Owner's Manual

2-lines display Scientific Calculator

with fractional, statistical, formula memory, equation solving functions

Please read before using.

Safety Precautions

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

Batteries

- After removing the batteries from the calculator, put them in a safe place where there is no danger of them getting into the hands of small children and accidently swallowed.
- Keep batteries out of the reach of children. If accidentally swallowed, consult with a physician immediately.
- Never charge batteries, try to take batteries apart, or allow batteries to become shorted. Never expose batteries to direct heat or dispose of them by incineration.
- Misuse of batteries can cause them to leak acid that can cause damage to nearby items and creates the possibility of fire and personal injury.
- Always make sure that a battery's positive (+) and negative (–) sides are facing correctly when you load it into the calculator.
- Remove the batteries if you do not plan to use the calculator for a long time.
- Use only the type of batteries specified for this calculator in this manual.

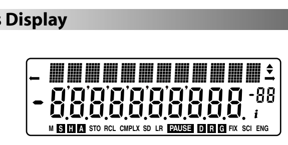
Disposing of the Calculator

- Never dispose of the calculator by burning it. Doing so can cause certain components to suddenly burst, creating the danger of fire and personal injury.
- The displays and illustrations (such as key markings) shown in this Owner's Manual are for illustrative purposes only, and may differ somewhat from the actual items they represent.
- The contents of this manual are subject to change without notice.

Handling Precautions

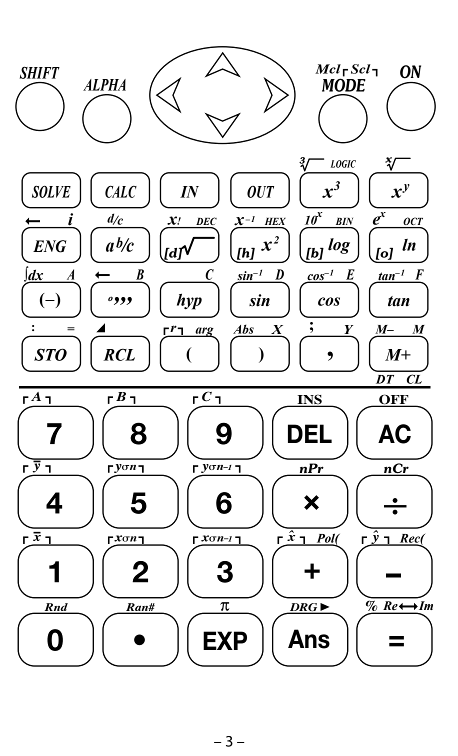
- Be sure to press the "ON" key before using the calculator for the first time.
- Even if the calculator is operating normally, replace the battery at least once every three years. Dead battery can leak, causing damage to and malfunction of the calculator. Never leave the dead battery in the calculator.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

Two-lines Display



You can simultaneously check the calculation formula and its answer. The first line displays the calculation formula. The second line displays the answer.

Keys Layout



Before Starting Calculations

Operation Modes

When using this calculator, it is necessary to select the proper mode to meet your requirements. This can be done by pressing **[MODE]** to view the main menu and select the appropriate mode by moving the cursor to the right or the left.

Press **[MODE]** once to read the first page of the main menu.

`COMP  CMPLX →`

Press [→] to select the mode.

`COMP  CMPLX →`

As the icons [→] or [←] appear, one can press [→] or [←] correspondingly to view the hidden menu.

`←SD  REG BASE→`

After locating the desired mode, press **[=]** to confirm and leave the main menu.

Or if you want to define the "degree" or "radian" or "gradient", you can press **[MODE]** again during the display of "mode-selection" menu mentioned above.

Press **[MODE]** again. (This sub-menu will be skipped in Base-N mode.)

`DEG RAD GRA`

Select the angular unit by pressing [←] or [→] then followed by **[=]**.

Or if you want to define the answer display format, you can proceed to the following page by pressing **[MODE]** further. (This sub-menu will be skipped in Base-N mode.)

`FIX SCI NORM`

Press **"MODE"** once more to leave the menu.

`_`

Calculation Modes

"COMP" mode : - general calculations, including function calculations can be executed.
"CMPLX" mode:- calculations including complex numbers can be executed.
"SD" mode:- standard deviation calculation can be executed. "SD" symbol appears in display.
"REG" mode:- regression calculations can be performed. "LR" symbol appears in display.
"BASE-N" mode:- binary, octal, decimal, hexadecimal conversion and calculations, as well as logical operations can be carried out.

Note:-

- The five calculation modes listed above are totally independent, and cannot be used together.
- The calculation mode last selected is retained in memory when the power is switched OFF.

Angular Measurement Modes

"DEG" mode:- specify measurement in "degrees". **"D"** symbol appears in display window.
"RAD" mode:- specify measurement in "radians". **"R"** symbol appears in display window.
"GRA" mode:- specify measurement in "grads". **"G"** symbol appears in display window.

With the exception of the BASE-N mode, these three angular measurement modes can be used in combination with the manual calculation modes.

Display Modes

"FIX" mode:- specify number of decimal places. **"FIX"** symbol appears in display window.
"SCI" mode:- specify number of significant digits. **"SCI"** symbol appears in display window.
"NORM" mode:- cancels "Fix" and "Sci" specifications. This operation also changes the range of the exponent display. When the results exceed the following limits, exponent is to be displayed.

Norm 1 :- $10^{-2} > |x|$, or $|x| \geq 10^{10}$
Norm 2 :- $10^{-9} > |x|$, or $|x| \geq 10^{10}$

In combination with "FIX", "SCI" or "NORM" mode, you can cause the exponent display for the number being

displayed to change in multiples of 3 by pressing the **[ENG]** key .

- With the exception of the BASE-N mode, "FIX", "SCI" and "NORM" modes can be used in combination with the manual calculations.
- Engineering display format is not available in "CMPLX" mode.
- The display mode last selected is retained in memory when the power is switched OFF.

Calculation Priority Sequence

This calculator employs true algebraic logic to calculate the parts of a formula in the following order :-

1. Coordinate transformation / integration, Pol(x, y),Rec(r, θ), ∫dx
2. Type A functions :-
   These functions are those in which the value is entered and than the function key is pressed, such as x^2, x^{-1}, x!, °'", Engineering symbols.
3. Power / root, x^y, $^x\sqrt{}$
4. Fractions, a^b/c
5. Abbreviated multiplication format in front of π, memory or parenthesis, such as 2π, 5A, π6. R, etc.
6. Type B functions :-
   These functions are those in which the function key is pressed and then the value is entered such as √, ³√, log, ln, e^x, 10^x, sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$, Int, Frac, Abs, (–), (following in BASE-N mode only) d, H, b, o, Neg, Not.
7. Abbreviated multiplication format in front of Type B functions, such as, 2√3, A log2, etc.
8. Permutation, combination, nPr, nCr
9. ×, ÷
10. +, –
11. and (in BASE-N mode only)
12. or, xor, xnor (in BASE-N mode only)

- When functions with the same priority are used in series, execution is performed from right to left for :- $e^x\ln\sqrt{120}$ → $e^x\{\ln(\sqrt{120})\}$. Otherwise, execution is from left to right.
- Operations enclosed in parentheses are performed first.

Number of Stacks

There is a memory area known as a "stack" for the temporary storage of low priority numeric values and commands (functions, etc.). The numeric value stack has

nine levels, while the command stack has 24. If a complex formula is employed that exceeds the stack space available, a stack error (Stk ERROR) message will appear on the display.

Calculations are performed in the order of the highest calculation priority first. Once a calculation is executed, it is cleared from the stack.

Number of Input/output Digits and Calculation Digits

The allowable input/output range (number of digits) of this unit is 10 digits for a mantissa and 2 digits for the exponent. Calculations, however, are performed internally with a range of 12 digits for a mantissa and 2 digits for an exponent.

Example: $3 \times 10^5 \div 7 =$
3**[EXP]**5[÷]7**[=]** — `3E5÷7` / `42857.14286`

3**[EXP]**5[÷]7[–]42857**[=]** — `3E5÷7-42857` / `0.14285714`

Overflow and Errors

If the operational range of the unit is exceeded, or incorrect inputs are made, an error message will appear on the display and subsequent operation will be impossible. This is carried out by the error check function. The following operations will result in errors :-

1. The answer, whether intermediate or final, or any value in memory exceeds the value of $\pm 9.999999999 \times 10^{99}$.
2. An attempt is made to perform function calculations that exceed the input range.
3. Improper operation during statistical calculations, e.g., attempting to obtain x or xσn without data input.
4. The capacity of the numeric value stack or the command stack is exceeded.
5. Input errors are made, e.g. 5 × × 3 = .

When error message appears, most keys will become inoperative. In this case, press the **[AC]** key to return to normal operation. You can also press the **[←]** or **[→]** key to cause the cursor to show the position of the error.

The following error messages will be displayed for the operations listed above:-

case (1) to case (3)	Ma ERROR
case (4)	Stk ERROR
case (5)	Syn ERROR

Besides pressing **[AC]** when an error occurs, you can also press **[ON]** key to clear the error.

Number of Input Characters

This calculator features a 79-step area for calculation execution. One function comprises one step. Each press of numeric or +, –, × and ÷ keys comprise one step. Though such operations as **[SHIFT] [x!]** (x^{-1} key) require two key operations, they actually comprise only one function, and, therefore, only one step. These steps can be confirmed using the cursor. With each press of the **[←]** or **[→]** key, the cursor is moved one step.

Input characters are limited to 79 steps. Usually, the cursor is represented by a blinking **" _ "**.

When numeric values or calculation commands are input, they appear on the display from the left. Calculation results, however, are displayed from the right.

Corrections

To make corrections in a formula that is being input, use the [←] and [→] keys to move to the position of the error and press the correct keys.

Example: To change an input of 122 to 123 :-

[1] [2] [2] — `122_` / `0.`

[←] — `122` / `0.`

[3] — `123_` / `0.`

Example: To change an input of cos60 to sin60 :-

[cos]60 — `cos 60_` / `0.`

[←][←][←] — `cos 60` / `0.`

[sin] — `sin 60` / `0.`

If after making corrections, input of the formula is complete, the answer can be obtained by pressing **[=]**. If, however, more is to be added to the formula, advance the cursor using the [→] key to the end of the formula for input.

If an unnecessary character has been included in a formula, use the [←] and [→] keys to move to the position of the error and press the DEL key. Each press of DEL will delete one command (one step).

Example: To correct an input of 369 × × 2 to 369 × 2 :-

[3] [6] [9] [×] [×] [2] — `369xx2_` / `0.`

[←][←][DEL] — `369x2` / `0.`

If a character has been omitted from a formula, use the " ← " and " → " key to move to the position where the character should have been input, and press **[SHIFT]** followed by **[INS]** key. Each press of **[SHIFT] [INS]** will create a space for input of one command.

Example: To correct an input of 2.36^2 to sin 2.36^2 :-

2[•]36**[x^2]** — `2.36²_` / `0.`

[←][←][←][←][←] — `2.36²` / `0.`

[SHIFT][INS] — `[].36²` / `0.`

[sin] — `sin[].36²` / `0.`

When **[SHIFT] [INS]** are pressed, the space that is opened is displayed as **" [] "**. The function or value assigned to the next key you press will be inserted in the []. To exit from the insertion mode, move the cursors, or press **[SHIFT] [INS]**, or press **[=]**.

Even after the **[=]** key has been pressed to calculate a result, it is possible to use this procedure for correction. Press the [←] key to move the cursor to the place where the correction is to be made.

Arithmetic Operations & Parenthesis Calculations

- Arithmetic operations are performed by pressing the keys in the same order as noted in the formula.
- For negative values, press [(-)] before entering the value
- For mixed basic arithmetic operations, multiplication and division are given priority over addition and subtraction
- Assuming that display mode Norm is selected.

Example	Operation	Display (Lower)
23 + 4.5 –53 =–25.5	23 [+] 4.5 [–] 53 [=]	–25.5
56×(–12)÷(–2.5)=268.8	56[×][(–)]12[÷][(–)]2.5[=]	268.8
12369×7532×74103= 6.903680613×10^{12}	12369[×] 7532 [×] 74103[=]	6.903680613^{12}
$(4.5\times10^{75})\times(-2.3\times10^{-79}) = -1.035\times10^{-3}$	4.5[EXP]75 [×] [(–)]2.3 [EXP] [(–)]79 [=]	-1.035^{-03}
$(2+3)\times10^2$=500	[( ] 2 [+] 3[ )][×] 1 [EXP]2 [=]	500.
$(1\times10^5)\div7$= 14285.71429	1[EXP]5 [÷] 7 [=]	14285.71429
$(1\times10^5)\div7-14285$= 0.7142857	1[EXP]5[÷]7 [–] 14285 [=]	0.71428571
please note that internal calculation is calculated in 12 digits for a mantissa and the result is displayed and rounded off to 10 digits.		
3 + 5 × 6 = 33	3 [+] 5 [×] 6 [=]	33.
7 × 8 – 4 × 5 = 36	7 [×] 8 [–] 4 [×] 5 [=]	36.
1 + 2 – 3 × 4 ÷ 5 + 6 = 6.6	1 [+] 2 [–] 3 [×] 4 [÷] 5 [+] 6 [=]	6.6
100 – (2+3) × 4 = 80	100 [–][( ] 2 [+] 3[ )] [×] 4 [=]	80.
2 + 3 × (4 + 5) = 29	2 [+] 3 [×] [( ] 4 [+] 5 [=] Closed parentheses occurring immediately before operation of the [=] key may be omitted.	29.
(7 – 2) × (8 + 5) = 65	[( ] 7 [–] 2 [ )][( ] 8 [+] 5 [=] A multiplication sign [×] occurring immediately before an open parantheses can be omitted.	65.
10 – {2 + 7 × (3 + 6)} = –55	10 [–][( ] 2 [+] 7 [( ] 3 [+] 6 [=]	–55.

Percentage Calculations

Percentage cannot be executed in Base-N mode or CMPLX mode.

Example	Operation	Display (Lower)
Percentage 26% of $15.00	15 [×]26 [SHIFT] [%]	3.9
Premium 15% increase from $36.20	36.2[×]15 [SHIFT] [%] [+]	41.63
Discount 4% discount from $47.50	47.5[×]4 [SHIFT] [%] [–]	45.6
Ratio 75 is what % of 250?	75[÷]250 [SHIFT] [%]	30.
Rate of change 141 is an increase of what % from 120?	141[–]120 [SHIFT] [%]	17.5
Rate of change 240 is a decrease of what % from 300?	240[–]300 [SHIFT] [%]	–20.

Specifying the Format of Calculation Results

You can change the precision of calculation results by specifying the number of decimal places or the number of significant digits. You can also shift the decimal place of a displayed value three places to the left or right for one-touch conversions of metric weights and measures.

Upon power up reset, the display format is defaulted at "Norm1". Each time you can press **[MODE]** to enter the menu and select the desired format in the sub-menu "FIX/SCI/NORM". When you choose "Norm", you can further select between "Norm 1" or "Norm 2" in the following window.

`Norm 1~2?`

Key in either 1 or 2 to specify "Norm 1" or "Norm 2" respectively.

Norm 1 :- all values less than 10^{-2} or greater than 10^9 are automatically expressed as exponents.
Norm 2 :- all values less than 10^{-9} or greater than 10^9 are automatically expressed as exponents.

Note: You cannot specify the display format (Fix, Sci) while the calculator is in Base-N mode.

Specifying the Number of Decimal Places

The calculator always performs calculations using a 10-digit mantissa and 2-digit exponent, and results are stored in memory as a 12-digit mantissa and 2-digit exponent no matter how many decimal places you specify. Intermediate results and final results are then automatically rounded off to the number of decimal places you have specified.

It should be noted that displayed results are rounded to the specified number of decimal places, but stored results are normally not rounded.

To specify the number of decimal places (FIX), select **[FIX]** in the sub-menu "FIX/SCI/NORM" and then you are asked to enter a value indicating the number of places (0~9) as below.

`Fix 0~9?`

At this time, you should be able to see "FIX" on the display. The number of decimal places specified will remain in effect until Norm1 or Norm2 is specified as described above or significant digits are specified by selecting "SCI" in the sub-menu "FIX/SCI/NORM".

Example	Operation	Display (Lower)
100÷6 = 16.66666666	100 [÷] 6 [=]	16.66666667
specify 4 decimal places	[Mode][Mode][Mode][=][4]	16.6667
cancel specification	[Mode][Mode][Mode] [→][→][=][1]	16.66666667
200÷7×14 = 400	200[÷]7 [×] 14[=]	400.
rounded to 3 decimal places	[Mode][Mode][Mode][=][3]	400.000
	200 [÷] 7[=] The intermediate result is automatically rounded to the specified three decimal places.	28.571

Example	Operation	Display (Lower)
The stored 10-digit result (28.571421857) is used when you continue the calculation by simply pressing [×] or any other arithmetic function key.	[×]	Ans × (upper display)
	14 [=] (The final result is automatically rounded to the specified three decimal places.)	400.000
Cancel specification by specifying Norm 1 again.	[Mode][Mode][Mode] [→][→][=][1]	400.

Rounding the Intermediate Result

As the number of decimal places is specified, the intermediate result will be automatically rounded to the specified decimal places. However, the stored intermediate result is not rounded. In order to match the displayed value and the stored value, **[SHIFT] [RND]** can be input.

You can compare the final result obtained in the previous example with the final result of the following example.

Example	Operation	Display (Lower)
200÷7×14 = 400	200[÷]7 [×] 14[=]	400.
rounded to 3 decimal places	[Mode][Mode][Mode][=][3]	400.000
	200[÷]7 [=] The intermediate result is automatically rounded to the specified three decimal places.	28.571
round the stored intermediate result to the specified three decimal places	[SHIFT] [RND]	28.571
	[×]	Ans × (upper display)
	14 [=]	399.994
Cancel specification by specifying Norm1 again.	[Mode][Mode][Mode] [→][→][=][1]	399.994

Specifying the Number of Significant Digits

This specification is used to automatically round intermediate results and final results to the number of digits you have specified.

As with the number of decimal places, displayed results are rounded to the specified number of digits, but stored results are normally not rounded.

To specify the number of significant digits (Sci.), select **[SCI]** in the sub-menu "FIX/SCI/NORM" and then you are asked to enter a value indicating the number of significant digits (0~9) as below.

`Sci 0~9?`

Note : "0" indicating 10 significant digits.
Meanwhile, the "SCI" indicator will appear on the display.

Example	Operation	Display (Lower)
100÷6 = 16.66666666	100[÷]6 [=]	16.66666667
specify 5 significant digits	[Mode][Mode][Mode][→] [=][5]	1.6667^{01}
Cancel specification by specifying Norm 1 again.	[Mode][Mode][Mode] [→][→][=][1]	16.66666667

Shifting the Decimal Place

You can use the key **[ENG]** to shift the decimal point of the displayed value three places to the left or right. Each 3-place shift to the left is the same as dividing the value by 1000, and each shift to the right is the same as multiplying by 1000. This means that this function is useful when converting metric weights and measures to other metric units.

Example	Operation	Display (Lower)
123m×456 = 56088m	123[×]456 [=]	56088.
= 56.088km	[ENG]	56.088^{03}
78g×0.96 = 74.88g	78[×]0.96 [=]	74.88
= 0.07488kg	[SHIFT] [ENG]	0.07488^{03}

Memory

This calculator contains 9 standard memories. There are two basic types of memories, i.e., "variable" memories, which are accessed by using the **[STO]** and **[RCL]** keys in

combination with the alphabets A, B, C, D, E, F, M, X and Y. The "independent" memories, which are accessed by using the **[M+]**, **[Shift] [M–]** and **[RCL]** and **[M]** keys. The variable memory and independent memory utilize the same memory area.
Contents of both the variable and independent memories are protected even when the power is turned OFF.

Variable memories

Up to 9 values can be retained in memory at the same time, and can be recalled when desired.

Example: Input 123 into memory "A" :-

[AC] [1] [2] [3] — `123_` / `0.`

[STO] [A] — `A=` / `123.`

[AC] — `_` / `0.`

[RCL] [A] — `A=` / `123.`

When formulas are input, the result of the formula's calculation is retained in memory.

Example: Input the result of 123×456 into memory "B" :-

[AC] [1] [2] [3] [×] [4] [5] [6] — `123X456` / `0.`

[STO] [B] — `B=` / `56088.`

[AC] — `_` / `0.`

[RCL] [B] — `B=` / `56088.`

If a variable expression is entered, the expression is first calculated according to the values stored in the variable memories used in the expression. The result is then stored in the variable memory specified for the result.

Example: Input the results of A×B into memory "C" :-

[AC] [ALPHA] [A] [×] [ALPHA] [B] — `AXB_` / `0.`

[STO] [C] — `C=` / `6898824.`

[AC] — `_` / `0.`

[RCL] [C] — `C=` / `6898824.`

Syn ERROR is generated when an attempt is made to input a substitution formula (such as C = A×B) or multistatements (such as A×B : C×D), and the existing memory contents are retained.

When input is made in a format such as "A=log 2", where the variable is equal to the formula, the results of the calculation are input into the specified memory.

Example: Executing "A=log2" :-

[AC] [ALPHA] [A] [ALPHA] [=] [log] [2] — `A=log2_` / `0.`

[=] — `A=log2` / `0.301029995.`

[AC] — `_` / `0.`

[RCL] [A] — `A=` / `0.301029995.`

Deleting memories
To delete all contents of variable memories, press **[Shift]** followed by **[Mcl] [=]**.

Independent Memory

Addition and subtraction (to and from sum) results can be stored directly in memory. Results can also be totalized in memory, making it easy to calculate sums. The icon **"M"** will be lighted as long as M is not empty.

Example: Input 123 to independent memory.

[AC] [1] [2] [3] — `123_` / `0.`

[M+] — `123` / `123.`

Recall memory data
[AC] — `_` / `0.`

[RCL] [M] — `M=` / `123.`

Add 25, subtract 12
25 [M+] 12 [SHIFT] [M–] — `12` / `12.`

Recall memory data
[AC] — `_` / `0.`

[RCL] [M] — `M=` / `136.`

To clear memory contents, press **[0] [STO] [M]**.
Addition/subtraction to or from sum in memory cannot be carried out with **[M+]**, **[Shift] [M–]** keys in **SD mode** and **LR** mode.

Difference between [STO][M] and [M+], [Shift][M–] :-
Both **[STO] [M]** and **[M+]**, **[Shift] [M–]** can be used to input results into memory, however when the **[STO] [M]** operation is used, previous memory contents are cleared. When either **[M+]** or **[Shift] [M–]** is used, value is added or subtracted to or from present sum in memory.

Example: Input 456 into memory "M" using **[STO] [M]** procedure. Memory already contains value of 123.

[AC] [1] [2] [3] [STO] [M] — `M=` / `123.`

[AC] [4] [5] [6] [STO] [M] — `M=` / `456.`

[AC] — `_` / `0.`

[RCL] [M] — `M=` / `456.`

Example: Input 456 into memory "M" using M+. Memory already contains value of 123.

[AC] [1] [2] [3] [STO] [M] — `M=` / `123.`

[AC] [4] [5] [6] [M+] — `456` / `456.`

[AC] — `_` / `0.`

[RCL] [M] — `M=` / `579.`

Special Functions

Answer Function

This unit has an answer function that stores the result of the most recent calculation. Once a numeric value or numeric expression is entered and **[=]** is pressed, the result is stored by this function.
To recall the stored value, press the **[Ans]** key. When **[Ans]** is pressed, "Ans" will appear on the display, and the value can be used in subsequent calculations.

Example: 123+456 = 579
789–579 = 210

[AC][1][2][3][+][4][5][6][=] — `123+456` / `579.`

[7][8][9][–][Ans] — `789-Ans_` / `579.`

[=] — `789-Ans` / `210.`

Numeric values with 12 digits for a mantissa and 2 digits for an exponent can be stored in the **"Ans"** memory. The **"Ans"** memory is not erased even if the power of the unit is turned OFF. Each time [=] , [Shift] [%] , [M+] , [Shift] [M–] , and [STO] ∞ (∞ = A ~ F, M, X, Y) is pressed, the value in the Ans memory is replaced with the new value produced by the calculation execution. When execution of a calculation results in an error, however, the **"Ans"** memory retains its current value.

Note:- Contents of **"Ans"** memory are not altered when RCL ∞ (∞ = A~F, M, X, Y) is used to recall contents of variable memory. Also, contents of **"Ans"** memory are not altered when variables are input when the variable input prompt is displayed.

Omitting the multiplication sign (×)

When inputting a formula as it is written, from left to right, it is possible to omit the multiplication sign (×) in the following cases :-

- Before the following functions :-
  sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$, log, ln, 10^x, e^x, √, ³√, Pol(x,y), Rec(r, θ)
  example: 2sin30, 10log1.2, 2√3, 2Pol(5, 12), etc.
- Before fixed numbers, variales and memories :-
  example: 2π, 2AB, 3Ans, etc.
- Before parentheses :-
  example: 3(5+6), (A+1)(B–1), etc.

Continuous Calculation Function

Even if calculations are concluded with the **[=]** key, the result obtained can be used for further calculations. In this case, calculations are performed with 10 digits for the mantissa which is displayed.

Example: To calculate ÷3.14 continuing after 3×4=12

[AC] [3] [×] [4] [=] — `3x4` / `12.`

(continuing) **[÷] [3] [•] [1] [4]** — `Ans÷3.14_` / `12.`

[=] — `Ans÷3.14` / `3.821656051`

Example: To calculate 1÷3×3 =

[AC] [1] [÷] [3] [×] [3] [=] — `1÷3x3` / `1.`

[1] [÷] [3] [=] — `1÷3` / `0.333333333`

(continuing) **[×] [3] [=]** — `Ansx3` / `1.`

This function can be used with Type A functions (x^2, x^{-1}, x!), +, –, x^y, $^x\sqrt{}$ and °'".

Example: Squaring the result of 78÷6=13

[AC] [7] [8] [÷] [6] [=] — `78÷6` / `13.`

(continuing) **[x^2]** — `Ans²_` / `13.`

[=] — `Ans²` / `169.`

Replay Function

This function stores formulas that have been executed. After execution is complete, pressing either the [←] or [→] key will display the formula executed.
Pressing [→] will display the formula from the beginning, with the cursor located under the first character.
Pressing [←] will display the formula from the end, with the cursor located at the space following the last character. After this, using the [→] and [←] to move the cursor, the formula can be checked and numeric values or commands can be changed for subsequent execution.

Example:

[AC] [1] [2] [3] [×] [4] [5] [6] [=] — `123x456` / `56088.`

[→] — `123x456` / `56088.`

[=] — `123x456` / `56088.`

[←] — `123x456_` / `56088.`

Example:
4.12×3.58+6.4 = 21.496
4.12×3.58–7.1 = 7.6496

[AC] [4] [•] [1] [2] [×] [3] [•] [5] [8] [+] [6] [•] [4] [=] — `4.12x3.58+6.→` / `21.1496`

[←] — `←12x3.58+6.4_` / `21.1496`

[←] [←] [←] [←] — `4.12x3.58+6.→` / `21.1496`

[–] [7] [•] [1] — `←12x3.58-7.1_` / `21.1496`

[=] — `4.12x3.58-7.→` / `7.6496`

The replay function is not cleared even when **[AC]** is pressed or when power is turned OFF, so contents can be recalled even after **[AC]** is pressed.

Replay function is cleared when mode or operation is switched.

Error Position Display Function

When an **ERROR** message appears during operation execution, the error can be cleared by pressing the **[AC]** key, and the values or formula can be re-entered from the beginning. However, by pressing the [←] or [→] key, the ERROR message is cancelled and the cursor moves to the point where the error was generated.

Example: 14÷0×2.3 is input by mistake

[AC] [1] [4] [÷] [0] [×] [2] [.] [3] [=] — `Ma ERROR`

[←] (or [→]) — `14÷0x2.3` / `0.`

Correct the input by pressing [←] **[SHIFT] [INS] [1]** — `14÷10x2.3` / `0.`

[=] — `14÷10x2.3` / `3.22`

Multistatement Function

- The multistatement function (using colons to separate formulas or statements) available in program calculations can also be used for manual calculations.
- The multistatement function allows formulas to be separated by colons (**[SHIFT] [:]**) to make consecutive, multiple statement calculations possible.
- When **[=]** is pressed to execute a formula input using the

  multistatement format, the formula is executed in order from the beginning.
- Inputting " ◢ " (**[SHIFT] [◢]**) in place of the colon will display the calculation result up to that point during execution.

Example:
6.9×123 = 848.7
123÷3.2 = 38.4375

[AC]123 [STO] [A] 6.9 [×] [ALPHA] [A] [SHIFT] [◢] [ALPHA] [A] [÷] 3.2 [=] — `6.9xA` / `PAUSE 848.7`

"Disp" appears on the display when " ◢ " is used.

[=] — `A÷3.2` / `38.4375`

- Even if " ◢ " is not input at the end of a formula, the final result will be displayed.
- Consecutive calculations containing multistatements cannot be performed.
  123 × 456 : ×5
  ∑ invalid
- Calculations can be performed while an intermediate result is displayed during execution interrupted by " ◢ ".

Example: 5×6 ◢ 7×8

[AC] [5] [×] [6] [SHIFT] [◢] [7] [×] [8] — `5x6 ◢ 7x8_` / `0.`

[=] — `5x6` / `PAUSE 30.`

[sin] [Ans] — `sin Ans_` / `PAUSE 30.`

[=] — `sin Ans_` / `PAUSE 0.5`

When interrupt operation is completed, press **[=]** once again to execute.

[=] — `7x8` / `56.`

Scientific Function

Trigonometric functions and inverse trigonometric functions

- Be sure to set the unit of angular measurement before performing trigonometric function and inverse

  trigonometric function calculations.
- The unit of angular measurement (degrees, radians, grads) is selected in sub-menu.
- Once a unit of angular measurement is set, it remains in effect until a new unit is set. Settings are not cleared when power is switched OFF.
- This operation is invalid in the **"BASE-N"** mode. When in the **"BASE-N"** mode, go back to COMP mode by selecting **"COMP"** in the main menu.

Example	Operation	Display (Lower)
sin 63°52'41" = 0.897859012	[MODE][MODE][=]("DEG" selected) [sin] 63 [°'"] 52 [°'"] 41 [°'"][=]	0.897859012
cos (π/3 rad) = 0.5	[MODE][MODE][→][=]("RAD") [cos][( ] [SHIFT][π][÷]3 [ )] [=]	0.5
tan (–35 grad) = –0.612800788	[MODE][MODE][→][→][=] ("GRA" selected) [tan] [(–)] 35 [=]	–0.612800788
2sin45°×cos65° = 0.597672477	[MODE][MODE][=]("DEG") 2[sin] 45 [cos] 65 [=]	0.597672477
$\sin^{-1}$ 0.5 = 30	[SHIFT][$\sin^{-1}$] 0.5 [=]	30.
$\cos^{-1}(\sqrt{2}/2)$ = 0.785398163 rad = π/4 rad	[MODE][MODE][→][=]("RAD") [SHIFT][$\cos^{-1}$][( ][√]2 [÷]2 [ )][=] [÷][SHIFT][π][=]	0.785398163 0.249999999
$\tan^{-1}$ 0.741 = 36.53844577° = 36°32' 18.4"	[MODE][MODE][=]("DEG") [SHIFT][$\tan^{-1}$]0.741[=] [SHIFT] [←°'"]	36.53844577 36°32°18.4
If the total number of digits for degrees/minutes/seconds exceed 11 digits, the higher order values are given display priority, and any lower-order values are not displayed. However, the entire value is stored within the unit as a decimal value.		
2.5×($\sin^{-1}$0.8–$\cos^{-1}$0.9) = 68°13'13.53"	2.5[×] [( ] [SHIFT] [$\sin^{-1}$]0.8 [–] [SHIFT] [$\cos^{-1}$] 0.9 [ )] [=] [SHIFT] [←°'"]	68°13°13.53

Logarithmic and Exponential Functions

The following operation is invalid in the BASE-N mode. When in the BASE-N mode, carry out calculation after selecting **"COMP"** mode in main menu.

Example	Operation	Display (Lower)
log1.23 = 8.9905111$\times10^{-2}$	[log] 1.23 [=]	0.089905111
ln90 = 4.49980967	[ln] 90 [=]	4.49980967
log456÷ln456 = 0.434294481	[log]456÷[ln]456 [=]	0.434294481
$10^{1.23}$ = 16.98243652	[SHIFT][10^x] 1.23 [=]	16.98243652
$e^{4.5}$ = 90.0171313	[SHIFT][e^x]4.5[=]	90.0171313
$10^4 \cdot e^{-4}+1.2\cdot10^{2.3}$ = 422.5878667	[SHIFT][10^x]4[×][SHIFT][e^x] [(–)]4[+]1.2[×][SHIFT][10^x] 2.3[=]	422.5878667
$(-3)^4$ = 81	[(][(–)] 3 [)] [x^y] 4 [=]	81.
-3^4 = –81	[(–)] 3 [x^y] 4 [=]	–81.
$5.6^{2.3}$ = 52.58143837	5.6 [x^y] 2.3 [=]	52.58143837
$\sqrt[7]{123}$ = 1.988647795	7 [SHIFT][$\sqrt[x]{}$] 123 [=]	1.988647795
$(78-23)^{-12}$ = 1.305111829$\times10^{-21}$	[(]78[–]23[)][x^y][(–)]12[=]	1.305111829^{-21}
$2+3\times\sqrt[3]{64}-4$ = 10	2[+]3[×]3[SHIFT][$\sqrt[x]{}$]64 [–]4[=]	10.
$2\times3.4^{(5+6.7)}$ = 3306232	2[×]3.4[x^y][(]5[+]6.7[)][=]	3306232.001

Performing Hyperbolic and Inverse Hyperbolic Functions

The following operation is invalid in the BASE-N mode. When the user is in the BASE-N mode, he/she should go back to **"COMP"** mode before carrying out calculation.

Example	Operation	Display (Lower)
sinh3.6= 18.28545536	[hyp][sin] 3.6 [=]	18.28545536
cosh1.23 = 1.856761057	[hyp][cos] 1.23 [=]	1.856761057
tanh2.5= 0.986614298	[hyp][tan] 2.5 [=]	0.986614298
cosh1.5–sinh1.5 = 0.22313016	[hyp][cos] 1.5 [–][hyp] [sin] 1.5 [=]	0.22313016
$\sinh^{-1}$ 30 = 4.094622224	[hyp][SHIFT][$\sin^{-1}$] 30 [=]	4.094622224
$\cosh^{-1}$ (20/15) = 0.795365461	[hyp][SHIFT][$\cos^{-1}$][(] 20 [÷] 15 [)][=]	0.795365461
x = ($\tanh^{-1}$ 0.88) / 4 = 0.343941914	[hyp][SHIFT][$\tan^{-1}$]0.88 [÷]4[=]	0.343941914
$\sinh^{-1}$ 2×$\cosh^{-1}$1.5 = 1.389388923	[hyp][SHIFT][$\sin^{-1}$]2[×] [hyp][SHIFT][$\cos^{-1}$]1.5[=]	1.389388923
$\sinh^{-1}$ (2/3)+$\tanh^{-1}$(4/5) = 1.723757406	[hyp][SHIFT][$\sin^{-1}$][(]2[÷] 3[)][+][hyp][SHIFT][$\tan^{-1}$] [(]4[÷]5[)][=]	1.723757406

Coordinate Transformation

- This scientific calculator lets you convert between rectangular coordinates and polar coordinates, i.e., P(x, y) ↔ P(r, θ)
- Calculation results are stored in variable memory E and variable memory F. Contents of variable memory E are displayed initially. To display contents of memory F, press **[RCL] [F]**.
- With polar coordinates, θ can be calculated within a range of –180°< θ≤180°.
  (Calculated range is the same with radians or grads.)
- The following operation is invalid in the BASE-N mode. Before carry out calculation, one should switch back to **"COMP"** mode.

Example	Operation	Display (Lower)
x=14 and y=20.7, what are r and θ°?	[MODE][MODE][=]("DEG" selected) [SHIFT][Pol(]14 [,]20.7[)][=] [RCL][F][SHIFT][←°' "]	24.98979792(r) 55°55°42.2(θ)
x=7.5 and y=–10, what are r and θ rad?	[MODE][MODE][→][=]("RAD") [SHIFT][Pol(]7.5[,][–]10[)][=] [RCL][F]	12.5(r) –0.927295218(θ)
r=25 and θ= 56°, what are x and y?	[MODE][MODE][=]("DEG") [SHIFT][Rec(]25 [,]56[)][=] [RCL][F]	13.97982259(x) 20.72593931(y)
r=4.5 and =2π/3 rad, what are x and y?	[MODE][MODE][→][=]("RAD") [SHIFT][Rec(]4.5[,][(]2[÷] 3[×][SHIFT][π][)][)][=] [RCL][F]	–2.25(x) 3.897114317(y)

Permutation and Combination

Total number of permutations nPr = n!/(n–r)!
Total number of combinations nCr = n!/(r!(n–r)!)

The following operation is invalid in the BASE-N mode. When in the BASE-N mode, carry out calculation after going back to **"COMP"** mode.

Example	Operation	Display (Lower)
Taking any four out of ten items and arranging them in a row, how many different arrangements are possible? $_{10}P_4$ = 5040	10[SHIFT][nPr]4[=]	5040.

Example	Operation	Display (Lower)
Using any four numbers from 1 to 7, how many four digit even numbers can be formed if none of the four digits consist of the same number? (3/7 of the total number of permutations will be even.) $_7P_4\times3\div7$ = 360	7[SHIFT][nPr]4[×]3[÷] 7[=]	360.
If any four items are removed from a total of 10 items, how many different combinations of four items are possible? $_{10}C_4$ = 210	10[SHIFT][nCr]4[=]	210.
If 5 class officers are being selected for a class of 15 boys and 10 girls, how many combinations are possible? At least one girl must be included in each group. $_{25}C_5-{}_{15}C_5$ = 50127	25[SHIFT][nCr]5[–]15 [SHIFT][nCr]5[=]	50127.

Other Functions (√ , x^2, x^{-1}, x!, ∛, Ran#)

The following operations is invalid in the BASE-N mode. When in the BASE-N mode, carry out calculation after going back to **"COMP"** mode.

Example	Operation	Display (Lower)
√2+√5 = 3.65028154	[√]2[+][√]5[=]	3.65028154
$2^2+3^2+4^2+5^2$ = 54	2[x^2][+]3[x^2][+]4[x^2] [+]5[x^2][=]	54.
$(-3)^2$ = 9	[(][(–)]3[)][x^2][=]	9.
1/(1/3–1/4) = 12	[(]3[SHIFT][x^{-1}][–]4[SHIFT] [x^{-1}][)][SHIFT][x^{-1}][=]	12.
8! = 40320	8[SHIFT][x!][=]	40320.
∛(36×42×49) = 42	[SHIFT][∛][(]36[×]42[×] 49[)][=]	42.
Random number generation (number is in the range of 0.000 to 0.999)	[SHIFT][Ran#][=]	0.792 (random)

Example	Operation	Display (Lower)
$\sqrt{1-\sin^2 40}$ = 0.766044443	[MODE][MODE][=]("DEG" selected) [√][(]1[–][(][sin]40[)][x^2] [)][=] [SHIFT][$\cos^{-1}$][Ans][=]	0.766044443 40.
1/2!+1/4!+1/6!+1/8! = 0.543080357	2[SHIFT][x!][SHIFT][x^{-1}][+] 4[SHIFT][x!][SHIFT][x^{-1}][+] 6[SHIFT][x!][SHIFT][x^{-1}][+] 8[SHIFT][x!][SHIFT][x^{-1}][=]	0.543080357

Fractions

Fractions are input and displayed in the order of integer, numerator and denominator.

Example	Operation	Display (Lower)
$^2/_5+3^1/_4=3^{13}/_{20}$	2[a^b/c]5[+]3[a^b/c]1 [a^b/c]4[=] (conversion to decimal)[a^b/c] Fractions can be converted to decimals, and then converted back to fractions.	3 ⌟13 ⌟20. 3.65
$3^{456}/_{78}=8^{11}/_{13}$	3[a^b/c]456[a^b/c]78[=] [SHIFT][$^d/c$]	8 ⌟11 ⌟13. 115 ⌟13.
$^1/_{2578}+^1/_{4572}$ = 6.066202547$\times10^{-4}$	1[a^b/c]2578[+]1[a^b/c] 4572[=] When the total number of characters, including integer, numerator, denominator and delimiter mark exceeds 10, the input fraction is automatically displayed in decimal format.	6.066202547^{-04}
$^1/_2\times0.5$ = 0.25	1[a^b/c]2[×].5[=]	0.25
$^1/_3\times(-^4/_5)-^5/_6=-1^1/_{10}$	1[a^b/c]3[×][(–)]4[a^b/c]5 [–]5[a^b/c]6[=]	–1 ⌟1 ⌟10.
$^1/_2\times^1/_3+^1/_4\times^1/_5$ = $^{13}/_{60}$	1[a^b/c]2[×]1[a^b/c]3[+] 1[a^b/c]4[×]1[a^b/c]5[=]	13 ⌟60.
$(^1/_2)/3=^1/_6$	[(]1[a^b/c]2[)][a^b/c]3[=]	1 ⌟6.
$^1/(^1/_3+^1/_4)=1^5/_7$	1[a^b/c][(]1[a^b/c]3[+] 1[a^b/c]4[)][=]	1 ⌟5 ⌟7.

Degree, Radian, Gradient Interconversion

Degree, radian and gradient can be converted to each other with the use of **[SHIFT][DRG>]**. Once **[SHIFT] [DRG>]** have been keyed in, the **"DRG"** selection menu

will be shown as follows.

`D  R  G`

Example	Operation	Display
Define degree first	[MODE][MODE][=]("DEG" selected)	
Change 20 radian to degree	20[SHIFT][DRG>][→][=][=]	20^r 1145.91559
To perform the following calculation :- 10 radians+25.5 gradients The answer is expressed in degree.	10[SHIFT][DRG>][→][=] [+]25.5[SHIFT][DRG>][→] [→][=][=]	$10^r+25.5^g$ 595.9077951

Degrees, Minutes, Seconds Calculations

You can perform sexagesimal calculations using degrees (hours), minutes and seconds. And convert between sexagesimal and decimal values.

Example	Operation	Display
To express 2.258 degrees in deg/min/sec.	2.258[°' "][=]	2°15°28.8
To perform the calculation: 12°34'56"×3.45	12[°' "]34[°' "]56[°' "][×] 3.45[=]	43°24°31.2

Binary, Octal, Decimal, Hexadecimal Calculations

- Binary, octal, decimal, hexadecimal calculations, conversions and logical operations are performed in BASE-N mode (press **[MODE] [→] [→] [→] [→] [=]**)
- The number system (2, 8, 10, 16) is set by respectively pressing **[BIN], [OCT], [DEC], [HEX]**. A corresponding symbol **"b", "o", "d"** or **"H"** appears on the display.
- Number systems are specified for specific values by pressing **[SHIFT]**, then the numbers system designator (b, o, d, h), immediately followed by the value.
- General function calculations cannot be performed in the BASE-N mode.
- Only integers can be handled in the BASE-N mode. If a calculation produces a result that includes a decimal value, the decimal portion is cut off.
- If values not valid for the particular number system are used, attach the corresponding designator (b, o, d or h), or an error message will appear.

Number system	Valid values
Binary	0,1
Octal	0,1,2,3,4,5,6,7
Decimal	0,1,2,3,4,5,6,7,8,9
Hexadecimal	0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

- Negative numbers in binary, octal, hexadecimal are expressed as two's complements.
- Number of digits displayed in each number system

Number system	Number of digits displayed
Binary	Up to 10 digits
Octal	Up to 10 digits
Decimal	Up to 10 digits
Hexadecimal	Up to 8 digits

- Calculation range (in BASE-N mode)

Binary	Positive	: 0111111111≥x ≥0
	Negative	: 1111111111≥x ≥1000000000
Octal	Positive	: 3777777777≥x≥0
	Negative	: 7777777777≥x≥4000000000
Decimal	Positive	: 2147483647≥x≥0
	Negative	: –1≥x≥–2147483648
Hexadecimal	Positive	: 7FFFFFFF≥x≥0
	Negative	: FFFFFFFF≥x≥80000000

- Sub-menu for BASE-N operation

In the sub-menu, you can select operators AND, OR, XNOR, XOR, NOT, and NEG.

Press **[LOGIC]** to open the menu. `AND OR XNOR →`

Press[→]consecutively to select the operator.

[→] `AND OR XNOR →`

[→] `AND OR XNOR →`

[→] `←XOR NOT NEG`

After locating the desired operator, press [=] to confirm and go back to input mode.

Binary, Octal, Decimal, Hexadecimal Conversions

Conversion using number system specification key

Value from a different number system input when a specific number system mode is being used.

Example	Operation	Display (Lower)
What are the decimal values for 2A$_{16}$ and 274$_8$?	[MODE][→][→][→][→][=] [[d]] [SHIFT][[h]]2A[=] [SHIFT][[o]]274[=]	0^d 0^d 42^d 188^d
What are the hexadecimal values for 123$_{10}$ and 1010$_2$?	[[h]] [SHIFT][[d]]123[=] [SHIFT][[b]]1010[=]	bc^h $7b^h$ A^h
What are the octal values for 15$_{16}$ and 1100$_2$?	[[o]] [SHIFT][[h]]15[=] [SHIFT][[b]]1100[=]	12^o 25^o 14^o
What are the binary values for 36$_{10}$ and 2C$_{16}$?	[[b]] [SHIFT][[d]]36[=] [SHIFT][[h]]2C[=]	1100^b 100100^b 101100^b

Conversion Using Number System Mode Key

Calculation results can be converted to any specified number system by using the corresponding number system mode key.

Example	Operation	Display
How is 22$_{10}$ expressed in binary, octal and hexadecimal number system?	[MODE][→][→][→][→][=] [[d]] 22[=] [BIN] [OCT] [HEX]	0^d 0^d 22^d 10110^b 26^o 16^h

Basic Arithmetic Operations Using Binary, Octal, Decimal, Hexadecimal Values

Example	Operation	Display
10111$_2$+11010$_2$ = 110001$_2$	[MODE][→][→][→][→][=] [[b]] 10111[+]11010[=]	0^d 0^b 110001^b
B47$_{16}$–DF$_{16}$ = A68$_{16}$	[[h]] B47[–]DF[=]	31^h $A68^h$
123$_8$×ABC$_{16}$ = 37AF4$_{16}$ = 228084$_{10}$	[SHIFT][[o]]123[×]ABC[=] [DEC]	$37AF4^h$ 228084^d
1F2D$_{16}$–100$_{10}$ = 7881$_{10}$ = 1EC9$_{16}$	[SHIFT][[h]]1F2D[–]100[=] [HEX]	7881^d $1EC9^h$
7654$_8$÷12$_{10}$ = 334.3333333$_{10}$ = 516$_8$	[[d]] [SHIFT][[o]]7654[÷]12[=] [OCT]	7881^d 334^d 516^o
1234$_{10}$+1EF$_{16}$÷24$_8$ = 2352$_8$ = 1258$_{10}$	[SHIFT][[d]]1234[+][SHIFT] [[h]]1EF[÷]24[=] [DEC]	2352^o 1258^d

Negative Expressions

Example	Operation	Display
How is 110010$_2$ expressed as a negative?	[MODE][→][→][→][→][=] [[b]] [LOGIC][→][→][→][→][→][=] 110010[=]	0^d 0^b 1111001110^b
How is 72$_8$ expressed as a negative?	[[o]] [LOGIC][→][→][→][→][→][=] 72[=]	7777777706^o
How is 3A$_{16}$ expressed as a negative?	[[h]] [LOGIC][→][→][→][→][→][=] 3A[=]	$FFFFFFC6^h$

Logical Operations

Logical operations are performed through logical products (**and**), logical sums (**or**), negative (**Not**), exclusive logic sums (**xor**), and negation of exclusive logical sums (**xnor**).

Example	Operation	Display
19$_{16}$ AND 1A$_{16}$ = 18$_{16}$	[MODE][→][→][→][→][=] [[h]] 19[LOGIC][=]1A[=]	0^h 0^h 18^h
1110$_2$ AND 36$_8$ = 1110$_2$	[[b]] 1110[LOGIC][=][SHIFT][[h]] 36[=]	11000^b 1110^b
23$_8$ OR 61$_8$ = 63$_8$	[[o]] 23[LOGIC][→][=]61[=]	16^o 63^o
120$_{16}$ OR 1101$_2$ = 12D$_{16}$	[[h]] 120[LOGIC][→][=][SHIFT][[b]] 1101[=]	33^h $12d^h$
1010$_2$ AND (A$_{16}$ OR 7$_{16}$) = 1010$_2$	[[b]] 1010[LOGIC][=][(][SHIFT][[h]] A[LOGIC][→][=][SHIFT][[h]] 7[)][=]	100101101^b 1010^b
5$_{16}$ XOR 3$_{16}$ = 6$_{16}$	[[h]] 5[LOGIC][→][→][→][=]3[=]	A^h 6^h
2A$_{16}$ XNOR 5D$_{16}$ = FFFFFF88$_{16}$	[[h]] 2A[LOGIC][→][→][=]5D[=]	6^h $FFFFFF88^h$
Negation of 1234$_8$	[[o]] [LOGIC][→][→][→][→][→][=] 1234[=]	7777777610^o 7777776544^o
Negation of 2FFFED$_{16}$	[[h]] [LOGIC][→][→][→][→][→][=] 2FFFED[=]	$FFFFFd64^h$ $FFd00013^h$

Statistical Calculations

This unit can be used to make statistical calculations including standard deviation in the **"SD"** mode, and regression calculation in the **"REG"** mode.

Standard Deviation

In the **"SD"** mode, calculations including 2 types of standard deviation formulas, mean, number of data, sum of data, and sum of square can be performed.

Data input

1. Press **[MODE] [→] [→] [=]** to specify **SD** mode.
2. Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
3. Input data, pressing **[DT]** key (= **[M+]**) each time a new piece of data is entered.

Example Data: 10, 20, 30
Key operation: 10 **[DT]** 20 **[DT]** 30 **[DT]**

- When multiples of the same data are input, two different entry methods are possible.
  Example 1 Data: 10, 20, 20, 30
  Key operation: 10 **[DT]** 20 **[DT] [DT]** 30 **[DT]**
  The previously entered data is entered again each time the DT is pressed without entering data (in this case 20 is re-entered).
  Example 2 Data: 10, 20, 20, 20, 20, 20, 20, 30
  Key operation: 10 **[DT]** 20 **[SHIFT] [;]** 6 **[DT]** 30 **[DT]**

By pressing **[SHIFT]** and then entering a semicolon followed by value that represents the number of items the data is repeated (6, in this case) and the **[DT]** key, the multiple data entries (for 20, in this case) are made automatically.

Deleting input data

There are various ways to delete value data, depending on how and where it was entered.

Example 1 40 **[DT]** 20 **[DT]** 30 **[DT]** 50 **[DT]**
To delete 50, press **[SHIFT] [CL]**.
Example 2 40 **[DT]** 20 **[DT]** 30 **[DT]** 50 **[DT]**
To delete 20, press 20 **[SHIFT] [CL]**.
Example 3 30 **[DT]** 50 **[DT]** 120 **[SHIFT] [;]**
To delete 120 **[SHIFT] [;]** , press **[AC]**.
Example 4 30 **[DT]** 50 **[DT]** 120 **[SHIFT] [;]** 31
To delete 120 **[SHIFT] [;]** 31, press **[AC]**.

Example 5 30 **[DT]** 50 **[DT]** 120 **[SHIFT] [;]** 31 **[DT]**
To delete 120 **[SHIFT] [;]** 31 **[DT]**, press **[SHIFT] [CL]**.
Example 6 50 **[DT]** 120 **[SHIFT] [;]** 31 **[DT]** 40 **[DT]** 30 **[DT]**
To delete 120 **[SHIFT] [;]** 31 **[DT]**, press 120 **[SHIFT] [;]** 31 **[SHIFT] [CL]**.
Example 7 [√] 10 **[DT]** [√] 20 **[DT]** [√] 30 **[DT]**
To delete [√] 20 **[DT]**, press [√] 20 **[=] [Ans] [SHIFT] [CL]**.
Example 8 [√] 10 **[DT]** [√] 20 **[DT]** [√] 30 **[DT]**
To delete [√] 20 **[DT]**, press [√] 20 **[SHIFT] [;] [(–)]** 1 **[DT]**.

Performing calculations

The following procedures are used to perform the various standard deviation calculations.

Key operation	Result
[SHIFT][$x\sigma_n$]	Population standard deviation, $x\sigma_n$
[SHIFT][$x\sigma_{n-1}$]	Sample standard deviation, $x\sigma_{n-1}$
[SHIFT][$\bar{x}$]	Mean, $\bar{x}$
[RCL][A]	Sum of square of data, $\sum x^2$
[RCL][B]	Sum of data, $\sum x$
[RCL][C]	Number of data, n

Standard deviation and mean calculations are performed as shown below:
Population standard deviation $\sigma_n=\sqrt{\sum(x_i-\bar{x})^2/n}$
where i = 1 to n
Sample standard deviation $\sigma_{n-1}=\sqrt{\sum(x_i-\bar{x})^2/(n-1)}$
where i = 1 to n
Mean $\bar{x}=(\sum x)/n$

Example	Operation	Display
Data 55, 54, 51, 55, 53, 53, 54, 52	[MODE][→][→] [=] (SD Mode) [SHIFT][Scl][=] (Memory cleared) 55[DT]54[DT]51[DT] 55[DT]53[DT][DT]54[DT] 52[DT]	0. 0. 52.
What is deviation of the unbiased variance, and the mean of the above data?	[RCL][C](Number of data) [RCL][B](Sumof data) [RCL][A](Sum of square of data) [SHIFT][$\bar{x}$][=](Mean) [SHIFT][$x\sigma_n$][=](Population SD) [SHIFT][$x\sigma_{n-1}$][=](Sample SD) [SHIFT][$x\sigma_{n-1}$] [x^2][=](Sample variance)	8. 427. 22805. 53.375 1.316956719 1.407885953 1.982142857

Regression Calculation

In the REG mode, calculations including linear regression, logarithmic regression, exponential regression, power regression, quadratic regression and inverse regression can be performed.

Linear regression

Linear regression calculations are carried out using the following formula:
y = A + Bx.

Data input

Press **[MODE] [→] [→] [→] [=]** to specify the **"REG"** mode.
Press **[Shift] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data> [,] <y data> [DT]

- When multiples of the same data are input, two different entry methods are possible:

Example 1 Data: 10/20, 20/30, 20/30, 40/50
Key operation: 10 [,] 20 [DT]
20 [,] 30 [DT] [DT]
40 [,] 50 [DT]
The previously entered data is entered again each time the **[DT]** key is pressed (in this case 20/30 is re-entered).

Example 2 Data: 10/20, 20/30, 20/30, 20/30, 20/30, 20/30, 40/50
Key operation: 10 [,] 20 [DT]
20 [,] 30 [SHIFT] [;] 5 [DT]
40 [,] 50 [DT]
By pressing **[SHIFT]** and then entering a semicolon followed by a value that represents the number of times the data is repeated (5, in this case) and the **[DT]** key, the multiple data entries (for 20/30, in this case) are made automatically.

Deleting input data

There are various ways to delete value data, depending on how and where it was entered.

Example 1 10 [,] 40 [DT]
20 [,] 20 [DT]
30 [,] 30 [DT]
40 [,] 50
To delete 40 [,] 50, press **[AC]**

Example 2 10 [,] 40 [DT]
20 [,] 20 [DT]
30 [,] 30 [DT]
40 [,] 50 [DT]
To delete 40 [,] 50 [DT], press **[SHIFT][CL]**
Example 3
To delete 20 [,] 20 [DT], press 20 [,] 20 [SHIFT][CL]
Example 4 [√] 10 [,] 40 [DT]
[√] 40 [,] 50 [DT]
To delete[√]10[,]40[DT], press[√]10[=][Ans][,]40[SHIFT][CL]

Key Operations to recall regression calculation results

Key operation	Result
[SHIFT][⌜A⌝][=]	Constant term of regression A
[SHIFT][⌜B⌝][=]	Regression coefficient B
[SHIFT][⌜C⌝][=]	Regression coefficient C
[SHIFT][⌜r⌝][=]	Correlation coefficient r
[SHIFT][$\hat{x}$][=]	Estimated value of x
[SHIFT][$\hat{y}$][=]	Estimated value of y
[SHIFT][$y\sigma_n$]	Population standard deviation, $y\sigma_n$
[SHIFT][$y\sigma_{n-1}$]	Sample standard deviation, $y\sigma_{n-1}$
[SHIFT][$\bar{y}$]	Mean, $\bar{y}$
[SHIFT][$x\sigma_n$]	Population standard deviation, $x\sigma_n$
[SHIFT][$x\sigma_{n-1}$]	Sample standard deviation, $x\sigma_{n-1}$
[SHIFT][$\bar{x}$]	Mean, $\bar{x}$
[RCL][A]	Sum of square of data, $\sum x^2$
[RCL][B]	Sum of data, $\sum x$
[RCL][C]	Number of data, n
[RCL][D]	Sum of square of data, $\sum y^2$
[RCL][E]	Sum of data, $\sum y$
[RCL][F]	Sum of data, $\sum xy$

Performing calculations

The following procedures are used to perform the various linear regression calculations.

The regression formula is y = A + Bx. The constant term of regression A, regression coefficient B, correlation r, estimated value of x, and estimated value of y are calculated as shown below:

$A=(\sum y-\sum x)/n$
$B=(n\sum xy-\sum x\sum y)/(n\sum x^2-(\sum x)^2)$
$r=(n\sum xy-\sum x\sum y)/\sqrt{((n\sum x^2-(\sum x)^2)(n\sum y^2-(\sum y)^2))}$
$y=A+Bx$
$x=(y-A)/B$

Example	Operation	Display
Temperature and length of a steel bar	[MODE][→][→][→][=] ("REG" then select linear regression)	0.
Temp Length	[SHIFT][Scl][=] (Memory cleared)	0.
10°C 1003mm	10[,]1003[DT]	10.
15°C 1005mm	15[,]1005[DT]	15.
20°C 1010mm	20[,]1010[DT]	20.
25°C 1011mm	25[,]1011[DT]	25.
30°C 1014mm	30[,]1014[DT]	30.
Using this table, the regression formula and correlation coefficient can be obtained. Based on the coefficient formula, the length of the steel bar at 18°C and the temperature at 1000mm can be estimated. Furthermore the critical coefficient (r^2) and covariance can also be calculated.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=] (Regression coefficient B) [SHIFT][⌜r⌝][=] (Correlation coefficient r) 18[SHIFT][$\hat{y}$][=](Length at 18°C) 1000[SHIFT][$\hat{x}$][=](Temp at 1000mm) [SHIFT][⌜r⌝][x^2][=] (Critical coefficient) [(][RCL][F][–][RCL][C][×] [SHIFT][$\bar{x}$][×][SHIFT][$\bar{y}$][)][÷] [(][RCL][C][–]1[)][=](Covariance)	997.4 0.56 0.982607368 1007.48 4.642857143 0.965517241 35.

Logarithmic regression

Logarithmic regression calculations are carried out using the following formula:
y = A + B•ln$x$

Data input

Press **[MODE] [→] [→] [→] [=]** to specify **"REG"** mode.
Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data>, <y data> [DT]

- To make multiple entries of the same data, follow procedures described for linear regression.

Deleting input data

To delete input data, follow the procedures described for linear regression.

Performing calculations

The logarithmic regression formula y = A + B•ln$x$. As x is input, ln(x) will be stored instead of x itself. Hence, we can treat the logarithmic regression formula same as the linear regression formula. Therefore, the formulas for constant term A, regression coefficient B and correlation coefficient r are identical for logarithmic and linear regression.

Example	Operation	Display
x_i y_i	[MODE][→][→][→][=] ("REG" then select LOG regression)	0.
29 1.6 50 23.5 74 38 103 46.4 118 48.9	[SHIFT][Scl][=] (Memory cleared) 29[,]1.6[DT] 50[,]23.5[DT] 74[,]38[DT] 103[,]46.4[DT] 118[,]48.9[DT]	0. 29. 50. 74. 103. 118.
The logarithmic regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, respective estimated values y and x can be obtained for x_i = 80 and y_i = 73 using the regression formula.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=](Regression coefficient B) [SHIFT][⌜r⌝][=](Correlation coefficient r) 80[SHIFT][$\hat{y}$](y when x_i=80) 73[SHIFT][$\hat{x}$](x when y_i=73)	–111.1283976 34.0201475 0.994013946 37.94879482 224.1541313

A number of logarithmic regression calculation results differ from those produced by linear regression. Note the following:

Linear regression	Logarithmic regression
$\sum x$	$\sum \ln x$
$\sum x^2$	$\sum (\ln x)^2$
$\sum xy$	$\sum y\cdot\ln x$

Exponential regression

Exponential regression calculations are carried out using the following formula:
$y=A\cdot e^{B\cdot x}$ (ln y = ln A +Bx)

Data input

Press **[MODE] [→] [→] [→] [=]** to specify the **"REG"** mode.
Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data>,<y data> [DT]

- To make multiple entries of the same data, follow procedures described for linear regression.

Deleting input data

To delete input data, follow the procedures described for linear regression.

Performing calculations

If we assume that ln$y$ = y and lnA = a', the exponential regression formula $y=A\cdot e^{B\cdot x}$ (ln y = ln A +Bx) becomes the linear regression formula y =a' + bx if we store ln(y) instead of y itself. Therefore, the formulas for constant term A, regression coefficient B and correlation coefficient r are identical for exponential and linear regression.

A number of exponential regression calculation results

differ from those produced by linear regression. Note the following:

Linear regression	Exponential regression
$\sum y$	$\sum \ln y$
$\sum y^2$	$\sum (\ln y)^2$
$\sum xy$	$\sum x\cdot\ln y$

Example	Operation	Display
x_i y_i	[MODE][→][→][→][=] ("REG" then select EXP regression)	0.
6.9 21.4 12.9 15.7 19.8 12.1 26.7 8.5 35.1 5.2	[SHIFT][Scl][=] (Memory cleared) 6.9[,]21.4[DT] 12.9[,]15.7[DT] 19.8[,]12.1[DT] 26.7[,]8.5[DT] 35.1[,]5.2[DT]	0. 6.9 12.9 19.8 26.7 35.1
Through exponential regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, the regression formula is used to obtain the respective estimated values of y and x, when x_i = 16 and y_i = 20.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=] (Regression coefficient B) [SHIFT][⌜r⌝][=] (Correlation coefficient r) 16[SHIFT][$\hat{y}$](y when x_i=16) 20[SHIFT][$\hat{x}$](x when y_i=20)	30.49758743 –0.049203708 –0.997247352 13.87915739 8.574868046

Power regression

Power regression calculations are carried out using the following formula:
$y=A\cdot x^B$ (ln$y$ = lnA + Bln$x$)

Data input

Press **[MODE] [→] [→] [→] [=]** to specify the **"REG"** mode.
Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data>,<y data> [DT]

- To make multiple entries of the same data, follow procedures described for linear regression.

Deleting input data

To delete input data, follow the procedures described for linear regression

Performing calculations

If we assume that ln$y$ = y, lnA =a' and ln x = x, the power regression formula $y=A\cdot x^B$ (ln$y$ = lnA + Bln$x$) becomes the linear regression formula y = a' + bx if we store ln(x) and ln(y) instead of x and y themselves. Therefore, the formulas for constant term A, regression coefficient B and correlation coefficient r are identical the power and linear regression.

A number of power regression calculation results differ from those produced by linear regression. Note the following:

Linear regression	Power regression
$\sum x$	$\sum \ln x$
$\sum x^2$	$\sum (\ln x)^2$
$\sum y$	$\sum \ln y$
$\sum y^2$	$\sum (\ln y)^2$
$\sum xy$	$\sum \ln x\cdot\ln y$

Example	Operation	Display
x_i y_i	[MODE][→][→][→][=] ("REG" then select PWR regression)	0.
28 2410 30 3033 33 3895 35 4491 38 5717	[SHIFT][Scl][=] (Memory cleared) 28[,]2410[DT] 30[,]3033[DT] 33[,]3895[DT] 35[,]4491[DT] 38[,]5717[DT]	0. 28. 30. 33. 35. 38.
Through power regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, the regression formula is used to obtain the respective estimated values of y and x, when x_i = 40 and y_i = 1000.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=] (Regression coefficient B) [SHIFT][⌜r⌝][=] (Correlation coefficient r) 40[SHIFT][$\hat{y}$](y when x_i=40) 1000[SHIFT][$\hat{x}$](x when y_i=1000)	0.238801072 2.771866153 0.998906254 6587.674584 20.2622568

Inverse regression

Power regression calculations are carried out using the following formula:
y = A + (B/x)

Data input

Press **[MODE] [→] [→] [→] [=]** to specify the **"REG"** mode.
Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data>,<y data> [DT]

- To make multiple entries of the same data, follow procedures described for linear regression.

Deleting input data

To delete input data, follow the procedures described for linear regression

Performing calculations

If 1/x is stored instead of x itself, the inverse regression formula y = A + (B/x) becomes the linear regression formula y = a + bx. Therefore, the formulas for constant term A, regression coefficient B and correlation coefficient r are identical the power and linear regression.

A number of inverse regression calculation results differ from those produced by linear regression. Note the following:

Linear regression	Inverse regression
$\sum x$	$\sum(1/x)$
$\sum x^2$	$\sum(1/x)^2$
$\sum xy$	$\sum(y/x)$

Example	Operation	Display
x_i y_i	[MODE][→][→][→][=] ("REG" then select INV regression)	0.
2 2 3 3 4 4 5 5 6 6	[SHIFT][Scl][=] (Memory cleared) 2[,]2[DT] 3[,]3[DT] 4[,]4[DT] 5[,]5[DT] 6[,]6[DT]	0. 2. 3. 4. 5. 6.
Through inverse regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, the regression formula is used to obtain the respective estimated values of y and x, when x_i = 10 and y_i = 9.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=] (Regression coefficient B) [SHIFT][⌜r⌝][=] (Correlation coefficient r) 10[SHIFT][$\hat{y}$](y when x_i=10) 9[SHIFT][$\hat{x}$](x when y_i=9)	7.272727273 –11.28526646 –0.950169099 6.144200627 –6.533575317

Quadratic Regression

Quadratic regression calculations are carried out using the following formula:
y = A + Bx + Cx^2

Data input

Press **[MODE] [→] [→] [→] [=]** to specify **"REG"** mode.
Press **[SHIFT] [Scl] [=]** to clear the statistical memories.
Input data in the following format: <x data>,<y data> [DT]

- To make multiple entries of the same data, follow procedures described for linear regression.

Deleting input data

To delete input data, follow the procedures described for linear regression.

Performing calculations

The following procedures are used to perform the quadratic regression calculations.

The regression formula is y = A + Bx + Cx^2 where A, B, C are regression coefficients.

$C=[(n\sum x^2-(\sum x)^2)(n\sum x^2y-\sum x^2\sum y)-(n\sum x^3-\sum x^2\sum x)(n\sum xy-\sum x\sum y)]\div[(n\sum x^2-(\sum x)^2)(n\sum x^4-(\sum x^2)^2)-(n\sum x^3-\sum x^2\sum x)^2]$

$B=[n\sum xy-\sum x\sum y-C(n\sum x^3-\sum x^2\sum x)]\div(n\sum x^2-(\sum x)^2)$
$A=(\sum y-B\sum x-C\sum x^2)/n$

To read the value of $\sum x^3$, $\sum x^4$ or $\sum x^2y$, you can recall memory X, Y or M respectively.

Example	Operation	Display
x_i y_i	[MODE][→][→][→][=] ("REG" then select QUAD regression)	0.
29 1.6 50 23.5 74 38 103 46.4 118 48	[SHIFT][Scl][=] (Memory cleared) 29[,]1.6[DT] 50[,]23.5[DT] 74[,]38[DT] 103[,]46.4[DT] 118[,]48[DT]	0. 29. 50. 74. 103. 118.
Through quadratic regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, the regression formula is used to obtain the respective estimated values of y and x, when x_i = 16 and y_i = 20.	[SHIFT][⌜A⌝][=](Constant term A) [SHIFT][⌜B⌝][=] (Regression coefficient B) [SHIFT][⌜C⌝][=] (Regression coefficient C) 16[SHIFT][$\hat{y}$](y when x_i=16) 20[SHIFT][$\hat{x}$](x_1 when y_i=20) [SHIFT][$\hat{x}$](x_2 when y_i=20)	–35.59856934 1.495939413 -6.71629667^{-03} –13.38291067 47.14556728 175.5872105

Formula Memory Function

Formula memory lets you input a single formula in the memory, and then input values for the formula variables to calculate results. Memory can hold a single formula, up to 79 steps long.

Store a Formula in Memory

Input the formula as the normal input. Now, we try to input the following formula into the memory.

Y = X^2 + 3X – 12
[ALPHA][Y][ALPHA][=][ALPHA][X][x^2] [+]3[ALPHA][X][–]12 `Y=X²+3X-12_ 0.`
Press **[SHIFT] [IN]**
to store the formula . `_ 0.`

If you want to edit the stored formula, you can press **[OUT]** to recall the formula. To execute the formula, press **[CALC]** instead.
[CALC] `X? 0.`

Key in **[7] [=]** `Y=X²+3X-12 58.`

You can press **[=]** again to recycle the formula execution or you can press **[AC]** to stop the formula execution.
[AC] `_ 0.`

Complex Number Calculation

Press **[MODE] [→] [=]** to enter the **"CMPLX"** mode for calculations that include complex numbers. In **"CMPLX"** mode, only variables A, B, C and M can be used. The others are used for storing the imaginary parts of values.

Example	Operation	Display
	[MODE][→] [=] (CMPLX Mode)	0.
(2+3i)+(4+5i)	[(]2[+]3[i][)][+][(]4[+]5 [i][)][=] [SHIFT][Re↔Im]	6. 8.i
Find the absolute value of (3+4i)	[SHIFT][Abs][(]3[+]4[i][)][=]	5.
Determine the argument (3+4i)	[SHIFT][arg][(]3[+]4[i][)][=]	53.13010235

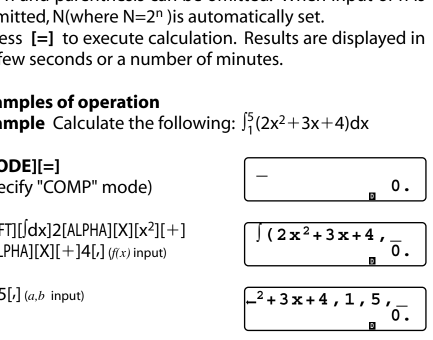
Integration Calculation

Integration calculation can be carried out by entering the integral calculus formula in the following format :-

[∫dx] f(x) [,] a [,] b [,] n

where a is the starting point
b is the ending point
n is the value such that the number divisions N=2^n

Integration calculation is performed using Simpson's rule to determine function f(x). Because of this, partition of the integrated area is necessary, however if the number of divisions is not specified, the unit automatically sets N according to the formula. To specify the number of divisions for N=2^n, n can be an integer from 1 to 9.



Input of function $f(x)$ and integration calculation

- Press **[∫dx]** to specify integration calculation.
- Input the formula for the function $f(x)$, then input integral partitions [a, b].
  Note:- $f(x)$ can use the variable X only. Anything other than X, i.e., A ~ F,
  Y are treated as a constant, and its memory contents are applied.
- Next input n and finish by inputting a parenthesis. Input of n and parenthesis can be omitted. When input of n is omitted, N(where N=2^n)is automatically set.
- Press **[=]** to execute calculation. Results are displayed in a few seconds or a number of minutes.

Examples of operation

Example Calculate the following: $\int_1^5(2x^2+3x+4)dx$

[MODE][=]
(specify "COMP" mode) `_ 0.`

[SHIFT][∫dx]2[ALPHA][X][x^2][+] 3[ALPHA][X][+]4[,] ($f(x)$ input) `∫(2x²+3x+4,_ 0.`

1[,]5[,] (a,b input) `←²+3x+4,1,5,_ 0.`

6[)] (n input) `←+3x+4,1,5,6)_ 0.`

[=] `∫(2x²+3x+4,1 → 134.6666667`

Equation Solving Function

Three choices are provided for users to select. They are :-

- Linear equation
- Quadratic equation
- Cubic equation

Once the user presses **[SOLVE]** to enter equation solving mode, the user is asked to select among linear (**LIN**) or non-linear (**NON-LIN**) equations or exit (**QUIT**) from **"SOLVE"** mode.

`LIN NON-LIN →`

[→] `←QUIT`

If the user selects Linear, he / she can select further between two unknowns and three unknowns as shown below. `2-xy 3-xyz`

After the user makes the selection, the calculator will ask the user for the corresponding coefficients.

2-unknown linear equations :-

$a_1x+b_1y=c_1$
$a_2x+b_2y=c_2$

3-unknow linear equations :-

$a_1x+b_1y+c_1z=d_1$
$a_2x+b_2y+c_2z=d_2$
$a_3x+b_3y+c_3z=d_3$

After user has been asked and enter all coefficients, the first answer will be displayed as below.

`X= 1.5`

The icon "▯ " will be ON if there are still further answers. You can press **[=]** or **[▯]** to read the next answer.

`Y= 1.5`

If Y is the last answer, the icon "▯ " will be lighted instead. You can scroll back to the answer X by pressing **[▯]**. Or you can press **[=]** to restart the input of all coefficients.

To exit from **"SOLVE"** function, you can press **[SOLVE]** and select **"QUIT"** to leave equation solving.

As you select **"NON-LIN"** in the SOLVE main menu, you will be asked to select between quadratic equation or cubic equation as below. `Degree? 2 3`

Select "2" for quadratic equation and "3" for cubic equation.

Quadratic equation :-

$ax^2+bx+c=0$

Cubic equation :-

$ax^3+bx^2+cx+d=0$

The solving function for quadratic equation and cubic equation is similar to linear equations. After the entry for all the coefficients, the variable "x" will be calculated and the answer will be displayed. For quadratic equations, there will be two answers, i.e., x_1 and x_2 available as the maximum. For cubic equations, there will be three answers, i.e., x_1 , x_2 and x_3 available as the maximum.

Example :- Solving the quadratic equation $x^2+2x+3=0$

After confirming degree-2 by pressing **[=]**, you will be asked to input the coefficient a. `"Solve" a? 0.`

Enter a as "1" by pressing **[1][=]**. You will proceed to the input of b. `"Solve" b? 0.`

Enter "2" for b by keying in **[2][=]**. Then go to the entry for c. `"Solve" c? 0.`

Enter "3" for c. `3_ 0.`

Press **[=]** to confirm the entry and the equation solving starts. `Solving...`

When the roots are available, the display will show x_1 first then x_2 as below. `X1= -1`

Since x_1 is an imaginary number, the icon **"CMPLX"** will flash and you can read the imaginary part by pressing

[SHIFT][RE↔IM]. `X1= 1.414213562`

Press **[=]** or **[▯]** to read next root. `X2= -1.`

In this case, x_2 is also an imaginary number.

Press **[SHIFT][RE↔IM]** to read the imaginary part. `X2= -1.414213562`

If you want to enter another values for a, b, c, you can press **[=]** to restart the coefficient input procedures. Or you can open the main menu to select another type of equations or stop solving function by choosing **"QUIT"**.

Previous Calculation Recall

Latest 20 calculations will be saved in the last calculation memory and be able to recall using **[▯]** or **[▯]** key buttons. The maximum total size is 750 characters.

(**Note :-** Answer for these latest 20 calculations will not be stored.)

When the up-arrow is present on the right side of the LCD, it indicates that there are previous calculations available in the last calculation memory. You can press **[▯]** to retrieve and show the previous calculation on the screen. The answer will be calculated instantly and displayed as well. At the same time, the down-arrow will be ON to indicate that more recent calculations are stored in the last calculation memory.

Let the current display be `1+2 3.`

Press **[▯]** to read the previous calculation. `100÷2 0.`

Then you can press **[▯]** to go back to the more recent calculation. `1+2_ 0.`

Replacing the Battery

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

To replace the battery:-

- Remove the two screws that hold the back cover in place and then remove the back cover,
- Remove the old battery,
- Wipe off the side of the new battery with a dry, soft cloth. Load it into the unit with the positive(+) side facing up.

- Replace the battery cover and secure it in place with the two screws.
- Press **[ON]** to turn power on.

Auto Power Off

Calculator power automatically turns off if you do not perform any operation for about six minutes. When this happens, press **[ON]** to turn power back on.

Specifications

Power supply: single CR2025 battery
Operating temperature: 0° ~ 40°C (32°F ~ 104°F)