

Canon

F-720

Scientific Statistical Calculator

ENGLISH

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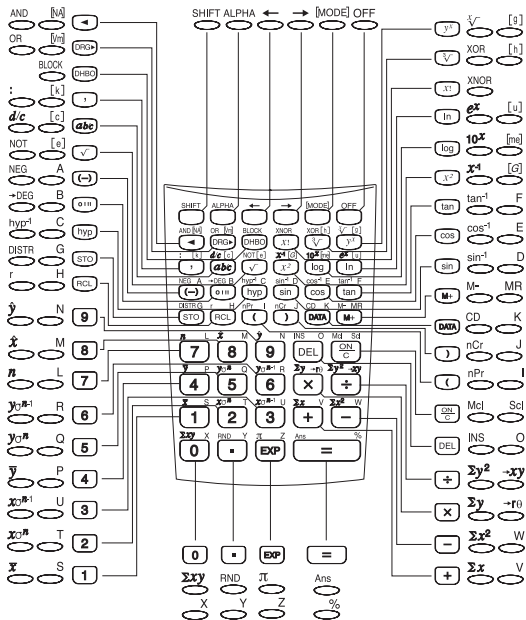
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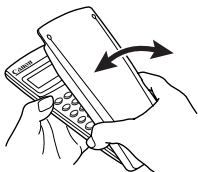
Thank you for purchasing Canon's advanced scientific calculator, which features a 2-line display capable of displaying both formulas and result at the same time. The main features include Base-N calculations, statistical calculations, linear regression calculations, probability calculations, 10 built-in scientific constants, and more....

KEY ASSIGNMENT

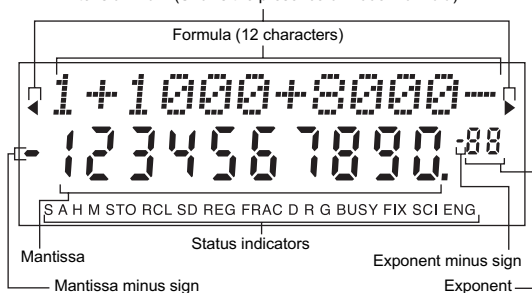


How To Open/Close the Cover:

Open or close the cover by turning it as shown in the figure.
Do not slide the cover to remove or install it.

**Two-Line Display**

Extension mark (Shows the presence of hidden formula)





**<Status indicators>**




- S : SHIFT key
- A : ALPHA key
- H : hyp key
- M : Independent memory
- STO : Variable memory storage
- RCL : Variable memory recall
- SD : Statistic mode
- REG : Regression mode
- FRAC : Fraction mode
- D : Degree mode
- R : Radian mode
- G : Gradient mode
- BUSY : Busy status (Under calculation)
- FIX : Fixing mode
- SCI : Scientific exponential mode
- ENG : Engineering exponential mode




How To Use Multiple Function Keys (using)

Function keys can perform several different functions.

Example:

 The key name will be described as ,  or  in this book.

 : Works as the “sin” key.
 : Works as the “sin⁻¹” key.
 : In Decimal mode, this key works as the variable memory “D” key.

However, in Hexadecimal mode only, the keys  ~  work as “A ~ F (10 ~ 15 in decimal)” and, in this case, you need not to press .

Tip:

- You will see the function group from the color of the key names (e.g. green for statistic and regression).







<Display description in this book>

In the example table, the upper line display will be shown as “xx” (e.g. “Ans”).



Precautions Before Calculation

- Calculation Mode
Before starting calculation, be sure to check the Calculation mode from the status indicators, such as SD (static), REG (regression), FRAC (Fraction) and D (degree). In Base-N mode, the Calculation mode is displayed in exponent display part as **d** (decimal), **H** (hex.), **b** (binary) or **o** (octal).
- Returning to the Initial mode
If you get into trouble during calculation, it is recommended to return the calculation mode to the initial one once, where only “D (Degree)” indicator is lit (refer to page 6).


<How to return to initial mode>

- 1)  1 (Select "CMP"): Normal calculation mode
- 2)   1 (Select "Deg"): Set the angle unit mode to Degree
- 3)    4 (Select "Norm"): Floating mode

Also, clears the memories as follows:

  : Clears the independent memory and variable memories A ~ Z.

Power ON, OFF keys


 (**Power ON/Clear**): Turns the calculator on. When it is pressed with the calculator turned on, all registers except the memory registers are cleared.


- Auto Power Off Function:

When the calculator is not used for about 6 minutes, the calculator is automatically turned off to save power.

 (**Power OFF**): Turns off the calculator.


Memory Clear keys

 (**Independent/Variable Memory Clear**): Clears the independent memory and variable memories A ~ Z. When it is pressed, "Mcl" appears on the display.

 (**Statistic Memory Clear**): Clears the statistic memory in Statistic or Regression mode. When it is pressed, "Scl" appears on the display.


Numeric Entry Keys

 ~  (**Numeric**): Enter numbers.


 (**Decimal Point**): Enters a decimal point.

 (**Exponential**): Used to enter exponents.


Example: $35 \times 10^{43} = \rightarrow 35$  43  (3.5^{44})

 (**Negative**): Used to obtain negative value.

Example: $12 \times (-3) = \rightarrow 12$   3  $(-36.)$



 (**Back Space**): Clears the last digit entered from the upper (formula) line.

Example:

Value	Operation	Display
12345	1 2 4 incorrect entry	"124"
		"12"
	3 4 5	"12345"




Cursor/Edit Keys



The cursor keys are used to move the cursor in the upper (formula entry) line. When the entry is long, an extension mark appears to let you know that the hidden formula is present.



With  (deletion) and  (insertion), you can correct the formula during entry or after calculation. Also, after calculation, you can use the replay function to move the cursor to the end or beginning of the formula to add further formula or to change it.

Example:1234567  889900

Extension mark Cursor


Replacing an entry (7 → 0):
 (Press or keep press until "7" blinks.) 1234567+8899.
0 (Replace with "0") 1234560+8899.**Deletion (1234560 → 134560):**
 (Press or keep press until "2" blinks.) 1234560+8899.
 ("2" is deleted.) 134560+8899.**Insertion (889900 → 2889900):**
 (Press or keep press until "8" blinks.) 134560+88990.

  ("8" and  alternates.) 134560+88990.
2 (Insert "2".) 134560+2899.
 (or  or ) 134560+28899.
Replay function (You can add or change the formula):
  (Cursor moves to the end.) 560+2889900_

  (Cursor moves to the beginning.) 134560+28899.


Mode Selection Key
























[MODE]

Using , you can select the calculation modes. Refer to the following table:

Display example when  is pressed once:

CMP	BAS	FRA	▶	→	◀	SD	REG
1	2	3				4	5

To select CMP, press 1. To select SD (Statistic), press 4, or press  then 4.

Operation	Indicator	Mode	
 1	—	CMP	Normal calculation mode
 2	d	BAS ^(*1) (Base-N)	Decimal ^(*2)
	H		Hexadecimal ^(*2)
	b		Binary ^(*2)
	o		Octal ^(*2)
 3	FRAC	FRA ^(*1)	Fraction
 4	SD	SD	Statistic
 5	REG	REG	Regression
  1	D	Deg	Degree
  2	R	Rad	Radian
  3	G	Gra	Gradient
   1	FIX	Fix ^(*3)	Fixing mode
   2	SCI	Sci ^(*4)	Scientific exponential mode
   3	ENG	Eng	Engineering exponential mode
   4	—	Norm	Floating mode

- *1 Angle Unit mode and Display mode cannot be selected in Base-N mode and Fraction mode.
 *2 Shown in the exponent part. Changes by pressing $\boxed{\text{DHBO}}$.
 *3 "Fix 0 ~ 9?" appears. Enter 0 ~ 9 to specify the number of decimal places.
 *4 "Sci 0 ~ 9?" appears. Enter 0 ~ 9 to specify the number of significant digits.

Example for Display modes:

Operation	Display	Explanation
$\boxed{\text{MODE}} \boxed{\text{MODE}} \boxed{\text{MODE}} 1$	"Fix 0~9?"	FIX mode
2	(FIX)	Decimal places: 2 ^(*2)
123456 \times .001 $=$	123.46 ^(*1)	Result is rounded
$\boxed{\text{MODE}} \boxed{\text{MODE}} \boxed{\text{MODE}} 2$	"Sci 0~9?"	SCI mode
5		Significant digits: 5 ^(*2)
123456 \times .001 $=$	1.2346 ^{02(*1)}	Result is rounded
$\boxed{\text{MODE}} \boxed{\text{MODE}} \boxed{\text{MODE}} 3$	(ENG)	ENG mode
123456 \times .001 $=$	123.456 ⁰⁰	

- *1 The displayed value is rounded up within the specified range, but the actual calculation result is retained in the register.
 *2 If you want to cancel the current mode and return to Normal (floating) mode, press $\boxed{\text{MODE}} \boxed{\text{MODE}} \boxed{\text{MODE}} 4$.

Angle Unit Conversion Key $\boxed{\text{DRG}}$

Used to change the angle values to different unit.
 (DEG) \rightarrow (RAD) \rightarrow (GRAD)

- Relationship of units: $200^{\text{GRAD}} = 180^{\circ} = \pi^{\text{RAD}}$

Example: Convert 180 degrees into radian and gradient.

Operation	Display (Upper)	Display (Lower)
$\boxed{\text{MODE}} \boxed{\text{MODE}} 1$	"Deg"	(D)
180 $\boxed{\text{DRG}}$	"180 \rightarrow RAD"	(R) 3.141592654
$\boxed{\text{DRG}}$	"Ans \rightarrow GRAD"	(G) 200.

Basic Instruction Keys

$\boxed{+}$ $\boxed{-}$ $\boxed{\times}$ $\boxed{\div}$ $\boxed{=}$: Used for basic arithmetic calculation. Press keys as they are written.

$\boxed{\times}$ can be omitted in the following cases:

- Before parenthesis (e.g. $3(4 + 7)$, $(A + 1)(B + 2)$)
- Before $\sqrt{\quad}$, $\sqrt[3]{\quad}$, \sin , \sin^{-1} , \log , \ln , 10^x , e^x , etc. (e.g. $2\sqrt{5}$)
- Before fixed number and variables (e.g. 2π , $3AB$)

$\boxed{\%}$ (**Percent**): Used for percentage calculations.

When this key is pressed before using the four fundamental operations, the entered value is divided by 100 and the calculation result is displayed.

Example: $123 \boxed{\text{ALPHA}} \boxed{\%} \boxed{=}$ (1.23)

$\boxed{(}$ $\boxed{)}$ (**Open, Close Parenthesis**): For performing parenthesis calculations where numbers and instructions to be stored in the register are within 12 levels.

Example:

Value	Operation	Display
$2 \times (3 + 4)$	$2 \boxed{(} 3 \boxed{+} 4 \boxed{)}$	14.
$= 14$	$\boxed{=}$	
$1 + [(4 - 3.6 + 5)$	$1 \boxed{+} \boxed{(} \boxed{(} 4 \boxed{-}$	-6.056
$\times 0.8 - 6] \times 4.2$	$3.6 \boxed{+} 5 \boxed{)} \boxed{\times} .8$	
	$\boxed{-} 6 \boxed{)} \boxed{\times} 4.2$	
$= -6.056$	$\boxed{=}$	

- $\boxed{(}$ and $\boxed{)}$ are always used together. Otherwise, "Syn (Syntax) ERROR" will be displayed.

Fractional Calculation Keys



It enters fractions and calculates both mixed and improper fractions. Answers are given in mixed fractions.

\boxed{abc} (**Fraction**): Use it to enter fractions for both mixed and improper fractions.

When entering improper fractions (A/B):

A (numerator) → \boxed{abc} → B (denominator)

When entering mixed fractions (A B/C):

A (integer) → \boxed{abc} → B (numerator) → \boxed{abc} → C (denominator)

Fractions 2/3 is displayed as "2 r 3", and 1 2/5 as "1 r 2 r 5".

Example:

Value	Operation	Display
$\frac{2}{3}$	[MODE] 3	(FRAC)
	$\frac{2}{}$	"2"
	\boxed{abc}	"2 r"
	3	"2 r 3"
	[=]	2 r 3
$1\frac{2}{5}$	1 \boxed{abc}	"1 r"
	2 \boxed{abc} 5	"1 r 2 r 5"
	[=]	1 r 2 r 5

* If the result exceeds 10 digits including delimiters, it is displayed in the decimal point expression.

<Fractions ↔ Decimal point expression>

\boxed{abc} can convert the results of the fractional calculations to the decimal expression, and vice versa.

Example: Calculate $1\frac{2}{3} + 4\frac{5}{6}$ and convert the result to the decimal point expression.

Operation	Display
1 \boxed{abc} 2 \boxed{abc} 3 [+] 4 \boxed{abc} 5 \boxed{abc} 6 [=]	6 r 1 r 2
\boxed{abc}	6.5
\boxed{abc}	6 r 1 r 2



(Mixed/Improper Fraction Conversion):

It converts mixed fractions to improper fractions and vice versa. It changes alternatively at each time the key is pressed.

Example: Enter 10/3 and convert it to the mixed fraction.

Operation	Display
10 $\frac{abc}{d/c}$ 3 =	3 r 1 r 3
SHIFT $\frac{d/c}{}$	10 r 3

Memory Keys

[M+] M- MR Mcl [STO] [RCL] A ~ Z

The memory contents are retained even when the calculator is turned off.

[M+] (**Memory Plus**): For adding numbers to the independent memory.

M- (**Memory Minus**): For subtracting numbers from the independent memory.

MR (**Memory Recall**): For recalling the independent memory contents.

Mcl (**Independent/Variable Memory Clear**): Clears the independent memory and variable memories A ~ Z. When it is pressed, "Mcl" appears on the display.

[STO] (**Store**): For storing into the variable memory. By combining with A ~ Z, up to 26 contents can be stored. (e.g. [STO] A)

[RCL] (**Recall**): For recalling the contents of the variable memory. (e.g. [RCL] A)

Example using the independent memory:

Operation	Display	Memory contents	Explanation
[MODE] 1	-		Normal calculation
SHIFT Mcl	"Mcl"	0	Clear memory
456 [M+]	(M) 456.	456	Enter 456
123 SHIFT M-	(M) 123.	333	Subtract 123
ALPHA MR =	(M) 333.	333	Recall from memory
5 [X] ALPHA			
MR =	(M) 1665.	1665	Calculate 5×MR

* Memory keys are ineffective in Base-N and Fraction modes.

Example using the variable memory:

Operation	Display	Memory contents	Explanation
SHIFT Mcl	"Mcl"	0	Clear memory
12 \times 3 =	36.	0	
STO A	"A=" 36.	36	Store 36 to "A"
ON C		36	Clear register
RCL A	"A=" 36.	36	Recall from "A"

* After pressing STO or RCL , press A without pressing ALPHA .

Last Answer Key Ans

The result of the most recent calculation is stored into the answer memory. You can recall and use this result by pressing SHIFT Ans .

Example: Calculate $123 + 456$ and subtract the result from 789.


Operation	Display (Upper)	Display (Lower)
123 + 456 =	"123+456"	579.
789 - SHIFT Ans	"789-Ans"	
=	"789-Ans"	210.

Example using continuous calculation:

Operation	Display (Upper)	Display (Lower)
123 + 456 =	"123+456"	579.
\div 10	"Ans/10"	
=	"Ans/10"	57.9



Random Key











RND

 **(Random):** For generating a random number between 0.000 and 0.999.

Example:    (0.132)

Scientific Constant Keys

The following scientific constant keys can be used in the formulas. Press , then  for example.

 Velocity of light:	299792458 [ms ⁻¹]
 Planck's constant:	6.626176×10 ⁻³⁴ [J.S]
 Gravitational constant:	6.672×10 ⁻¹¹ [Nm ² kg ⁻²]
 Electronic charge:	1.6021892×10 ⁻¹⁹ [C]
 Electronic rest mass:	9.109534×10 ⁻³¹ [kg]
 Atomic mass:	1.6605655×10 ⁻²⁷ [kg]
 Avogadro's constant:	6.022045×10 ²³ [mol ⁻¹]
 Boltzmann's constant:	1.380662×10 ⁻²³ [J.K ⁻¹]
 Volume mass at s.t.p:	0.02241383 [m ³ mol ⁻¹]
 Gravity acceleration of free fall:	9.80665 [ms ⁻²]

Example: How many times the light can run around the earth in 1 second.

1×c÷40000 [km] = →     4000000 
(7.49481145)

Calculation Priority

The calculation procedure priority is automatically determined by the calculator. This means that algebraic expressions can be entered just as they are written. The calculation priority is as follows:

- 1) Parentheses
- 2) A type functions (the value is entered before pressing the function key): x², x⁻¹, x!, %, D°M'S"
- 3) Power/root: y^x, $\sqrt[x]{y}$
- 4) Fractions: a/b/c

- 5) Abbreviated multiplication format in front of constant: 2π , $2\pi\pi$, $3A$, $5Vm$, πA , etc.
 - 6) Type B functions (the function key is pressed before entering the value): $\sqrt{\quad}$, $\sqrt[3]{\quad}$, \sin , \sin^{-1} , \sinh^{-1} , \log , \ln , 10^x , e^x , $(-)$, NEG , NOT , etc.
 - 7) Abbreviated multiplication format in front of Type B functions: $2\sin 5$, $A\log 3$, etc.
 - 8) Permutation, Combination: nPr , nCr
 - 9) \times , \div
 - 10) $+$, $-$
 - 11) AND
 - 12) OR , XOR , $XNOR$
 - 13) $=$, $M+$, $M-$, STO , $DATA$, CD , $\rightarrow xy$, $\rightarrow r\theta$, $DRG \rightarrow$
- <Stack memory (nesting)>**

During actual calculation, lower priority calculations are stored in the stack memory and then processed in turn. This stack memory can store up to 12 levels of calculations.

Calculation Range


The allowable result display in the lower line is 10 digits for a mantissa and 2 digits for an exponent. However, calculations are internally performed with a range of 12 digits for a mantissa and 2 digits for an exponent.

Calculation range:

$$\pm 1 \times 10^{-99} \sim \pm 9.999999999 \times 10^{99}, \text{ and } 0$$

Error Messages

The error message let you know overflow or your entry mistake. When an error message is displayed, press

 to clear it.

Ma ERROR (Mantissa Error)




When one of the following operations is made, "Ma ERROR" will appear on the display.

- The calculation result exceeds the allowable range, i.e., $\pm 9.999999999 \times 10^{99}$.
- An attempt is made to perform function calculations that exceed the input range.
- An attempt was made to divide by 0.

Stk ERROR (Stack Error)





When the number of nesting in the stack memory exceeds 12, "Stk ERROR" will appear on the display. In this case, you need to simplify the formula, or use answer memory (Ans) or variable memories to reduce nesting.

Syn ERROR (Syntax Error)








When an input error is made, "Syn ERROR" will appear on the display. In this case, press  to clear your entry, or press  or  to display the input formula for correction.

Entry exceeding error (█ blinking)

When the number of key presses exceeds 100 for one entry, the cursor "█" blinks on the display. In this case, you need to simplify the formula.

- The key combinations such as   and   are counted as a single key.

Base-N Calculations

In Base-N mode, decimal, hexadecimal, binary and octal conversions, calculations and logical operations can be performed. The keys used for Base-N calculation are as follows:

Note:

Decimal calculation (**d** lit) in Base-N mode is mainly used to convert the notation (hexadecimal, binary or octal). So, do not use this decimal calculation for normal decimal calculation.



 ~  (**Binary Number Entry**): 2 ~ 9 are not used.


Otherwise, Syn ERROR occurs.



 ~  (**Octal Number Entry**): 8 and 9 are not used.


Otherwise, Syn ERROR occurs.


 ~  ,  ~  (**Hexadecimal Number Entry**):







 ~  corresponds to 10 ~ 15 in decimal.

 (**Logic Negative**): Logic negative sign

Example: -11 →   11

 (**Base-N Number System Select**): As you press the key, the number system changes **d** (DEC) → **H** (HEX) → **b** (BIN) → **o** (OCT).

 (**Block Select**): In binary or octal number system, the calculation result display is divided into blocks since the result digits can exceed 10 digits. As you press the key, each block is displayed in succession as shown in Example 1.

 (**Logical Product**),  (**Logical Sum**), 
 (**Negation**),  (**Exclusive Logical Sum**),  (**Exclusive Logical Sum Negation**)

<Number of digits displayed in each number system>

Number system	Number of digits displayed
Binary	Up to 32 digits (8 × 4) 4 blocks
Octal	Up to 11 digits (8 + 3) 2 blocks
Decimal	Up to 10 digits
Hexadecimal	Up to 8 digits

Example 1: Calculate $ABCD_{16} \times 12E_{16}$ and convert it into the binary value and octal value.

Operation	Display	Explanation
[MODE] 2	d	Decimal
[DHBO]	H	Hexadecimal
A B C D ×		
12 E =	00CAAbd6 ^H	
[DHBO]	11010110 ^{1b}	Binary (1st block)
SHIFT BLOCK	10101011 ^{2b}	2nd block
SHIFT BLOCK	11001010 ^{3b}	3rd block
SHIFT BLOCK	00000000 ^{4b}	4th block
[DHBO]	62525726 ^{1o}	Octal (1st block)
SHIFT BLOCK	000 ^{2o}	2nd block
SHIFT BLOCK	62525726 ^{1o}	Return to 1st block

* 1st block is the lowest significant block.

* Hexadecimal B and D are displayed as "b" and "d".

Example 2: Calculate $1100_2 \text{ AND } 1010_2$.

Operation	Display	Explanation
[MODE] 2	d	Decimal
[DHBO] [DHBO]	b	Binary
1100 SHIFT AND 1010		
=	00001000 ^{1b}	1st block

<Reference - Two's complement calculations>

Inside the calculator, negative binary, octal and hexadecimal values are calculated by taking the two's complement. This means that subtraction is made by adding the two's complement.

Example: Enter data 5, 20, 20, 25, 25, and 25.

Operation	Display	Explanation
[MODE] 4	(SD)	Statistic mode
ALPHA Scl	"Scl"	Clear statistic memory
5 [DATA]	"n=" 1.	DATA1 entry
20 [DATA]	"n=" 2.	DATA2 entry
[DATA]	"n=" 3.	DATA3 entry(*1)
25 SHIFT : 3 [DATA]	"n=" 6.	DATA4-6 entry(*2)
SHIFT \bar{x} [=]	\bar{x} 20.	Find the mean
SHIFT n [=]	n 6.	Find the number of data

*1 For the same data, you can simply press [DATA].

*2 For repeated data, you can use SHIFT : [number of times].

Cancelling Statistical Data

CD are used to cancel the data entry.

Example 1: 1 [DATA] 2 [DATA] 3 [DATA] SHIFT CD
(Data "3" is cancelled.)

Example 2: 1 [DATA] 2 [DATA] 3 [DATA] 2 SHIFT CD
(Data "2" is cancelled.)

Example 3: 1 [DATA] 2 [DATA] 3 SHIFT : 4 [DATA] SHIFT CD
(4 pieces of data "3" are cancelled.)

Example 4: 1 [DATA] 2 SHIFT : 4 [DATA] 3 [DATA] 2 SHIFT : 4 SHIFT CD
(4 pieces of data "2" are cancelled.)

Output of Statistical Calculation Results

Output	Operation	Equation
Number of sample	SHIFT \overline{n}	--
Mean	SHIFT \overline{x}	$\bar{x} = \sum_{i=1}^n x_i / n$
Standard deviation of sample	SHIFT σ^{n-1}	$\sigma^{n-1} = \sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 / (n-1)}$
Standard deviation population parameter	SHIFT σ^n	$\sigma^n = \sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 / n}$
Variance of sample	SHIFT $\sigma^{n-1} \quad \boxed{x^2}$	$V^{n-1} = \sum_{i=1}^n (x_i - \bar{x})^2 / (n-1)$
Variance of population	SHIFT $\sigma^n \quad \boxed{x^2}$	$V^n = \sum_{i=1}^n (x_i - \bar{x})^2 / n$
Sum	SHIFT Σx	$\sum x$
Square sum	SHIFT Σx^2	$\sum x^2$

Statistic Calculation Problem

You bought 20 large sized pizza for the party. The large is supposed to be 30 cm diameter. Their sizes were, however, varied as shown below.

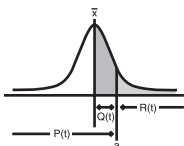
Diameter	Midpoint	Frequency
27.6 ~ 28.5	28	2
28.6 ~ 29.5	29	4
29.6 ~ 30.5	30	5
30.6 ~ 31.5	31	6
31.6 ~ 32.5	32	3
		(20 in total)

Operation	Display	Explanation
[MODE] 4	(SD)	Statistic mode
ALPHA Scl	"Scl"	Clear statistic memory
[MODE] [MODE] [MODE] 1	"Fix 0~9?"	Number of decimal places specification
4	(FIX)	Specify 4
28 [DATA] [DATA]	"n=" 2.0000	"28" × 2
29 SHIFT : 4 [DATA]	"n=" 6.0000	"29" × 4
30 SHIFT : 5 [DATA]	"n=" 11.0000	"30" × 5
31 SHIFT : 6 [DATA]	"n=" 17.0000	"31" × 6
32 SHIFT : 3 [DATA]	"n=" 20.0000	"32" × 3
SHIFT \bar{n} [=]	20.0000	Total number of sample
SHIFT \bar{x} [=]	30.2000	Mean
SHIFT Σx [=]	604.0000	Sum of the values
SHIFT Σx^2 [=]	18270.0000	Square sum of value
SHIFT σ^{n-1} [=]	1.2397	Standard deviation of sample
SHIFT σ^n [=]	1.2083	Standard deviation of population

Probability Distribution Calculation

DISTR

After sample data is entered in Statistic or Regression mode, you can perform probability calculations, P(t), Q(t) and R(t) which are functions of t.



$$t = \frac{x - \bar{x}}{\sigma^n}$$

x : Random variable

\bar{x} : Mean of sample

σ^n : Standard deviation

P(t): Probability below a given point x.

Q(t): Probability below a given point x and above the mean.

R(t): Probability above a given point x.

$$P(t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^a e^{-\frac{x^2}{2}} dx$$

$$Q(t) = \frac{1}{\sqrt{2\pi}} \int_0^a e^{-\frac{x^2}{2}} dx$$

$$R(t) = \frac{1}{\sqrt{2\pi}} \int_a^{\infty} e^{-\frac{x^2}{2}} dx$$

Example: Using the pizza's problem mentioned above ($\bar{x}=30.2$, $x\sigma^n=1.2083$), find

- 1) The probability of pizza below 29 cm in diameter.
- 2) The probability of pizza below 32 cm and above the mean value.
- 3) The probability of pizza above 33 cm.

No.	Operation	Display
1	SHIFT Mcl 	"Mcl"
	29 SHIFT DISTR 4 = 	"29→t" -0.9931
	M+ SHIFT DISTR 1 ALPHA MR) = 	"P(Mr)" 0.1603
2	SHIFT Mcl 32 SHIFT DISTR 4 = 	"32→t" 1.4897
	M+ SHIFT DISTR 2 ALPHA MR) = 	"Q(Mr)" 0.4319
	SHIFT Mcl 33 SHIFT DISTR 4 = 	"33→t" 2.3173
3	M+ SHIFT DISTR 3 ALPHA MR) = 	"R(Mr)" 0.0102

Regression Calculations

Before starting, be sure to clear the statistic memory. The principle of data entry and cancellation is the same as for the statistical one except for entering the data as a pair.

Example: Enter data (10, 20), (10, 20), (30, 40), (30,40) and (30, 40).

Operation	Display	Explanation
[MODE] 5	(REG)	Regression mode
ALPHA Scl	"Scl"	Clear statistic memory
10 , 20 DATA	"n=" 1.	DATA1 entry
DATA	"n=" 2.	DATA2 entry
30 , 40 SHIFT : 3 DATA	"n=" 5.	DATA3-5 entry

Canceling Regression Data

CD are used to cancel the data entry in the same way as for the statistical data entry.

Example 1: 1 , 2 DATA 3 , 4 DATA SHIFT CD

(or 3 , 4 SHIFT CD) (Data "3, 4" is cancelled.)

Example 2: 1 , 2 DATA 3 , 4 SHIFT : 4 DATA SHIFT CD

(or 3 , 4 SHIFT : 4 SHIFT CD) (4 pieces of data "3, 4" are cancelled.)

Output of Regression Calculation Results

For equation, refer to Statistical calculation. Same equation applies to y.

Number of sample:

$$\text{SHIFT } n$$

Mean:

$$\text{SHIFT } \bar{x}, \text{SHIFT } \bar{y}$$

Standard deviation of sample:

$$\text{SHIFT } s_x, \text{SHIFT } s_y$$

Standard deviation population parameter:

$$\text{SHIFT } \sigma_x, \text{SHIFT } \sigma_y$$

Variance of sample:

$$\text{SHIFT } s_x^2$$

Variance of population:

$$\text{SHIFT } \sigma_x^2$$

Sum:

$$\text{SHIFT } \Sigma x, \text{ SHIFT } \Sigma y$$

Square sum:

$$\text{SHIFT } \Sigma x^2, \text{ SHIFT } \Sigma y^2$$

Linear Regression Calculation Problem

The regression formula for linear regression is: $y = A + Bx$. The temperature and atmospheric pressure are as follows: Obtain regression term A, coefficient B, and correlation coefficient r. Then, using the regression formula, calculate atmospheric pressure at 18°C and temperature at 1000hPa. Note that obtained values A and B are stored into the variable memories A and B, respectively.

Temperature	Atmospheric pressure
10°C	1003 hPa
15°C	1005 hPa
20°C	1010 hPa
25°C	1011 hPa
30°C	1014 hPa

Operation	Display	Explanation
[MODE] 5	(REG)	Regression mode
ALPHA Scl	"Scl"	Clear statistic memory
10 [.] 1003 [DATA]	"n="	1. Enter the data
15 [.] 1005 [DATA]	"n="	2.
20 [.] 1010 [DATA]	"n="	3.
25 [.] 1011 [DATA]	"n="	4.
30 [.] 1014 [DATA]	"n="	5.
[RCL] A [=]	"A" 997.4	Regression term
[RCL] B [=]	"B" 0.56	Coefficient
[RCL] SHIFT r [=]	"r" 0.982607368	Correlation coefficient
18 SHIFT y	"y" 1007.48	Pressure at 18°
1000 SHIFT x	"x" 4.642857143	Temp. at 1000 hPa

Calculation Examples

<Initial mode setting - only "D" indicator is lit>

Calculation Mode: Decimal Mode

Press $\boxed{[\text{MODE}]}$ 1.

Angle Unit Mode: Degree

Press $\boxed{[\text{MODE}]}$ $\boxed{[\text{MODE}]}$ 1.

Display Mode: Floating Mode (Norm.)

Press $\boxed{[\text{MODE}]}$ $\boxed{[\text{MODE}]}$ $\boxed{[\text{MODE}]}$ 4.

Addition and Subtraction

$8+3+5.5=16.5$	$8 \boxed{+} 3 \boxed{+} 5.5 \boxed{=}$	(16.5)
$-4+7-2=1$	$\boxed{(-)} 4 \boxed{+} 7 \boxed{-} 2 \boxed{=}$	(1.)

Multiplication and Division

$3.6 \times 1.7=6.12$	$3.6 \boxed{\times} 1.7 \boxed{=}$	(6.12)
$592 \div 4.8$ $=123.3333333$	$592 \boxed{\div} 4.8 \boxed{=}$	(123.3333333)

Mixed Calculations

$3+5 \times 7=38$	$3 \boxed{+} 5 \boxed{\times} 7 \boxed{=}$	(38.)
$6 \times 9+3 \div 2=55.5$	$6 \boxed{\times} 9 \boxed{+} 3 \boxed{\div} 2 \boxed{=}$	(55.5)

Exponential Calculations

$(321 \times 10^{-14}) \times (65 \times 10^{28})$ $=2.0865 \times 10^{18}$	$321 \boxed{\text{EXP}} \boxed{(-)} 14 \boxed{\times}$ $65 \boxed{\text{EXP}} 28 \boxed{=}$	(2.0865 ¹⁸)
--	--	-------------------------

Parentheses Calculations

$3+[(4-3.6+5) \times$ $0.8-6] \times 4.2$ $=-4.056$	$3 \boxed{+} \boxed{(} \boxed{(} 4 \boxed{-} 3.6$ $\boxed{+} 5 \boxed{)} \boxed{\times} .8 \boxed{-}$ $6 \boxed{)} \boxed{\times} 4.2 \boxed{=}$	(-4.056)
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Percentage Calculations

$200 \times 17\% = 34$	200 \times 17 ALPHA % = (34.)
$\frac{456}{789} \times 100 =$	456 \div 789 ALPHA % =
57.79467681%	(57.79467681)

Memory Calculations

	SHIFT Mcl	Clear memory
$20 \times 30 = 600$	20 \times 30 M+	(M 600.)
$40 \times 50 = 2000$	40 \times 50 M+	(M 2000.)
$+ 15 \times 20 = 300$	15 \times 20 M+	(M 300.)
2900	ALPHA MR =	(M 2900.)
$- 125 \times 40 = -5000$	125 \times 40 SHIFT M-	(M 5000.)
-2100	ALPHA MR =	(M -2100.)

Composition Ratio Calculations

	SHIFT Mcl	Clear memory
A 125(25%)	125 + 185 + 190 M+	(M 500.)
B 185(37%)	125 \div ALPHA MR ALPHA % =	(M 25.)
C 190(38%)	185 \div ALPHA MR ALPHA % =	(M 37.)
(500)(100%)	190 \div ALPHA MR ALPHA % =	(M 38.)

Fractional Calculation Examples

$\frac{2}{3} + 3\frac{4}{7} - \frac{5}{4} = 2\frac{83}{84}$ $\left(\frac{3}{5} + 2\frac{3}{8}\right) \times \frac{2}{5} \div 2 - 1 = -\frac{81}{200}$	[MODE] 3 (FRAC)
	2 [abc] 3 + 3 [abc] 4 [abc]
	7 - 5 [abc] 4 = (2r 83r 84)
	(3 [abc] 5 + 2 [abc] 3 [abc] 8) × 2 [abc] 5 ÷ 2 - 1 = (-81r 200)

Binary/Octal/Hexadecimal Calculation Examples

<Base-N mode setting>

Press [MODE] 2 to enter Base-N mode. Then, press [DHBO] to select **d** (Decimal), **H** (Hexadecimal), **b** (Binary), or **o** (Octal). "d", "H", "b", or "o" appears.

Binary Calculations (BIN)

• Addition and Subtraction

$10101011 + 1100 + 1110$ $= 11000101$ $11100011 - 10101100$ $= 110111$	[MODE] 2 (b)
	10101011 + 1100 + 1110 = (11000101 ^{1b})
	11100011 - 10101100 = (00110111 ^{1b})

• Multiplication and Division

$11 \times 1001 = 11011$ $1101110 \div 1010 = 1011$	11 × 1001 = (00011011 ^{1b}) 1101110 ÷ 1010 = (00001011 ^{1b})
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Octal Calculations (OCT)

• Addition and Subtraction

	[MODE] 2	() °
654+321=1175	654 + 321 =	(00001175 ¹⁰)
741-357=362	741 - 357 =	(00000362 ¹⁰)

• Multiplication and Division

56 × 23=1552	56 × 23 =	(00001552 ¹⁰)
621 ÷ 12=50	621 ÷ 12 =	(00000050 ¹⁰)

• Mixed Calculations

52+63 × 14=1216	52 + 63 × 14 =	(00001216 ¹⁰)
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Hexadecimal Calculations (HEX)

• Addition and Subtraction

	[MODE] 2	() ^H
AAA+BB+C=B71	A A A + B B C =	(00000b71 ^H)
DEF-EFE=	D E F - E F E =	(FFFFFEF1 ^H)
FFFFFEF1		

• Multiplication and Division

FEDC × A9=A83F3C	F E D C × A 9 =	(00A83F3C ^H)
CA11 ÷ DF=E7	C A 11 ÷ D F =	(000000E7 ^H)

• Mixed Calculations

(AB+9) × D ÷ F=9C	((A B + 9) × D ÷ F =)	(0000009C ^H)
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Logical Calculations - Binary

	[MODE] 2	() ^b
101010 AND 111000=	101010 SHIFT AND 111000 =	(00101000) ^{1b}
101010 OR 111000=	101010 SHIFT OR 111000 =	(00111010) ^{1b}
111000 XOR 101010=	111000 SHIFT XOR 101010 =	(00010010) ^{1b}
111000 XNOR 101010=	111000 SHIFT XNOR 101010 =	(11101101) ^{1b}
NOT 101010=	SHIFT NOT 101010 =	(11010101) ^{1b}

Logical Calculations - Octal

	[MODE] 2	() ^o
123456 AND 765432=	123456 SHIFT AND 765432 =	(00121412) ^{1o}
123456 OR 765432=	123456 SHIFT OR 765432 =	(00767476) ^{1o}
765432 XOR 123456=	765432 SHIFT XOR 123456 =	(00646064) ^{1o}
765432 XNOR 123456=	765432 SHIFT XNOR 123456 =	(77131713) ^{1o}
NOT 123456=	SHIFT NOT 123456 =	(77654321) ^{1o}

Logical Calculations - Hexadecimal

	[MODE] 2 (H)
789ABC AND 147258=	789 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C SHIFT AND 147258 [=] (00101218 ^H)
789ABC OR 147258=	789 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C SHIFT OR 147258 [=] (007CFAFC ^H)
789ABC XOR 147258=	789 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C SHIFT XOR 147258 [=] (006CE8E4 ^H)
789ABC XNOR 147258=	789 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C SHIFT XNOR 147258 [=] (FF93171b ^H)
NOT 789ABC=	SHIFT NOT 789 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C [=] (FF876543 ^H)

Basic Function Calculation Examples

Pi Function π

$$10 \pi \quad 10 \text{ SHIFT } \pi \quad [=] \quad (31.41592654)$$

Logarithmic Functions log ln

log123=2.089905111	<input type="radio"/> log 123 [=]	(2.089905111)
ln123=4.812184355	<input type="radio"/> ln 123 [=]	(4.812184355)

Logarithmic Mean ln

$\bar{L} = \frac{4-8}{\ln 4 - \ln 8}$	<input type="radio"/> (4 - 8) <input type="radio"/> ÷ <input type="radio"/> (
=5.770780164	<input type="radio"/> ln 4 - <input type="radio"/> ln 8) [=] (5.770780164)

Exponential Functions e^x 10^x

$$e^{22} = 3584912846 \quad \text{SHIFT } e^x \text{ 22 } = \quad (3584912846.)$$

$$10^{2.3} = 199.5262315 \quad \text{SHIFT } 10^x \text{ 2.3 } = \quad (199.5262315)$$

Square Calculations x^2

$$1.25^2 = 1.5625 \quad 1.25 \quad x^2 \quad = \quad (1.5625)$$

Power Calculations y^x

$$5.43^3 = 160.103007 \quad 5.43 \quad y^x \quad 3 \quad = \quad (160.103007)$$

$$5^{\frac{1}{4}} \quad 5 \quad y^x \quad 4 \quad \text{SHIFT } x^{\frac{1}{y}} \quad = \quad (1.495348781)$$

Extraction of Square Root $\sqrt{\quad}$

$$\sqrt{(5+6) \times 7} = 8.774964387 \quad \sqrt{\quad} \quad (\quad) \quad 5 \quad + \quad 6 \quad) \quad \times \quad 7 \quad) \quad = \quad (8.774964387)$$

Multiple Root $\sqrt[y]{\quad}$

$$5.3 \sqrt[3]{100} = 2.384286779 \quad 5.3 \quad \text{SHIFT } \sqrt[y]{\quad} \quad 100 \quad = \quad (2.384286779)$$

Geometric Mean $\sqrt[y]{\quad}$

$$\bar{G} = \sqrt[4]{1.23 \times 1.48 \times 1.96 \times 2.2} = 1.673830182 \quad 4 \quad \text{SHIFT } \sqrt[y]{\quad} \quad (\quad 1.23 \quad \times \quad 1.48 \quad \times \quad 1.96 \quad \times \quad 2.2 \quad) \quad = \quad (1.673830182)$$

Extraction of Cubic Root $\sqrt[3]{\quad}$

$$\sqrt[3]{123} = 4.973189833 \quad \sqrt[3]{\quad} \quad 123 \quad = \quad (4.973189833)$$

Reciprocal Calculations $x^{\pm 1}$

$\frac{1}{2 \times 3 + 4} = 0.1$	2 [×] 3 [+] 4 [=] $\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{x^{\pm 1}}$
	[=] (0.1)
$\frac{1}{\frac{1}{3} - \frac{1}{4}} = 12$	[(] 3 $\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{x^{\pm 1}}$ [-] 4 $\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{x^{\pm 1}}$ [)]
	$\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{x^{\pm 1}}$ [=] (12.)

Factorial Calculations $x!$

$(4 \times 2 - 3)! = 120$	4 [×] 2 [-] 3 [=] [x!] [=] (120.)
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Hyperbolic Functions $\overset{\text{hyp}}{\text{O}}$

cosh34 = 2.917308713 × 10 ¹⁴	[hyp] [cos] 34 [=] (2.917308713 ¹⁴)
tanh1.23 = 0.842579325	[hyp] [tan] 1.23 [=] (0.842579325)

Inverse Hyperbolic Functions $\overset{\text{hyp}^{-1}}{\text{O}}$

$\sinh^{-1} 1$ = 0.881373587	$\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{\text{hyp}^{-1}}$ [sin] 1 [=] (0.881373587)
---------------------------------	--

Permutations (of n things taken r at a time) $\overset{\text{nPr}}{\text{O}}$

$nPr = \frac{n!}{(n-r)!}$	
${}^5P_3 = \frac{5!}{(5-3)!}$	5 $\overset{\text{SHIFT}}{\text{O}} \overset{\text{O}}{\text{nPr}}$ 3 [=] (60.)
= 60	

Combinations (of n things taken r at a time) nCr

$nCr = \frac{n!}{r!(n-r)!}$	
${}^5C_3 = \frac{5!}{3!(5-3)!}$	$5 \text{ SHIFT } nCr \text{ 3 } = \quad (10.)$
$= 10$	

Degrees-Minutes-Seconds → Decimal Degrees OIII

$123^\circ 45' 06'' \rightarrow$	$123 \text{ OIII } 45 \text{ OIII } 6 \text{ OIII } =$
123.7516667°	(123.7516667)

Decimal Degrees → Degrees-Minutes-Seconds +DEG

$2.3456 \rightarrow 2^\circ 20' 44''$	$2.3456 = \text{SHIFT } \text{+DEG} (2^\circ 20' 44'')$
---------------------------------------	---

* When the total number of digits exceeds 10, any lower-order values are not displayed, though it is stored in the calculator as a decimal value.

Angle Unit Mode Calculation Examples**<Angle unit mode setting>**

$\text{[MODE]} \text{ [MODE]}$ 1: For DEG (Degree)

$\text{[MODE]} \text{ [MODE]}$ 2: For RAD (Radian)

$\text{[MODE]} \text{ [MODE]}$ 3: For GRAD (Gradient)

Trigonometric Functions \sin \cos \tan

$\sin 53^\circ = 0.79863551$	(DEG) $\sin \text{ 53 } = (0.79863551)$
$\cos \frac{\pi}{6}^{\text{RAD}} = 0.866025403$	(RAD) $\cos (\text{SHIFT } \pi \div 6) = (0.866025403)$
$\tan 65^{\text{GRAD}} = 1.631851687$	(GRAD) $\tan \text{ 65 } = (1.631851687)$

Inverse Trigonometric Functions \sin^{-1} \cos^{-1} \tan^{-1}

$\sin^{-1} 0.3 = 17.45760312^\circ$	(DEG) SHIFT \sin^{-1} .3 = (17.45760312)
$\cos^{-1} 0.8 = 36.86989765^\circ$	(DEG) SHIFT \cos^{-1} .8 = (36.86989765)
$\tan^{-1} 1.5 = 56.30993247^\circ$	(DEG) SHIFT \tan^{-1} 1.5 = (56.30993247)
$\sin^{-1} 1 = 1.570796327$ (rad)	(RAD) SHIFT \sin^{-1} 1 = (1.570796327)

Trigonometric Calculations x^{\wedge}

$\operatorname{cosec} x = \frac{1}{\sin x}$	(DEG) \sin 45 = SHIFT x^{\wedge}
$\operatorname{cosec} 45^\circ = 1.414213562$	= (1.414213562)

Degree \rightarrow Radian Conversion $\text{DRG}\blacktriangleright$

$60^\circ = 1.047197551^{\text{RAD}}$	(DEG) 60 $\text{DRG}\blacktriangleright$	(1.047197551)
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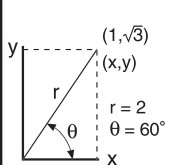
Radian \rightarrow Gradient Conversion $\text{DRG}\blacktriangleright$

$2^{\text{RAD}} = 127.3239545^{\text{GRAD}}$	(RAD) 2 $\text{DRG}\blacktriangleright$	(127.3239545)
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Gradient \rightarrow Degree Conversion $\text{DRG}\blacktriangleright$

$120^{\text{GRAD}} = 108^\circ$	(GRAD) 120 $\text{DRG}\blacktriangleright$	(108.)
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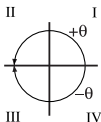
Rectangular \rightarrow Polar Conversion $\text{r}\theta$

	(DEG) 1 , $\sqrt{}$ 3 ALPHA $\text{r}\theta$ "r=" (2.) \rightarrow "theta=" (60.) \leftarrow "r=" (2.)
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Polar → Rectangular $\overset{-xy}{\curvearrowright}$

	$(r = 2)$ $(\theta = 60^\circ)$	(DEG) 2 , 60 ALPHA $\overset{-xy}{\curvearrowright}$
	$x = 1$ $y = \sqrt{3}$	"x=" (1.)
	$x = 1$	"y=" (1.732050808)

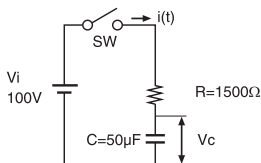
* In polar conversion θ in the third and fourth quadrant are as shown in the diagram below.



Applied Calculation Examples

Electricity - Integrating Circuit Problem

Obtain the voltage V_c across the capacitor at $t=56$ msec after the switch is turned on.



$V_c = V_i \left(1 - e^{-\frac{t}{RC}} \right)$												
$= 100 \times \left(1 - e^{-\frac{56 \times 10^{-3}}{1500 \times 50 \times 10^{-6}}} \right) = 52.60562649$												
100	X	(	1	-	SHIFT	e ^x	(	(-)	56	X	SHIFT	10 ^x
(-)	3	÷	(	1500	X	50	X	SHIFT	10 ^x	(-)	6)
)	)	=										(52.60562649)

Algebra

The Root of a Quadratic Equation (Only for problems having a real root)

$$4x^2 + 9x + 2 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-9 \pm \sqrt{9^2 - 4 \times 4 \times 2}}{2 \times 4}$$

$$x = \begin{cases} -0.25 \\ -2 \end{cases}$$

9 x^2 - 4 \times 4 \times 2 $M+$ (M) (49.)
 ((-) 9 + $\sqrt{\text{ALPHA}}$ MR) \div 2 \div 4 = (M) (-0.25)
 ((-) 9 - $\sqrt{\text{ALPHA}}$ MR) \div 2 \div 4 = (M) (-2.)

Calculation of time**Example 1:**

Departing at 2 hours 9 minutes and 56 seconds ($2^{\circ}09'56''$) the destination was reached at 4 hours 18 minutes and 23 seconds ($4^{\circ}18'23''$). What is the travel time?

4 OIII 18 OIII 23 OIII - 2 OIII 9 OIII 56 OIII =
 SHIFT \rightarrow DEG (2⁰⁸27)
 2 hours 8 minutes 27 seconds

Example 2:

The part-time work period is as follows. What will be the total time?

- 1st day: 5 hours 46 minutes ($5^{\circ}46'$)
- 2nd day: 4 hours 39 minutes ($4^{\circ}39'$)
- 3rd day: 3 hours 55 minutes ($3^{\circ}55'$)

5 OIII 46 OIII + 4 OIII 39 OIII + 3 OIII 55 OIII
 = SHIFT \rightarrow DEG (14²⁰00)
 14 hours 20 minutes

Input Range of Functions

Function	Input range
$\sin x$ $\cos x$ $\tan x$	DEG: $|x| < 1 \times 10^{10}$ RAD: $|x| < \pi/180 \times 10^{10}$ GRAD: $|x| < 10/9 \times 10^{10}$ However, for $\tan x$: DEG: $|x| \neq 90 (2n-1)$ RAD: $|x| \neq \pi/2 (2n-1)$ GRAD: $|x| \neq 100 (2n-1)$ (n is an integer)
$\sin^{-1} x$ $\cos^{-1} x$	$-1 \leq x \leq 1$
$\tan^{-1} x$	$|x| < 1 \times 10^{100}$
$\sinh x$ $\cosh x$ $\tanh x$	$-230.2585092 \leq x \leq 230.2585092$
$\sinh^{-1} x$	$|x| < 1 \times 10^{100}$
$\cosh^{-1} x$	$1 \leq x < 1 \times 10^{100}$
$\tanh^{-1} x$	$|x| < 1$
$\ln x$ $\log x$	$1 \times 10^{-99} \leq x < 1 \times 10^{100}$
e^x	$-1 \times 10^{100} < x \leq 230.2585092$
10^x	$-1 \times 10^{100} < x < 100$
y^x	$y > 0$: $-1 \times 10^{100} < x \log y < 100$ $y = 0$: $0 < x < 1 \times 10^{100}$ $y < 0$: $-1 \times 10^{100} < x \log |y| < 100$ (x is an integer or $1/x$ is odd number)
$x \sqrt[y]{y}$	$y > 0$: $-1 \times 10^{100} < 1/x \cdot \log y < 100$ ($x \neq 0$) $y = 0$: $0 < x < 1 \times 10^{100}$ $y < 0$: $-1 \times 10^{100} < 1/x \cdot \log |y| < 100$ (x is odd number or $1/x$ is an integer)
\sqrt{x}	$0 \leq x < 1 \times 10^{100}$
$\sqrt[3]{x}$	$|x| < 1 \times 10^{100}$
x^2$	|x| < 1 \times 10^{50}$
$\frac{1}{x}$	$|x| < 1 \times 10^{100}$ ($x \neq 0$)
$n!$	$0 \leq n \leq 69$ (n is an integer)
nPr	$0 \leq r \leq n$ (r and n are integers) result $< 1 \times 10^{100}$
nCr	$0 \leq r \leq n$ (r and n are integers) result $< 1 \times 10^{100}$
→ DEG	$|x| < 1 \times 10^7$ If $|x|$ exceeds the value, the function cannot be executed.
$x, y \rightarrow r, \theta$	$|x| < 1 \times 10^{100}$, $|y| < 1 \times 10^{100}$ $\sqrt{x^2 + y^2} < 1 \times 10^{100}$, $|y/x| < 1 \times 10^{100}$

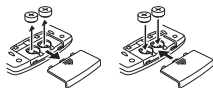
Function	Input range
$r, \theta \rightarrow x, y$	$0 \leq r < 1 \times 10^{100}$ DEG: $|\theta| < 1 \times 10^{10}$, RAD: $|\theta| < \pi/180 \times 10^{10}$, GRAD: $|\theta| < 10/9 \times 10^{10}$
DRG→	DEG→ RAD: $|x| < 1 \times 10^{100}$ RAD→ GRAD: $|x| < \pi/2 \times 10^{98}$ GRAD→ DEG: $|x| < 1 \times 10^{100}$
→ BIN → DEC → OCT → HEX	BIN: Positive: 0 ~ 01111111111111111111111111111111111111 Negative: 1000 ~ 111 DEC: Positive: 0 ~ 2147483647 Negative: -2147483647 ~ -1 OCT: Positive: 0 ~ 17777777777 Negative: 20000000000 ~ 3777777777 HEX: Positive: 0 ~ 7FFFFFFFFF Negative: 80000000 ~ FFFFFFFF
Statistical calculations	$|x| < 1 \times 10^{50}$ $|\sum x| < 1 \times 10^{100}$ $n < 1 \times 10^{100}$ $\sum x^2 < 1 \times 10^{100}$ $x: n \neq 0$ $\sigma^n: 0 \leq \frac{\sum x^2 - ((\sum x)^2/n)}{n} < 1 \times 10^{100}, n > 0$ $\sigma^{n-1}: 0 \leq \frac{\sum x^2 - ((\sum x)^2/n)}{n-1} < 1 \times 10^{100}, n > 1$
Regression calculation	$|x| < 1 \times 10^{50} |y| < 1 \times 10^{50}$ $|\sum x| < 1 \times 10^{100} |\sum y| < 1 \times 10^{100}$ $|n| < 1 \times 10^{100}$ $\sum x^2 < 1 \times 10^{100} \sum y^2 < 1 \times 10^{100}$ $\bar{x}: n \neq 0 \quad \bar{y}: n \neq 0$ $x\sigma^n: 0 \leq \frac{\sum x^2 - ((\sum x)^2/n)}{n} < 1 \times 10^{100}, n > 0$ $y\sigma^n: 0 \leq \frac{\sum y^2 - ((\sum y)^2/n)}{n} < 1 \times 10^{100}, n > 0$ $x\sigma^{n-1}: 0 \leq \frac{\sum x^2 - ((\sum x)^2/n)}{n-1} < 1 \times 10^{100}, n > 1$ $y\sigma^{n-1}: 0 \leq \frac{\sum y^2 - ((\sum y)^2/n)}{n-1} < 1 \times 10^{100}, n > 1$ $|\sum xy| < 1 \times 10^{100}$
Probability distribution calculations	$|t| < 1 \times 10^{50}$ $P(t) \leq 1$ $Q(t) \leq 0.5$ $R(t) \leq 1$

Battery

2 alkaline batteries (Type:LR44):

Approx. 1,000 hours continuous display. When the display dims, change the batteries.

- Keep the battery out of children's reach. If the battery is swallowed, contact a doctor immediately.
- Do not try to recharge, disassemble or do anything to the battery that could cause a short circuit.
- Do not expose the battery to high temperatures or open flames.
- Replace new batteries to the same positions. Replace both batteries at the same time.
- When the batteries are replaced or malfunction occurs, push the reset switch at the rear with a pointed object.



Battery Replacement



How To Reset

Advice and Precautions

- This calculator contains precision components such as LSI chips and should not be used in places subject to rapid variations in temperature, excessive humidity, dirt or dust, or exposed to direct sunlight.
- The liquid crystal display panel is made of glass and should not be subjected to excessive pressure.
- When cleaning the device, do not use a damp cloth or a volatile liquid such as paint thinner. Instead, use only a soft, dry cloth.
- Do not under any circumstances dismantle this device. If you believe that the calculator is not functioning properly, either bring or mail the device together with the guarantee to the service representative of a Canon business office.

Specifications

Exponential Type Mantissa, 10 digits + exponent, 2 digits + sign, 2 digits
 Floating Type Mantissa, 10 digits + sign, 1 digit
 Calculation Range:

Decimal $\pm 1 \times 10^{-99} \sim \pm 9.999999999 \times 10^{99}$
 Binary 111 ~
 0 ~ 011
 Octal 37777777777 ~ 0 ~ 17777777777
 Hexadecimal FFFFFFFF ~ 0 ~ 7FFFFFFF
 Auto Power Off Approx. 6 minutes
 Power Source: DC 3.0 V/0.24 mW

Alkaline battery: 2 alkaline batteries (Type:LR44)
 Approx. 1,000 hours continuous display.
 Usable Temperature: 0° ~ 40°C (32°F ~ 104°F)
 Size: 144 (L)×79 (W)×11 (H) mm (5-43/64"×3-7/64"×7/16")
 Weight: 78 g (2.8 oz)

* Specifications are subject to change without notice.