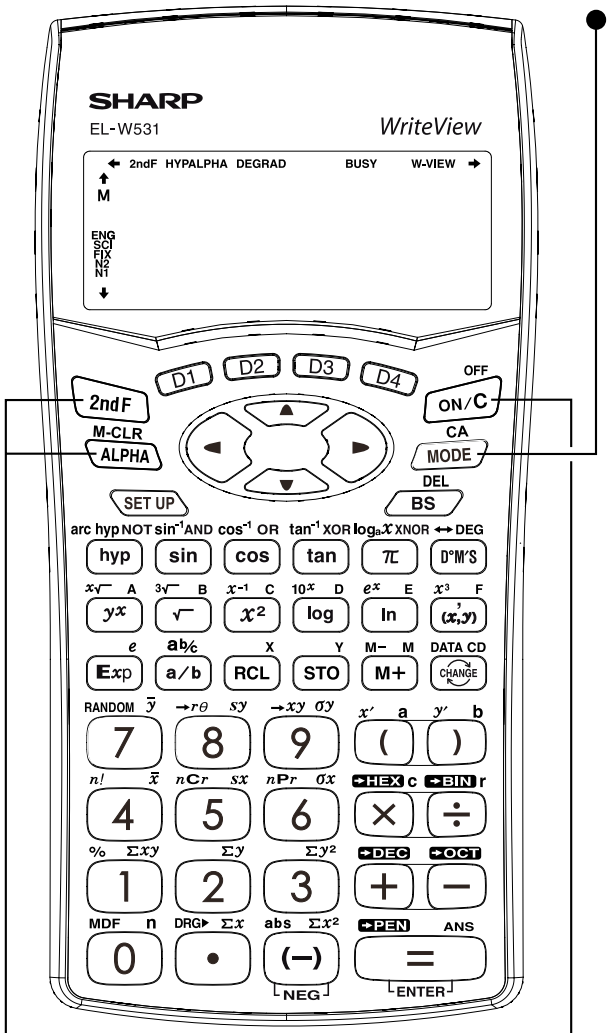
CONTENTS

How to Operate

≈Read Before Using≈

This operation guide has been written based on the EL-W531, EL-W531G, and EL-W531H models. Some functions described here are not featured on other models. In addition, key operations and symbols on the display may differ according to the model.

1. KEY LAYOUT



Mode key

This calculator can operate in three different modes as follows.

<Example>

[Normal mode] MODE 0

•Mode = 0; normal mode for performing normal arithmetic and function calculations.

[STAT mode] MODE 1

•Mode = 1; mode for performing 1- or 2-variable statistical calculations. To select the statistical sub-mode, press the corresponding number key after MODE 1.

- 0 (SD): Single variable statistic calculation
- 1 (LINE): Linear regression calculation
- 2 (QUAD): Quadratic regression calculation
- 3 (E_EXP): Eular Exponential regression calculation
- 4 (LOG): Logarithmic regression calculation
- 5 (POWER): Power regression calculation
- 6 (INV): Inverse regression calculation
- 7 (EXP): Exponential regression calculation

[Drill mode] MODE 2

•Mode = 2; mode for performing drill calculations. To select the drill sub-mode, press the corresponding number key after MODE 2.

- 0 (MATH): Math drill
- 1 (TABLE): Multiplication table drill

2nd function, ALPHA keys

Pressing these keys will enable the functions written in orange (2nd F) or green (ALPHA) above the calculator buttons.

2nd function

2ndF OFF Written in orange above the ON/C key

<Power off>

ON/C, OFF key

Direct function

ON/C

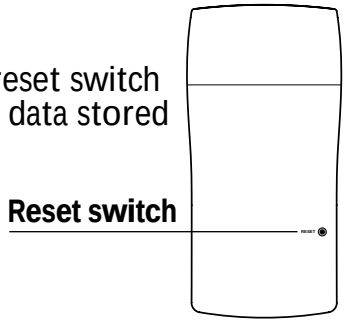
<Power on>

2. RESET SWITCH

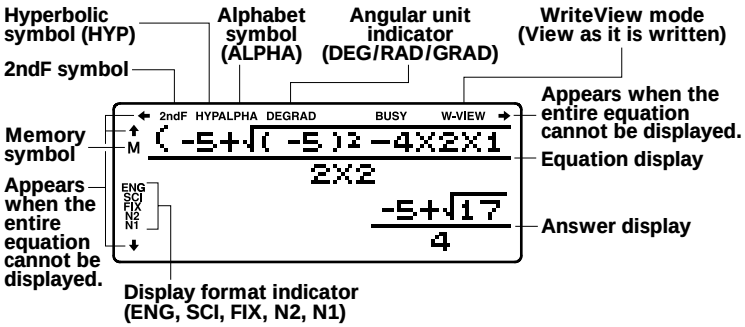
RESET

If the calculator fails to operate normally, press the reset switch on the back to reinitialise the unit. The display format and calculation mode will return to their initial settings.

NOTE:
Pressing the reset switch will erase any data stored in memory.



3. DISPLAY PATTERN



The actual display does not appear like this.
This illustration is for explanatory purposes only.

4. DISPLAY FORMAT AND DECIMAL SETTING FUNCTION

For convenient and easy operation, this model can be used in one of five display modes. The selected display status is shown in the lower left part of the display (Format Indicator).
Note: If more 0's (zeros) than needed are displayed when the ON/C key is pressed, check

- Floating decimal point format 1/2 (N1/N2 is displayed)
  Valid values beyond the maximum range are displayed in the form of [10-digit (mantissa) + 2-digit (exponent)]
- Fixed decimal point format (FIX is displayed)
  Displays the fractional part of the calculation result according to the specified number of decimal places.
- Scientific notation (SCI is displayed)
  Frequently used in science to handle extremely small or large numbers.
- Engineering scientific notation (ENG is displayed)
  Convenient for converting between different units.

<**Example**> Let's compare the display result of [10000 ÷ 8.1 =] in each display format.

(specifies normal mode)

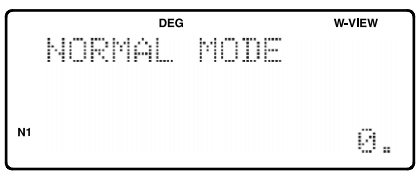
Note: The calculator has two settings for displaying a floating point number: NORM1 (default setting) and NORM2. In each display setting, a number is automatically displayed in scientific notation outside a preset range:

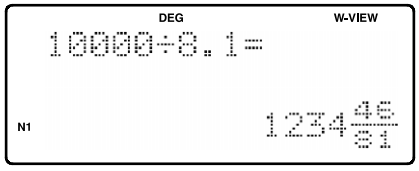
- NORM1: $0.000000001 \leq x \leq 9999999999$
- NORM2: $0.01 \leq x \leq 9999999999$

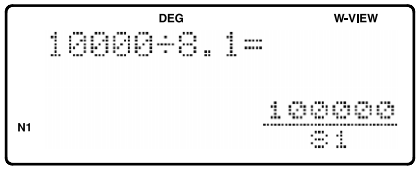
10000 ÷ **8.1** =

CHANGE

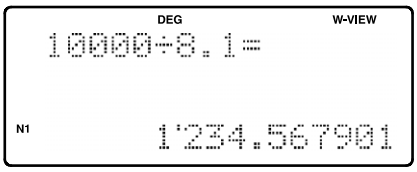
Initial display



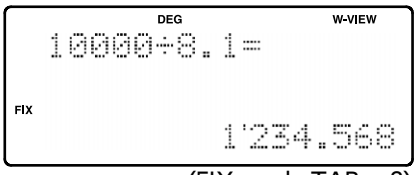




CHANGE

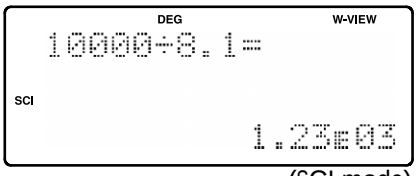


SET UP 1 0 3



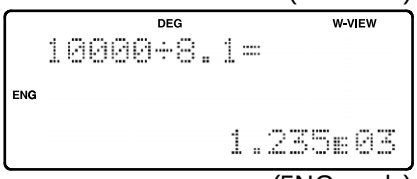
(FIX mode TAB = 3)

SET UP 1 1 3



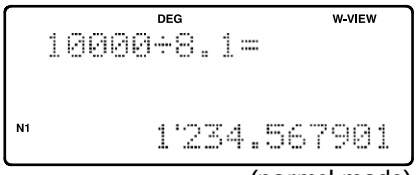
(SCI mode)

SET UP 1 2 3



(ENG mode)

SET UP 1 3



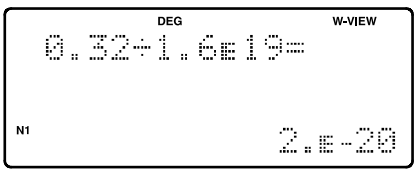
(normal mode)

5. EXPONENT DISPLAY

The distance from the earth to the sun is approx. 150,000,000 (1.5×10^8) km. Values such as this with many zeros are often used in scientific calculations, but entering the zeros one by one is a great deal of work and it's easy to make mistakes. In such cases, the numerical values are divided into mantissa and exponent portions, displayed and calculated.

<Example> What is the number of electrons flowing in a conductor when the electrical charge across a given cross-section is 0.32 coulombs. (The charge on a single electron = 1.6×10^{-19} coulombs).

0.32 ÷ **1.6** Exp **19** =



6. ANGULAR UNIT

Angular values are converted from DEG to RAD to GRAD with each push of the DRG key. This function is used when doing calculations related to trigonometric functions or coordinate geometry conversions.

Degrees (DEG is shown at the top of the display)

A commonly used unit of measure for angles. The angular measure of a circle is expressed as 360°.

Radians (RAD is shown at the top of the display)

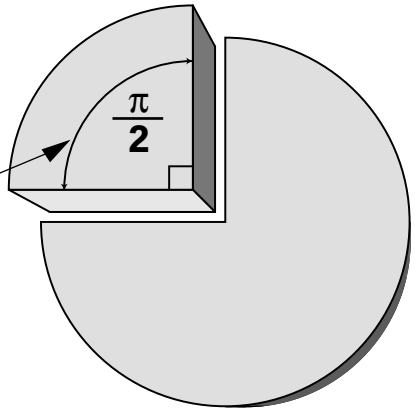
Radians are different from degrees and express angles based on the circumference of a circle. 180° is equivalent to π radians. Therefore, the angular measure of a circle is 2π radians.

Grads (GRAD is shown at the top of the display)

Grads are a unit of angular measure used in Europe, particularly in France. An angle of 90 degrees is equivalent to 100 grads.

The relationships between the three types of angular units can be expressed as right:

90° (DEG) =
π/2 (RAD) =
100 (GRAD) =

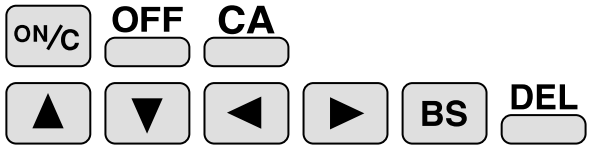


<Example> Check to confirm 90 degrees equalling π/2 radians equalling 100 grads. (π=3.14159...)

Operation	Display
SET UP 0 0	DEG W-VIEW NORMAL MODE N1 0.
90 2nd F DRG▶	RAD W-VIEW 90▶RAD N1 $\frac{1}{2}\pi$
2nd F DRG▶	GRAD W-VIEW ANS▶GRAD N1 100.
2nd F DRG▶	DEG W-VIEW ANS▶DEG N1 90.

≈Functions and Key Operations≈

ON/OFF, Entry Correction Keys



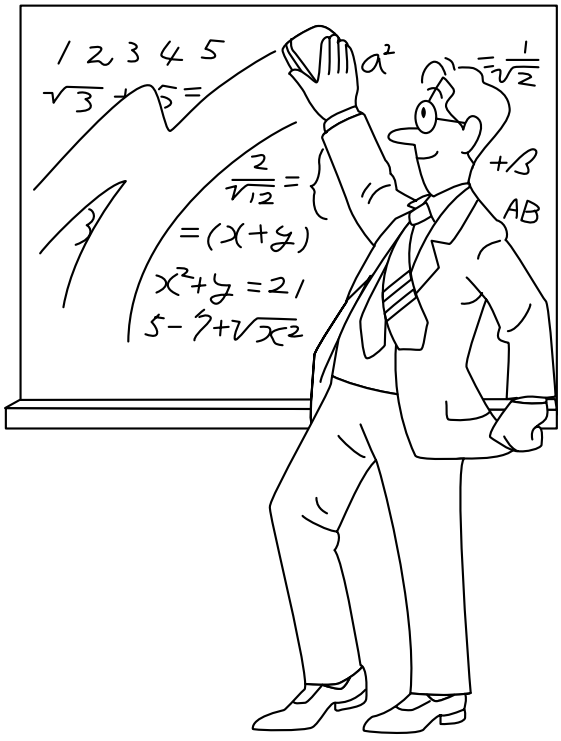
ON/C Turns the calculator on or clears the data. It also clears the contents of the calculator display and voids any calculator command; however, coefficients in 3-variable linear equations and statistics, as well as values stored in the independent memory in normal mode, are not erased.

OFF Turns the calculator off.

CA Clears all internal values, including the last answer (ANS) and statistics. Values stored in memory in normal mode are not erased.

▲ ▼ These arrow keys are useful for Multi-Line playback, which lets you scroll through calculation steps one by one.

◄ ► BS DEL These keys are useful for editing equations. The ◄ key moves the cursor to the left, and the ► key moves the cursor to the right. The BS key deletes the symbol/number at the left of the cursor, and the DEL key deletes the symbol/number at the cursor.



Data Entry Keys [•] [(–) NEG] [π] [Exp]

0 to 9 Numeric keys for entering data values.

[•] Decimal point key. Enters a decimal point.

[(–) NEG] Enters the minus symbol.
The subtraction key [−] is not used for entering negative numbers.

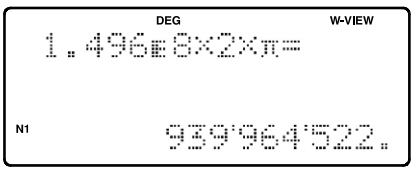
[π] Pressing π automatically enters the value for π (3.14159...).
The constant π, used frequently in function calculations, is the ratio of the circumference of a circle to its diameter.

[Exp] Pressing this key switches to scientific notation data entry.

<Example> Provided the earth is moving around the sun in a circular orbit, how many kilometers will it travel in a year?

* The average distance between the earth and the sun being 1.496×10^8 km.

Circumference equals diameter x π; therefore,
$1.496 \times 10^8 \times 2 \times \pi$

Operation	**Display**
1.496 [Exp] **8** [×] **2** [×] [π] [=]	

Random Key RANDOM

RANDOM Generates random numbers.

Random numbers are three-decimal-place values between 0.000 and 0.999. Using this function enables the user to obtain unbiased sampling data derived from random values generated by the calculator. (Using line mode is preferable since in W-View mode, the numbers are generated by fractions.)

<Example>

2ndF RANDOM 0 = **0.** * * * (A random number is generated.)

[Random Dice]

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

[Random Coin]

To simulate a coin flip, 0 (heads) or 1 (tails) can be randomly generated by pressing 2ndF RANDOM 2 ENTER. To generate the next random coin number, press ENTER.

[Random Integer]

An integer between 0 and 99 can be generated randomly by pressing 2ndF RANDOM 3 ENTER. To generate the next random integer, press ENTER.

APPLICATIONS:

Building sample sets for statistics or research.

Modify Key MDF

MDF Function to round calculation results.

Even after setting the number of decimal places on the display, the calculator performs calculations using a larger number of decimal places than that which appears on the display. By using this function, internal calculations will be performed using only the displayed value.

<Example> **FIX mode TAB = 1 (normal calculation)**

5 ÷ **9** = **0.6** (internally, 0.5555...)

× **9** = **5.0**

Rounded calculation (MDF)

5 ÷ **9** = **0.6** (internally, 0.5555...)

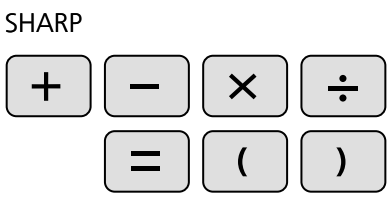
(In W-View mode, press CHANGE to show the answer in decimal.)

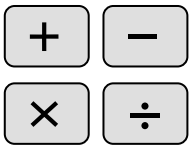
2ndF **MDF** (internally, 0.6)

× **9** = **5.4**

APPLICATIONS:
Frequently used in scientific and technical fields, as well as business, when performing chained calculations.

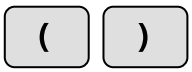
Basic Arithmetic Keys, Parentheses





The four basic operators. Each is used in the same way as a standard calculator:
+ (addition), – (subtraction), x (multiplication), and ÷ (division).

Finds the result in the same way as a standard calculator.



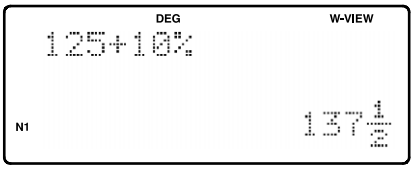
Used to specify calculations in which certain operations have precedence. You can make addition and subtraction operations have precedence over multiplication and division by enclosing them in parentheses.

Percent %

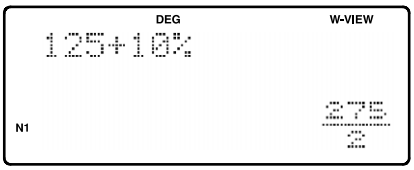
% For calculating percentages. Four methods of calculating percentages are presented as follows.

1) $125 increased by 10%...137.5

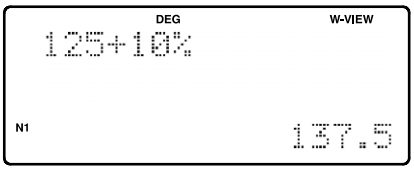
125 + 10 2ndF %



CHANGE

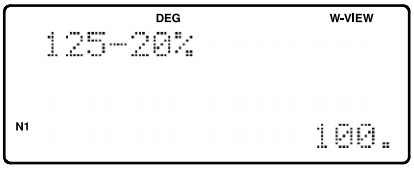


CHANGE



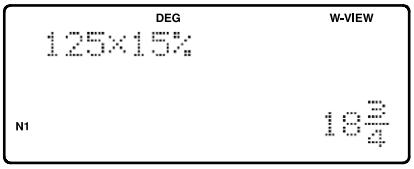
2) $125 reduced by 20%...100

125 − 20 2ndF %



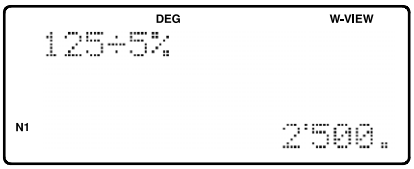
3) 15% of $125...18.75

125 × 15 2ndF %

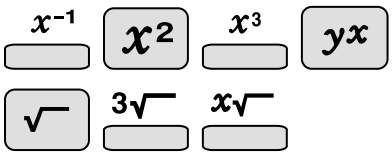


4) When $125 equals 5% of X, X equals...2500

125 ÷ 5 2ndF %



Inverse, Square, Cube, xth Power of y,Square Root, Cube Root, xth Root of y



x^{-1} Calculates the inverse of the value on the display.

x^2 Squares the value on the display.

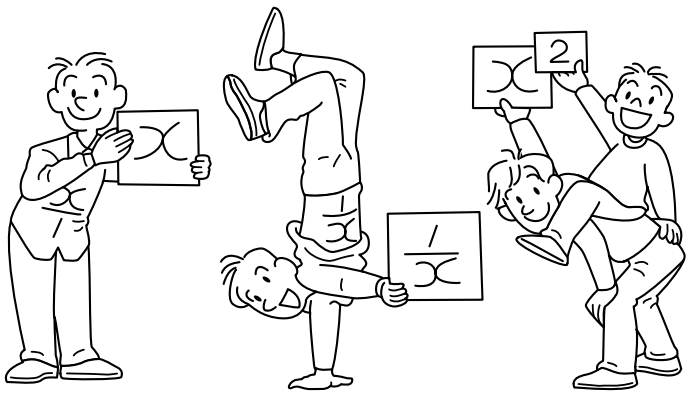
x^3 Cubes the value on the display.

y^x Calculates exponential values.

$\sqrt{\ }$ Calculates the square root of the value on the display.

$\sqrt[3]{\ }$ Calculates the cube root of the value on the display.

$\sqrt[x]{\ }$ Calculates the x^{th} root of y.



<Example>

Operation	Display
2 × 2 × 2 × 2 =	DEG W-VIEW 2×2×2×2= N1 16.
2 y^x 4 =	DEG W-VIEW 2^4= N1 16.
4 2ndF $\sqrt[x]{\ }$ 16 =	DEG W-VIEW $\sqrt[4]{16}$= N1 2.

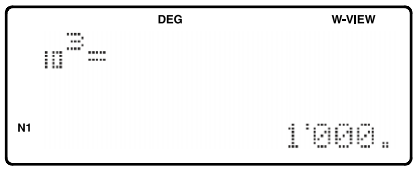
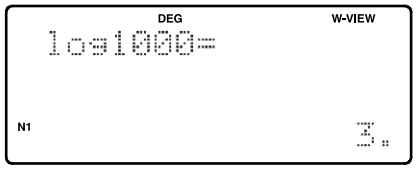
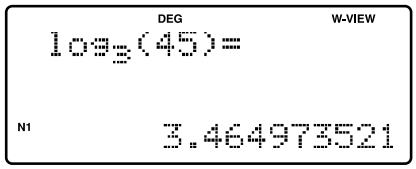
10 to the Power of x, Common Logarithm, Logarithm of x to Base a [10^x] [log] [log_a x]

[10^x] Calculates the value of 10 raised to the x^{th} power.

[log] Calculates the logarithm, the exponent of the power to which 10 must be raised to equal the given value.

[log_a x] Calculates the logarithm of *x* to power a.

<Example>

Operation	Display
[2ndF] [10^x] 3 [=]	
[log] 1000 [=]	
[2ndF] [log_a x] 3 [▶] 45 [=]	

e to the Power of x, Natural Logarithm [e^x] [ln]

[e^x] Calculates powers based on the constant e (2.718281828).

[ln] Computes the value of the natural logarithm, the exponent of the power to which e must be raised to equal the given value.

<Example>

Operation	Display
[2ndF] [e^x] 5 [=]	DEG W-VIEW e^5= N1 148.4131591
[ln] 10 [=]	DEG W-VIEW ln10= N1 2.302585093

Factorials $n!$

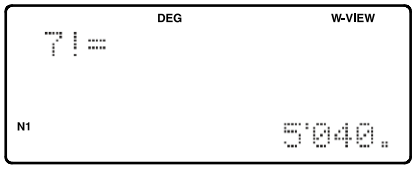
$n!$ The product of a given positive integer *n* multiplied by all the lesser positive integers from 1 to *n*-1 is indicated by *n*! and called the factorial of *n*.

<Example>

Operation

7 2nd F $n!$ =

Display



c.f
n! = 1 x 2 x 3 x …x*n*

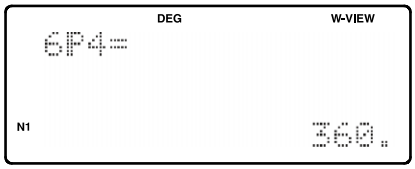
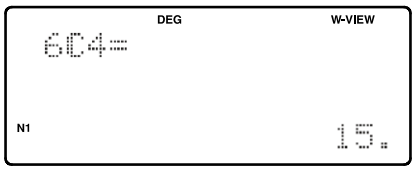
APPLICATIONS:
Used in statistics and mathematics. In statistics, this function is used in calculations involving combinations and permutations.

Permutations, Combinations $_nP_r$ $_nC_r$

$_nP_r$ This function finds the number of different possible orderings in selecting *r* objects from a set of *n* objects. For example, there are six different ways of ordering the letters ABC in groups of three letters—ABC, ACB, BAC, BCA, CAB, and CBA.
The calculation equation is $_3P_3 = 3 \times 2 \times 1 = 6$ (ways).

$_nC_r$ This function finds the number of ways of selecting *r* objects from a set of *n* objects. For example, from the three letters ABC, there are three ways we can extract groups of two different letters—AB, AC, and CB.
The calculation equation is $_3C_2$.

<Example>

Operation	Display
6 [2ndF] [$_nP_r$] 4 [=]	
6 [2ndF] [$_nC_r$] 4 [=]	

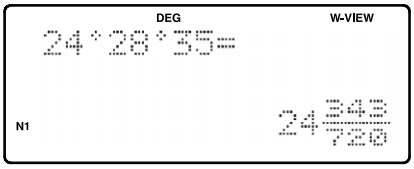
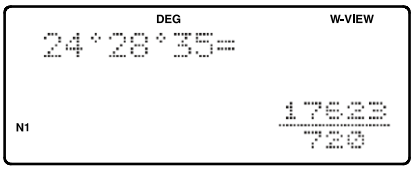
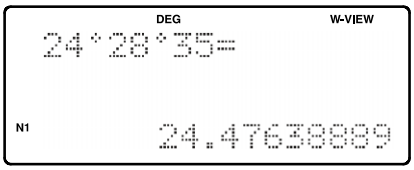
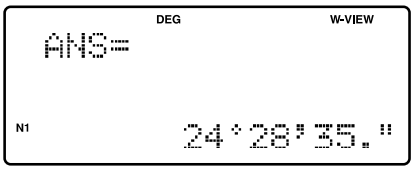
APPLICATIONS:
Used in statistics (probability calculations) and in simulation hypotheses in fields such as medicine, pharmaceutics, and physics. Also, can be used to determine the chances of winning in lotteries.

Time Calculation ↔DEG D°M′S

↔DEG Converts a sexagesimal value displayed in degrees, minutes, seconds to decimal notation. Also, converts a decimal value to sexagesimal notataion (degrees, minutes, seconds).

D°M′S Inputs values in sexagesimal notation (degrees, minutes, seconds).

<Example> Convert 24° 28’ 35” (24 degrees, 28 minutes, 35 seconds) to decimal notation. Then convert 24.476° to sexagesimal notation.

Operation	Display
24 D°M′S **28** D°M′S **35** 2ndF ↔DEG Convert to decimal notation	
CHANGE	
CHANGE	
2ndF ↔DEG	

Repeat last key operation to return to the previous display.

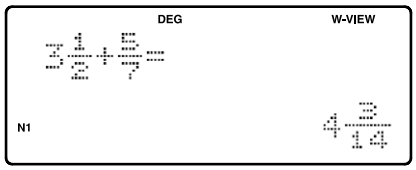
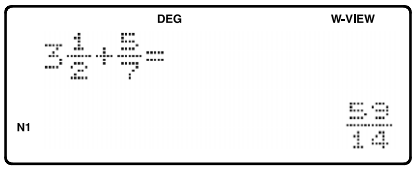
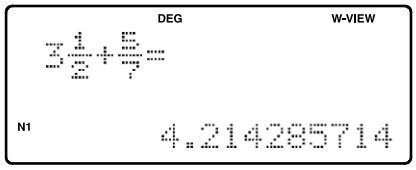
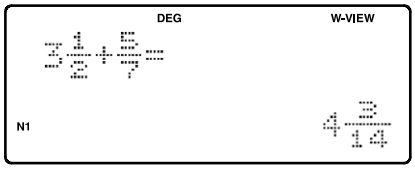
APPLICATIONS:
Used in calculations of angles and angular velocity in physics, and latitude and longitude in geography.

Fractional Calculations [a/b] [ab/c]

[a/b] Inputs proper or improper fractions which consist of a numerator and denominator.

[ab/c] Inputs a mixed fraction.

<**Example**> Add $3\frac{1}{2}$ and $\frac{5}{7}$, and convert to decimal notation.

Operation	Display
3 [2ndF] [ab/c] 1 [▶] 2 [▶] [+] 5 [a/b] [▶] 7 [=]	
[CHANGE] Convert to an improper fraction	
[CHANGE] Convert to decimal notation	
[CHANGE]	

APPLICATIONS:
There is a wide variety of applications for this function because fractions are such a basic part of mathematics. This function is useful for calculations involving electrical circuit resistance.

Memory Calculations

STO RCL M+ M−

A ~ F X Y M

STO — Stores displayed values in memories A~F, X, Y, M.

RCL — Recalls values stored in A~F, X, Y, M.

M+ — Adds the displayed value to the value in the independent memory M.

M− — Subtracts the displayed value from the value in the independent memory M.

A ~ F X Y — Temporary memories

M — Independent memory

<Example 1>

Operation	Display
0 STO M (Enter 0 for M)	DEG W-VIEW 0⇒M N1 0.
25 × 27 M+	DEG W-VIEW M 25×27M+ N1 675.
7 × 3 M+	DEG W-VIEW M 7×3M+ N1 21.
RCL M	DEG W-VIEW M M= N1 696.

<Example 2>

Calculates $/¥ at the designated exchange rate.
$1 = ¥110
¥26,510 = $?
$2,750 = ¥?

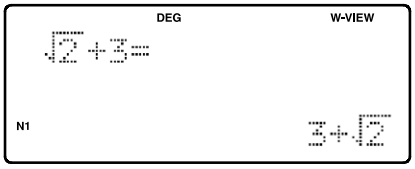
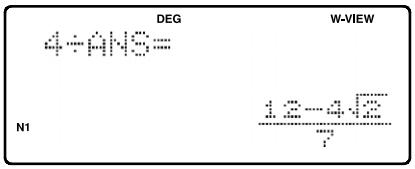
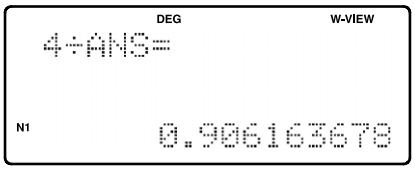
Operation	Display
110 STO Y	DEG W-VIEW 110⇒Y N1 110.
26510 ÷ RCL Y =	DEG W-VIEW 26510÷Y= N1 241.
2750 × RCL Y =	DEG W-VIEW 2750×Y= N1 302'500.

Last Answer Memory [ANS]

ANS Automatically recalls the last answer calculated by pressing [=]

<Example> Solve for *x* first and then solve for *y* using *x*.

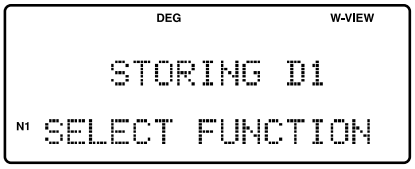
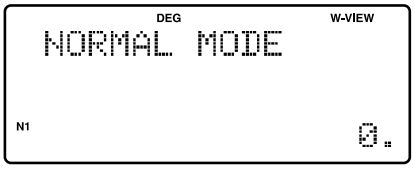
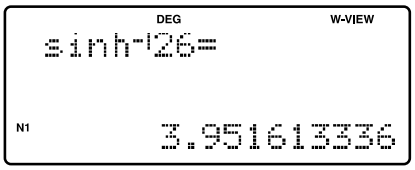
$$x = \sqrt{2} + 3 \quad \text{and} \quad y = 4 \div x$$

Operation	Display
[√] 2 [▶] [+] 3 [=]	
4 [÷] [ALPHA] [ANS] [=]	
[CHANGE]	

User-Defined Functions D1 ~ D4

D1 ~ D4 Recall a function that was defined by the user.

<Example>

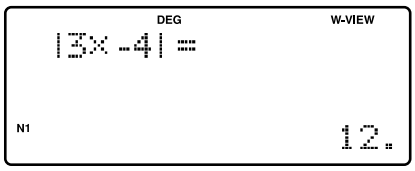
Operation	Display
STO D1	
2ndF hyp $\sin^{-1}$	
D1 26 =	

APPLICATIONS:
Functions that you have previously defined, including those using common 2nd Function buttons, can be stored in D1~ D4 for later use, thus saving time on keystrokes.

Absolute Value abs

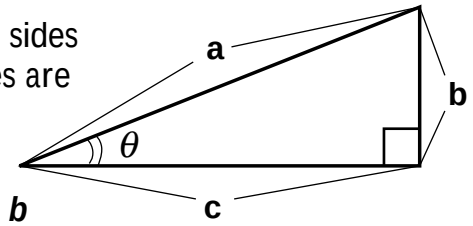
abs Returns an absolute value.

<Example>

Operation	Display
2ndF abs 3 ×	
−4 ((−) 4) =	

Trigonometric Functions [sin] [cos] [tan]

Trigonometric functions determine the ratio of three sides of a right triangle. The combinations of the three sides are sin, cos, and tan. Their relations are:



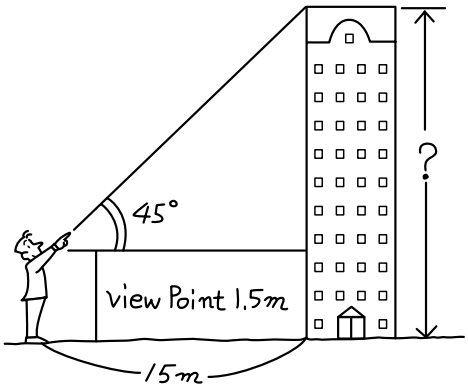
[sin] Calculates the sine of an angle. $\sin\theta = \frac{b}{a}$

[cos] Calculates the cosine of an angle. $\cos\theta = \frac{c}{a}$

[tan] Calculates the tangent of an angle. $\tan\theta = \frac{b}{c}$

<Example>

The angle from a point 15 meters from a building to the highest floor of the building is 45°. How tall is the building?



[DEG mode]

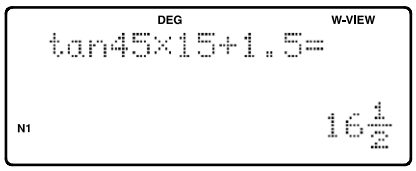
Operation

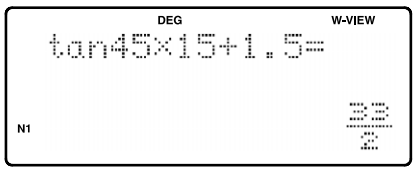
[tan] 45 [×] 15
[+] 1 [•] 5 [=]
View point

[CHANGE]

[CHANGE]

Display

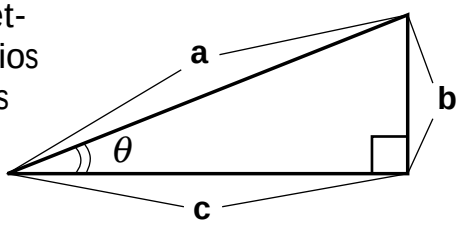




APPLICATIONS:
Trigonometric functions are useful in mathematics and various engineering calculations. They are often used in astronomical observations, civil engineering and in calculations involving electrical circuits, as well as in calculations for physics such as parabolic motion and wave motion.

Arc Trigonometric Functions $\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

Arc trigonometric functions, the inverse of trigonometric functions, are used to determine an angle from ratios of a right triangle. The combinations of the three sides are $\sin^{-1}$, $\cos^{-1}$, and $\tan^{-1}$. Their relations are;



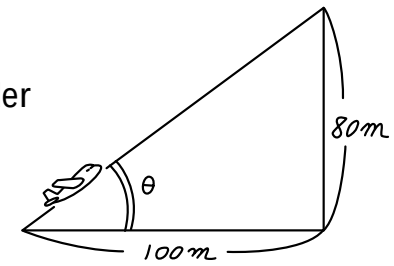
$\sin^{-1}$ (arc sine) Determines an angle based on the ratio *b*/*a* of two sides of a right triangle. $\theta = \sin^{-1}\frac{b}{a}$

$\cos^{-1}$ (arc cosine) Determines an angle based on the ratio *c*/*a* for two sides of a right triangle. $\theta = \cos^{-1}\frac{c}{a}$

$\tan^{-1}$ (arc tangent) Determines an angle based on the ratio *b*/*c* for two sides of a right triangle. $\theta = \tan^{-1}\frac{b}{c}$

<Example>

At what angle should an airplane climb in order to climb 80 meters in 100 meters?

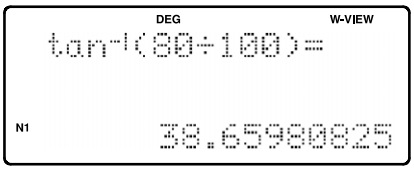


[DEG mode]

Operation

2ndF $\tan^{-1}$ (80 ÷ 100) =

Display



Hyperbolic Functions [hyp] [arc hyp]

[hyp] The hyperbolic function is defined by using natural exponents in trigonometric functions.

[arc hyp] Arc hyperbolic functions are defined by using natural logarithms in trigonometric functions.

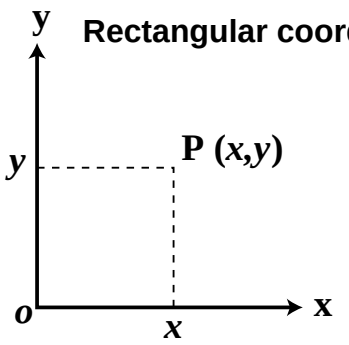
APPLICATIONS:
Hyperbolic and arc hyperbolic functions are very useful in electrical engineering and physics.

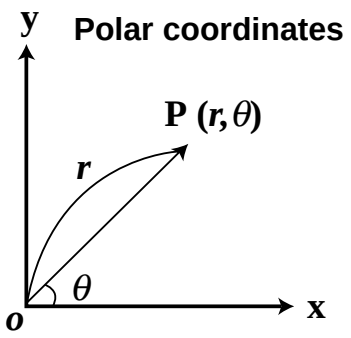
Coordinate Conversion [→rθ] [→xy] [(x,y)']

[→rθ] Converts rectangular coordinates to polar coordinates (x, $y \rightarrow r$, θ)

[→xy] Converts polar coordinates to rectangular coordinates (r, $\theta \rightarrow x$, y)

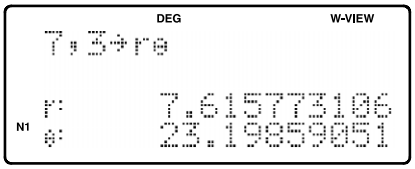
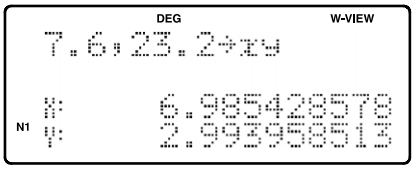
[(x,y)'] Splits data used for dual-variable data input.





<Example> Determine the polar coordinates (r, θ) when the rectangular coordinates of Point P are (x = 7, y = 3).

[DEG mode]

Operation	Display
7 [(x,y)'] 3 [2nd F] [→rθ]	
7.6 [(x,y)'] 23.2 [2nd F] [→xy]	

APPLICATIONS:
Coordinate conversion is often used in mathematics and engineering, especially for impedance calculations in electronics and electrical engineering.

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

→BIN →PEN →OCT →DEC →HEX

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.

- **→BIN** Converts to the binary system. "BIN" appears.
- **→PEN** Converts to the pental system. "PEN" appears.
- **→OCT** Converts to the octal system. "OCT" appears.
- **→HEX** Converts to the hexadecimal system. "HEX" appears.
- **→DEC** Converts to the decimal system. "BIN", "PEN", "OCT", and "HEX" disappear from the display.

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

<Example 1> HEX(1AC) →BIN →PEN →OCT →DEC

Operation	Display
2ndF →HEX 1AC	DEG W-VIEW 1AC_ N1 HEX
2ndF →BIN	DEG W-VIEW 1AC→BIN N1 BIN 110101100
2ndF →PEN	DEG W-VIEW ANS→PEN N1 PEN 3203
2ndF →OCT	DEG W-VIEW ANS→OCT N1 OCT 654
2ndF →DEC	DEG W-VIEW ANS→DEC N1 428.

<Example 2> 1011 AND 101 = (BIN) →DEC

Operation	Display
ON/C 2ndF →BIN 1011 AND 101 =	DEG W-VIEW 1011AND101= N1 BIN 1
2ndF →DEC	DEG W-VIEW ANS→DEC N1 1.

Statistics Functions

The statistics function is excellent for analyzing qualities of an event. Though primarily used for engineering and mathematics, the function is also applied to nearly all other fields including economics and medicine.

DATA INPUT AND CORRECTION

DATA Enters data for statistical calculations.

CD Clears data input.

(x,y) Splits data used for dual-variable data input.
(Used for dual-variable statistical calculations.)

<Example 1> Here is a table of examination results. Input this data for analysis.

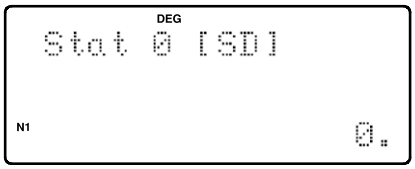
Data table 1

No.	1	2	3	4	5	6	7	8
Score	30	40	50	60	70	80	90	100
No. of pupils	2	4	5	7	12	10	8	2

Operation **Display**

MODE **1** **0**

Select single-variable statistics mode



30 **(x,y)** **2** **DATA**

⋮

100 **(x,y)** **2** **DATA**

"ANS" KEYS FOR 1-VARIABLE STATISTICS

$\bar{x}$ Calculates the average value of the data (sample data *x*).

sx Calculates the standard deviation for the data (sample data *x*).

σx Calculates the standard deviation of a data population (sample data *x*).

n Displays the number of input data (sample data *x*).

Σx Calculates the sum of the data (sample data *x*).

Σx^2 Calculates the sum of the data (sample data *x*) raised to the second power.

NOTE:

1. Sample data refers to data selected randomly from the population.
2. Standard deviation of samples is determined by the sample data shift from an average value.
3. Standard deviation for the population is standard deviation when the sample data is deemed a population (full data).

Let's check the results based on the previous data.

RCL $\bar{x}$ 69 (average value)

RCL sx 17.75686128 (standard deviation)

RCL σx 17.57839583 (standard deviation of the population)

RCL **n** 50 (total count of data)

RCL Σx 3450 (total)

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 'X:', 'Y:', or 'F:' (n is the sequential number of the data set).
Display the data item to modify, input the correct value, then press DATA.
Using (x,y)', 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.

<Example 2>

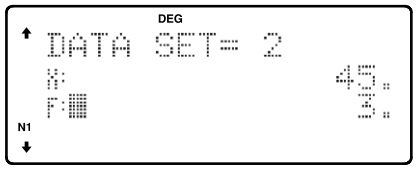
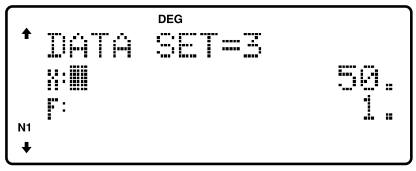
Data table 2

X: 30, 40, 40, 50

⬇

X: 30, 45, 45, 45, 60

Operation	Display
MODE 1 0 Select single-variable statistics mode	DEG Stat 0 [SD] N1 0.
30 DATA	DEG 30DATA N1 DATA SET= 1.
40 (x,y)' 2 DATA	DEG 40,2DATA N1 DATA SET= 2.
50 DATA	DEG 50DATA N1 DATA SET= 3.

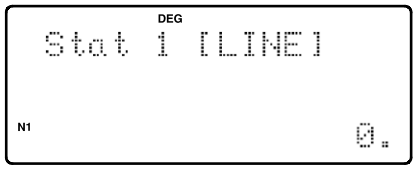
Operation	Display
▼ ▼ ▼	
45 (x,y) 3 DATA	
▼	
▼ 60 DATA	

APPLICATIONS:
Single-variable statistical calculations are used in a broad range of fields, including engineering, business, and economics. They are most often applied to analysis in atmospheric observations and physics experiments, as well as for quality control in factories.

<Example 3> The table below summarizes the dates in April when cherry blossoms bloom, and the average temperature for March in that same area. Determine basic statistical quantities for data X and data Y based on the data table.

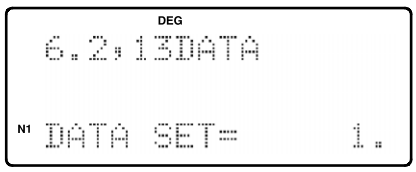
Data table 3

	Year	1998	1999	2000	2001	2002	2003	2004	2005
x	Average temperature	6.2	7.0	6.8	8.7	7.9	6.5	6.1	8.2
y	Date blossoms bloom	13	9	11	5	7	12	15	7

Operation	Display
MODE 1 1	

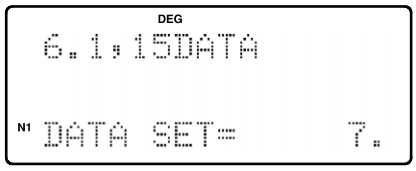
Select dual-variable statistics mode and linear regression calculation in sub-mode.

6.2 (x,y)' 13 DATA

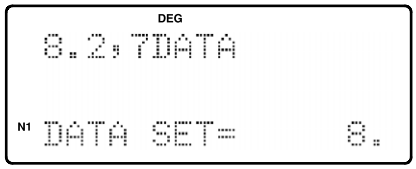


⋮

6.1 (x,y)' 15 DATA



8.2 (x,y)' 7 DATA



"ANS" KEYS FOR 2-VARIABLE STATISTICS

In addition to the 1-variable statistic keys, the following keys have been added for calculating 2-variable statistics.

Σxy Calculates the sum of the product for sample data *x* and sample data *y*.

Σy Calculates the sum of the data (sample data *y*).

Σy^2 Calculates the sum of the data (sample data *y*) raised to the second power.

$\bar{y}$ Calculates the average value of the data (sample data *y*).

sy Calculates the standard deviation for the data (sample data *y*).

σy Calculates the standard deviation of a data population (sample data *y*).

NOTE:
The codes for basic statistical quantities of sample data *x* and their meanings are the same as those for single-variable statistical calculations.

Let' s check the results based on the previous data.

RCL $\bar{x}$ 7.175 (Average for data *x*)

RCL sx 0.973579551 (Standard deviation for data *x*)

RCL σx 0.91070028 (Standard deviation of the population for data *x*)

RCL $\bar{y}$ 9.875 (Average for data *y*)

RCL sy 3.440826313 (Standard deviation for data *y*)

RCL σy 3.218598297 (Standard deviation of the population for data *y*)

RCL n 8 (Total count of data)

RCL Σx 57.4 (Sum of data *x*)

RCL Σx^2 418.48 (Sum of data *x* raised to the second power)

RCL Σxy 544.1 (Sum of the product of data *x* and data *y*)

RCL Σy 79 (Sum of data *y*)

RCL Σy^2 863 (Sum of data *y* raised to the second power)

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