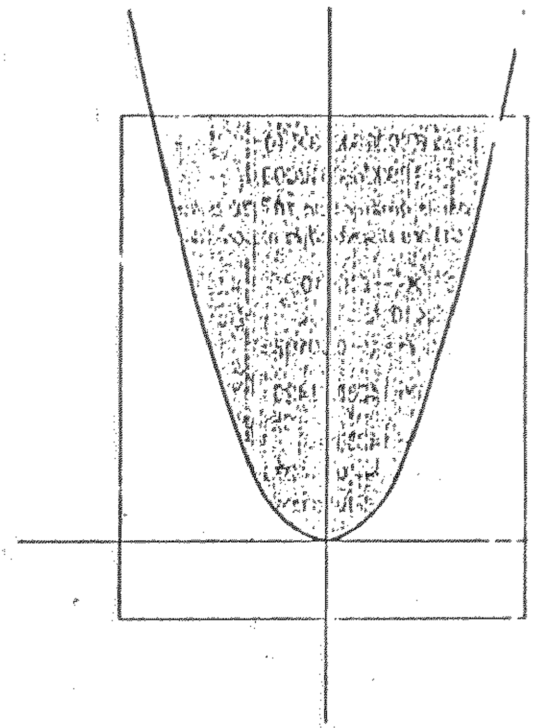
2
MANUAL COMPUTATIONS



2-1 BASIC COMPUTATIONS

Arithmetic operations

- 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.

Example	Operation	Display
23+4.5−53=−25.5	23 [+] 4.5 [−] 53 [EXE]	−25.5
56×(−12)÷(−2.5)=268.8	56 [×] [(−)] 12 [÷] [(−)] 2.5 [EXE]	268.8
12369×7532×74103= 6.903680613×10^{12} (6903680613000)	12369 [×] 7532 [×] 74103 [EXE]	6.903680613ᴇ+12

* *Results greater than 10^{10} (10 billion) or less than 10^{-2} (0.01) are displayed in exponential form.*

Example	Operation	Display
(4.5×10^{75})×(−2.3×10^{-79}) =−1.035×10^{-3} (−0.001035)	4.5 [EXP] 75 [×] [(−)] 2.3 [EXP] [(−)] 79 [EXE]	−1.035ᴇ−03
(1×10^{5})÷7=14285.71429	1 [EXP] 5 [÷] 7 [EXE]	14285.71429
(1×10^{5})÷7−14285= 0.7142857	1 [EXP] 5 [÷] 7 [−] 14285 [EXE]	0.71428571

* *Internal computations are computed in 13 digits for a mantissa, and the result is displayed rounded off to 10 digits.*

- For mixed basic arithmetic operations, multiplication and division are given priority over addition and subtraction.

Example	Operation	Display
3+5×6=33	3 [+] 5 [×] 6 [EXE]	33.
7×8−4×5=36	7 [×] 8 [−] 4 [×] 5 [EXE]	36.
1+2−3×4÷5+6=6.6	1 [+] 2 [−] 3 [×] 4 [÷] 5 [+] 6 [EXE]	6.6

Parenthesis computations

Example	Operation	Display
100−(2+3)×4=80	100 [−] [(] 2 [+] 3 [)] [×] 4 [EXE]	80.
2+3×(4+5)=29	2 [+] 3 [×] [(] 4 [+] 5 [EXE]	29.

* *Closed parentheses occurring immediately before operation of the [EXE] key may be omitted, no matter how many are required.*

Example	Operation	Display
(7−2)×(8+5)=65	[(] 7 [−] 2 [)] [(] 8 [+] 5 [EXE]	65.

* *A multiplication sign (×) occurring immediately before an open parenthesis can be omitted.*

Example	Operation	Display
10−{2+7×(3+6)}=−55	10 [−] [(] 2 [+] 7 [(] 3 [+] 6 [EXE]	−55.

* *Henceforth, abbreviated style will not be used in this manual.*

Example	Operation	Display
$\frac{2\times3+4}{5}$=(2×3+4)÷5=2	[(] 2 [×] 3 [+] 4 [)] [÷] 5 [EXE]	2.
$\frac{5\times6+6\times8}{15\times4+12\times3}$=0.8125	[(] 5 [×] 6 [+] 6 [×] 8 [)] [÷] [(] 15 [×] 4 [+] 12 [×] 3 [)] [EXE]	0.8125
(1.2×10^{19})−{(2.5×10^{20}) ×$\frac{3}{100}$}=4.5×10^{18}	1.2 [EXP] 19 [−] [(] 2.5 [EXP] 20 [×] 3 [÷] 100 [)] [EXE]	4.5ᴇ+18
$\frac{6}{4\times5}$=0.3	6 [÷] [(] 4 [×] 5 [)] [EXE]	0.3

* *The above is the same as 6 [÷] 4 [÷] 5 [EXE].*

Memory computations

- The contents of memories are not erased when power is switched OFF. They are cleared by pressing [SHIFT] followed by [Mcl] ([DEL] key) and then [EXE].

Example	Operation	Display
9.874×7=69.118	9.874 [→] [ALPHA] [A] [EXE]	9.874
9.874×12=118.488	[ALPHA] [A] [×] 7 [EXE]	69.118
9.874×26=256.724	[ALPHA] [A] [×] 12 [EXE]	118.488
9.874×29=286.346	[ALPHA] [A] [×] 26 [EXE]	256.724
	[ALPHA] [A] [×] 29 [EXE]	286.346
* The [→] key is used to input numeric values in memory. (Clearing a memory before input is not required, because the previous value in the memory will be automatically replaced with the new value.)		
23+9=32	23 [+] 9 [→] [ALPHA] [B] [EXE]	32.
53−6=47	53 [−] 6 [EXE]	47.
−)45×2=90	[ALPHA] [B] [+] [Ans] [→] [ALPHA] [B]	
99÷3=33	[EXE]	79.
Total 22	45 [×] 2 [EXE]	90.
	[ALPHA] [B] [−] [Ans] [→] [ALPHA] [B]	
	[EXE]	−11.
	99 [÷] 3 [EXE]	33.
	[ALPHA] [B] [+] [Ans] [→] [ALPHA] [B]	
	[EXE]	22.
12×(2.3+3.4)−5=63.4	2.3 [+] 3.4 [→] [ALPHA] [C] [EXE]	5.7
	12 [×] [ALPHA] [C] [−] 5 [EXE]	63.4
30×(2.3+3.4+4.5)−15 ×4.5=238.5	4.5 [→] [ALPHA] [D] [EXE]	4.5
	30 [×] [(] [ALPHA] [C] [+] [ALPHA] [D] [)]	
	[−] 15 [ALPHA] [D] [EXE]	238.5

* *Multiplication signs (×) immediately before memory names can be omitted.*

Specifying the number of decimal places, the number of significant digits and the exponent display

- To specify the number of decimal places, press [MODE] followed by [7], a value indicating the number of places (0−9) and then [EXE].
- To specify the number of significant digits, press [MODE] followed by [8], a value indicating the number of significant digits (0−9 to set from 1 to 10 digits) and then [EXE].
- Pressing the [ENG] key or [SHIFT] followed by [←] ([ENG] key) will cause the exponent display for the number being displayed to change in multiples of 3.
- The specified number of decimal places or number of significant digits will not be cancelled until another value or [MODE] [9] is specified using the sequence: [MODE], [9], [EXE]. (Specified values are not cancelled even if power is switched OFF or an other mode (besides [MODE] [9]) is specified.)
- Even if the number of decimal places and number of significant digits are specified, internal computations are performed in 13 digits for a mantissa, and the displayed value is stored in 10 digits. To convert these values to the specified number of decimal places and significant digits, press [SHIFT] followed by [Rnd] ([0] key) and then [EXE].

Example	Operation	Display
100÷6=16.66666666...	100 [÷] 6 [EXE]	16.66666667
	[MODE] [7] [4] [EXE] (Four decimal places specified.)	16.6667
	[MODE] [9] [EXE] (Specification cancelled.)	16.66666667
	[MODE] [8] [5] [EXE] (Five significant digits specified.)	1.6667E+01
	[MODE] [9] [EXE] (Specification cancelled.)	16.66666667

* *Values are displayed rounded off to the place specified.*

Example	Operation	Display
200÷7×14=400	[MODE] [7] [3] [EXE] (Three decimal places specified.)	16.667
	200 [÷] 7 [EXE]	28.571
(Continues computation with 10-digit display.)	[×]	28.57142857×_
	14 [EXE]	400.000
	If the same computation is performed with the specified number of digits:	
	200 [÷] 7 [EXE]	28.571
	(Value stored internally cut off at specified decimal place.) [SHIFT] [Rnd] [EXE]	28.571
	[×]	28.571×_
	14 [EXE]	399.994
	[MODE] [9] [EXE] (Specification cancelled.)	399.994
123m×456=56088m =56.088km	123 [×] 456 [EXE]	56088.
	[ENG]	56.088E+03
78g×0.96=74.88g =0.07488kg	78 [×] 0.96 [EXE]	74.88
	[SHIFT] [ENG]	0.07488E+03

2-2 SPECIAL FUNCTIONS

■ Continuous computation function

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

Ex. 3×4=12 Continuing ÷3.14=

Operation	Display
3 [×] 4 [EXE]	3×4 12.
(Continuing) [÷] 3.14 [EXE]	12.÷3.14 3.821656051

Ex. To compute 1÷3×3

Operation	Display
1 [÷] 3 [×] 3 [EXE]	1÷3×3 1.
1 [÷] 3 [EXE]	1÷3 0.3333333333
(Continuing) [×] 3 [EXE]	0.3333333333×3 0.9999999999

This function can be used with memory and Type A functions (x^2, x^{-1}, $x!$: see page 44), and +, −, x^y, $\sqrt[x]{\ }$, °′″.

Ex. To store the result of 12×45 in memory C:

Operation	Display
12 [×] 45 [EXE]	12×45 540.
(Continuing) [→] [ALPHA] [C] [EXE]	540.→C 540.

Ex. To square the result of 78÷6 (see page 44):

Operation	Display
78 [÷] 6 [EXE]	78÷6 13.
(Continuing) [x^2] [EXE]	13.² 169.

■ 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, with the cursor located under the first character.
  Pressing [⇦] will display the formula, with the cursor located at the space following the last character.
  Then using [⇨], [⇦], [⇧] and [⇩] to move the cursor, the formula can be checked and numeric values or commands can be changed for subsequent execution.

Ex.

123 [×] 456 [EXE]	123×456 56088.
[⇨]	123×456
	* *The formula appears after clearing the display.*
[EXE]	123×456 56088.
[⇦]	123×456_

Ex. 4.12×3.58+6.4=21.1496
4.12×3.58−7.1=7.6496

4.12 [×] 3.58 [+] 6.4 [EXE]	4.12×3.58+6.4 21.1496
[⇦]	4.12×3.58+6.4_
[⇦] [⇦] [⇦] [⇦]	4.12×3.58+6.4
[−] 7.1 [EXE]	4.12×3.58−7.1 7.6496

- If an error is generated during computation execution, an error check function eliminates the need to clear the error using [AC] and then re-starting input from the beginning. Pressing either [⇨] or [⇦] will automatically move the cursor to the point in the formula that generated the error and display it.

Ex. When 14÷0×2.3 is mistakenly entered for 14÷10×2.3:

14 [÷] 0 [×] 2.3 [EXE]	14÷0×2.3 Ma ERROR Step 4
[⇨] (or [⇦])	14÷0×2.3 Error generated here.
[⇦] [SHIFT] [INS] 1 [EXE]	14÷10×2.3 3.22

* *As with the number of input characters (see page 20), the replay function can accept input up to 127 steps.*
* *The replay function is cleared when the [AC] key is pressed, when power is switched OFF or when the mode is changed.*

■ Multistatement function

- The multistatement function (using colons to separate formulas or statements) available in program computations can also be used for manual computations.
- The multistatement function allows formulas to be separated by colons to make consecutive, multiple statement computations possible.
- When [EXE] 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 computational result up to that point during execution.

Ex. 6.9×123=848.7
123÷3.2=38.4375

Operation	Display
123 [→] [ALPHA] [A] [:] 6.9 [×] [ALPHA] [A] [SHIFT] [◢] [ALPHA] [A] [÷] 3.2 [EXE]	123→A:6.9×A◢ A÷3.2 848.7 — Disp —
[EXE]	123→A:6.9×A◢ A÷3.2 848.7 38.4375

The display halted by the ◢ command is represented with —Disp—.

Even if "◢" is not input at the end of a formula, the final result will be displayed.

Consecutive computations using multistatements cannot be performed.

123×456 : +5
└ Invalid

2-3 FUNCTIONAL COMPUTATIONS

■ Angular measurement units

- The unit of angular measurement (degrees, radians, grads) is set by pressing [MODE] followed by a value from 4 through 6 and then [EXE].
- The numeric value from 4 through 6 specifies degrees, radians and grads respectively.
- 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.
- The unit of angular measurement can be checked by pressing the [M Disp] key.

Example	Operation	Display
Conversion of 4.25 rad to degrees	[MODE] [4] [EXE] 4.25 [SHIFT] [MODE] [5] [EXE]	243.5070629
Conversion of 1.23 grad to radians	[MODE] [5] [EXE] 1.23 [SHIFT] [MODE] [6] [EXE]	0.01932079482
Conversion of 7.89 degrees to grads	[MODE] [6] [EXE] 7.89 [SHIFT] [MODE] [4] [EXE]	8.766666667
Result displayed in degrees 47.3°+82.5 rad= 4774.20181	[MODE] [4] [EXE] 47.3 [+] 82.5 [SHIFT] [MODE] [5] [EXE]	4774.20181
12.4°+8.3 rad−1.8 gra= 486.33497	12.4 [+] 8.3 [SHIFT] [MODE] [5] [−] 1.8 [SHIFT] [MODE] [6] [EXE]	486.33497
Result displayed in radians 24°6'31"+85.34 rad= 85.76077464	[MODE] [5] [EXE] 24 [°'"] 6 [°'"] 31 [°'"] [SHIFT] [MODE] [4] [+] 85.34 [EXE]	85.76077464
Result displayed in grads 36.9°+41.2 rad= 2663.873462	[MODE] [6] [EXE] 36.9 [SHIFT] [MODE] [4] [+] 41.2 [SHIFT] [MODE] [5] [EXE]	2663.873462

■ Trigonometric functions and inverse trigonometric functions

● Be sure to set the unit of angular measurement before performing trigonometric function and inverse trigonometric function computations.

Example	Operation	Display
sin 63°52'41" = 0.897859012	[MODE] [4] [EXE] [sin] 63 [°'"] 52 [°'"] 41 [°'"] [EXE]	0.897859012
$\cos\left(\frac{\pi}{3}\text{ rad}\right)=0.5$	[MODE] [5] [EXE] [cos] [(] [SHIFT] [π] [÷] 3 [)] [EXE]	0.5
tan (−35 gra) = −0.6128007881	[MODE] [6] [EXE] [tan] [(−)] 35 [EXE]	−0.6128007881
2·sin 45° × cos 65° = 0.5976724775	[MODE] [4] [EXE] 2 [×] [sin] 45 [×] [cos] 65 [EXE] └─Can be omitted.	0.5976724775
$\sin^{-1}0.5=30°$ (Determine the value of x when $\sin x=0.5$.)	[SHIFT] [sin⁻¹] 0.5 [EXE] Can be entered as .5	30.
$\cos^{-1}\frac{\sqrt{2}}{2}=$ 0.7853981634 rad $=\frac{\pi}{4}$ rad	[MODE] [5] [EXE] [SHIFT] [cos⁻¹] [(] [√] 2 [÷] 2 [)] [EXE] [÷] [SHIFT] [π] [EXE]	0.7853981634 0.25
$\tan^{-1}0.741=$ 36.53844577° = 36°32'18.4"	[MODE] [4] [EXE] [SHIFT] [tan⁻¹] 0.741 [EXE] [SHIFT] [°'"]	36.53844577 36°32'18.4"
* *If the total number of digits for degrees/minutes/seconds exceeds eleven digits, the high-order values (degrees and minutes) 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.*		
$2.5\times(\sin^{-1}0.8-\cos^{-1}0.9)$ = 68°13'13.53"	2.5 [×] [(] [SHIFT] [sin⁻¹] 0.8 [−] [SHIFT] [cos⁻¹] 0.9 [)] [EXE] [SHIFT] [°'"]	68°13'13.53"
sin18° × cos0.25rad = 0.2994104044	[sin] 18 [×] [cos] 0.25 [SHIFT] [MODE] [5] [EXE]	0.2994104044
* *The above is computed in radians, and is the same as* [sin] 18 [SHIFT] [MODE] [4] [×] [cos] 0.25 [EXE].		

■ Logarithmic and exponential functions

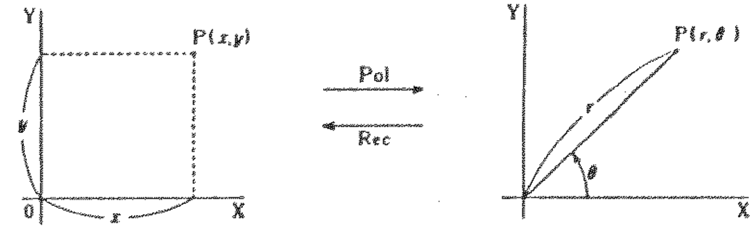
Example	Operation	Display
$\log 1.23(\log_{10}1.23)=$ 0.08990511144	[log] 1.23 [EXE]	0.0899051114
$\ln 90(\log_e 90)=$ 4.49980967	[ln] 90 [EXE]	4.4998096
log 456 ÷ ln 456 = 0.4342944819 (log/ln ratio = constant M)	[log] 456 [÷] [ln] 456 [EXE]	0.434294481
$10^{1.23}=16.98243652$ (To obtain the antilogarithm of common logarithm 1.23)	[SHIFT] [10ˣ] 1.23 [EXE]	16.9824365
$e^{4.5}=90.0171313$ (To obtain the antilogarithm of natural logarithm 4.5)	[SHIFT] [eˣ] 4.5 [EXE]	90.017131
$10^4\cdot e^{-4}+1.2\cdot 10^{2.3}=$ 422.5878667	[SHIFT] [10ˣ] 4 [×] [SHIFT] [eˣ] [(−)] 4 [+] 1.2 [×] [SHIFT] [10ˣ] 2.3 [EXE]	422.587866
$5.6^{2.3}=52.58143837$	5.6 [xʸ] 2.3 [EXE]	52.5814383
$\sqrt[7]{123}\ (=123^{\frac{1}{7}})=$ 1.988647795	7 [ˣ√] 123 [EXE]	1.9886477
$(78-23)^{-12}=$ $1.305111829\times10^{-21}$	[(] 78 [−] 23 [)] [xʸ] [(−)] 12 [EXE]	1.305111829ᴇ−2
$2+3\times\sqrt[3]{64}-4=10$	2 [+] 3 [×] 3 [ˣ√] 64 [−] 4 [EXE]	10
* *x^y and $\sqrt[x]{\ }$ given computation priority over × and ÷*		
$2\times3.4^{(5+6.7)}=3306232.001$	2 [×] 3.4 [xʸ] [(] 5 [+] 6.7 [)] [EXE]	3306232.00

Hyperbolic functions and inverse hyperbolic functions

Example	Operation	Display
sinh 3.6=18.28545536	[hyp] [sin] 3.6 [EXE]	18.28545536
cosh 1.23=1.856761057	[hyp] [cos] 1.23 [EXE]	1.856761057
tanh 2.5=0.9866142982	[hyp] [tan] 2.5 [EXE]	0.9866142982
cosh 1.5−sinh 1.5= 0.2231301601 $=e^{-1.5}$	[hyp] [cos] 1.5 [−] [hyp] [sin] 1.5 [EXE] (Continuing) [ln] [Ans] [EXE]	0.2231301601 −1.5
(Proof of cosh x ±sinh $x=e^{\pm x}$)		
$\sinh^{-1}30$=4.094622224	[SHIFT] [hyp] [sin⁻¹] 30 [EXE]	4.094622224
$\cosh^{-1}\left(\frac{20}{15}\right)$= 0.7953654612	[SHIFT] [hyp] [cos⁻¹] [(] 20 [÷] 15 [)] [EXE]	0.7953654612
Determine the value of x when tanh 4 x=0.88 $x=\frac{\tanh^{-1}0.88}{4}$ = 0.3439419141	[SHIFT] [hyp] [tan⁻¹] 0.88 [÷] 4 [EXE]	0.3439419141
$\sinh^{-1}2\times\cosh^{-1}1.5$= 1.389388923	[SHIFT] [hyp] [sin⁻¹] 2 [×] [SHIFT] [hyp] [cos⁻¹] 1.5 [EXE]	1.389388923
$\sinh^{-1}\left(\frac{2}{3}\right)+\tanh^{-1}\left(\frac{4}{5}\right)$= 1.723757406	[SHIFT] [hyp] [sin⁻¹] [(] 2 [÷] 3 [)] [+] [SHIFT] [hyp] [tan⁻¹] [(] 4 [÷] 5 [)] [EXE]	1.723757406

Coordinate transformation

● Rectangular coordinates ● Polar coordinates



● Computation results are stored in memories I and J. (Contents of memory I displayed.)

Pol→I=r, J=θ

Rec→I=x, J=y

● With polar coordinates, θ can be computed within a range of $-180° < \theta \leq 180°$. (The computation range is the same with radians or grads.)

Example	Operation	Display
If x=14 and y=20.7, what are r and θ?	[MODE] [4] [EXE] [SHIFT] [Pol(] 14 [SHIFT] [,] 20.7 [)] [EXE] (Continuing) [ALPHA] [J] [EXE] [SHIFT] [°' '']	24.98979792 (r) 55°55'42.2° (θ)
If x=7.5 and y=−10, what are r and θ rad?	[MODE] [5] [EXE] [SHIFT] [Pol(] 7.5 [SHIFT] [,] [(−)] 10 [)] [EXE] (Continuing) [ALPHA] [J] [EXE]	12.5 (r) −0.927295218 (θ)
If r=25 and θ=56, what are x and y?	[MODE] [4] [EXE] [SHIFT] [Rec(] 25 [SHIFT] [,] 56 [)] [EXE] (Continuing) [ALPHA] [J] [EXE]	13.97982259 (x) 20.72593931 (y)
If r=4.5 and $\theta=\frac{2}{3}\pi$ rad, what are x and y?	[MODE] [5] [EXE] [SHIFT] [Rec(] 4.5 [SHIFT] [,] [(] 2 [÷] 3 [×] [SHIFT] [π] [)] [)] [EXE] (Continuing) [ALPHA] [J] [EXE]	−2.25 (x) 3.897114317 (y)

■ Other functions ($\sqrt{\ }$, x^2, x^{-1}, $x!$, $\sqrt[3]{\ }$, Ran#, Abs, Int, Frac)

Example	Operation	Display
$\sqrt{2}+\sqrt{5}=3.65028154$	[√] 2 [+] [√] 5 [EXE]	3.65028154
$2^2+3^2+4^2+5^2=54$	2 [x²] [+] 3 [x²] [+] 4 [x²] [+] 5 [x²] [EXE]	54.
$\frac{1}{\frac{1}{3}-\frac{1}{4}}=12$	[(] 3 [x⁻¹] − 4 [x⁻¹] [)] [x⁻¹] [EXE]	12.
$8!\,(=1\times2\times3\times\cdots\times8)=40320$	8 [SHIFT] [x!] [EXE]	40320.
$\sqrt[3]{36\times42\times49}=42$	[SHIFT] [∛] [(] 36 [×] 42 [×] 49 [)] [EXE]	42.
Random number generation (pseudorandom number from 0.000 to 0.999)	[SHIFT] [Ran#] [EXE]	(Ex) 0.792
$\sqrt{13^2-5^2}+\sqrt{3^2+4^2}=17$	[√] [(] 13 [x²] [−] 5 [x²] [)] [+] [√] [(] 3 [x²] [+] 4 [x²] [)] [EXE]	17.
$\sqrt{1-\sin^2 40^\circ}=0.7660444431=\cos 40^\circ$	[MODE] [4] [EXE] [√] [(] 1 [−] [(] [sin] 40 [)] [x²] [)] [EXE]	0.7660444431
(Proof of $\cos\theta=\sqrt{1-\sin^2\theta}$)	(Continuing) [SHIFT] [cos⁻¹] [Ans] [EXE]	40.
$\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\frac{1}{8!}=0.5430803571$	2 [SHIFT] [x!] [x⁻¹] [+] 4 [SHIFT] [x!] [x⁻¹] [+] 6 [SHIFT] [x!] [x⁻¹] [+] 8 [SHIFT] [x!] [x⁻¹] [EXE]	0.5430803571
What is the absolute value of the common logarithm of $\frac{3}{4}$? $\left\lvert\log\frac{3}{4}\right\rvert=0.1249387366$	[SHIFT] [Abs] [log] [(] 3 [÷] 4 [)] [EXE]	0.1249387366

Example	Operation	Display
What is the integer part of $\frac{7800}{96}$?	[SHIFT] [Int] [(] 7800 [÷] 96 [)] [EXE]	81.
What is the fraction part of $\frac{7800}{96}$?	[SHIFT] [Frac] [(] 7800 [÷] 96 [)] [EXE]	0.25
What is the aliquot part of 2512549139÷2141?	2512549139 [÷] 2141 [EXE]	1173540.
	[SHIFT] [Frac] [(] 2512549139 [÷] 2141 [)] [EXE]	0.99953

2-4 BINARY, OCTAL, DECIMAL, HEXADECIMAL COMPUTATIONS

- Binary, octal, decimal and hexadecimal computations, conversions and logical operations are performed in the Base-n mode (press [MODE] [−]).
- The number system (2, 8, 10, 16) is set by respectively pressing [Bin], [Oct], [Dec] or [Hex], followed by [EXE].
- Number systems are specified for specific values by pressing [SHIFT], then the number system designator ([b], [o], [d] or [h]), immediately followed by the value.
- General function computations cannot be performed in the Base-n mode.
- Only integers can be handled in the Base-n mode. If a computation produces a result that includes a decimal value, the decimal portion is cut off.
- Octal, decimal and hexadecimal computations can be handled up to 32 bits, while binary can be handled up to 16 bits.

Binary	Up to 16 digits
Octal	Up to 11 digits
Decimal	Up to 10 digits
Hexadecimal	Up to 8 digits

- The total range of numbers handled in this mode is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. 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.

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 and hexadecimal are expressed as two's complements.
- To distinguish the A, B, C, D, E, F used in the hexadecimal system from standard letters they appear as: A, B, C, D, E, F.

- Computation range (in Base-n mode)

Binary	Positive:	$111111111111111 \geqq x \geqq 0$
	Negative:	$1111111111111111 \geqq x \geqq 1000000000000000$
Octal	Positive:	$17777777777 \geqq x \geqq 0$
	Negative:	$37777777777 \geqq x \geqq 20000000000$
Decimal	Positive:	$2147483647 \geqq x \geqq 0$
	Negative:	$-1 \geqq x \geqq -2147483648$
Hexadecimal	Positive:	$7FFFFFFF \geqq x \geqq 0$
	Negative:	$FFFFFFFF \geqq x \geqq 80000000$

■ Binary, octal, decimal, hexadecimal conversions

Example	Operation	Display
	[MODE] [−]	
What are the decimal values for $2A_{16}$ and 274_8?	[Dec] [EXE]	
	[SHIFT] [h] 2A [EXE]	42.
	[SHIFT] [o] 274 [EXE]	188.
What are the hexadecimal values for 123_{10} and 1010_2?	[Hex] [EXE]	
	[SHIFT] [d] 123 [EXE]	0000007B
	[SHIFT] [b] 1010 [EXE]	0000000A
What are the octal values for 15_{16} and 1100_2?	[Oct] [EXE]	
	[SHIFT] [h] 15 [EXE]	00000000025
	[SHIFT] [b] 1100 [EXE]	00000000014
What are the binary values for 36_{10} and $3B7_{16}$?	[Bin] [EXE]	
	[SHIFT] [d] 36 [EXE]	0000000000100100
	[SHIFT] [h] 3B7 [EXE]	0000001110110111

■ Negative expressions

Example	Operation	Display
	[MODE] [−]	
How is 110010_2 expressed as a negative?	[Bin] [EXE] [Neg] 110010 [EXE]	1111111111001110
How is 72_8 expressed as a negative?	[Oct] [EXE] [Neg] 72 [EXE]	3777777706
How is $3A_{16}$ expressed as a negative?	[Hex] [EXE] [Neg] 3A [EXE]	FFFFFFC6

■ Basic arithmetic operations using binary, octal, decimal and hexadecimal values

Example	Operation	Display
	[MODE] [−]	
$10111_2 + 11010_2 = 110001_2$	[Bin] [EXE] 10111 [+] 11010 [EXE]	0000000000110001
$B47_{16} - DF_{16} = A68_{16}$	[Hex] [EXE] B47 [−] DF [EXE]	00000A68
$123_8 \times ABC_{16} = 37AF4_{16}$ $= 228084_{10}$	[SHIFT] [o] 123 [×] ABC [EXE] [Dec] [EXE]	00037AF4 228084
$1F2D_{16} - 100_{10} = 7881_{10}$ $= 1EC9_{16}$	[SHIFT] [h] 1F2D [−] 100 [EXE] [Hex] [EXE]	7881 00001EC9
$7654_8 \div 12_{10}$ $= 334.3333333_{10}$ $= 516_8$	[Dec] [EXE] [SHIFT] [o] 7654 [÷] 12 [EXE] [Oct] [EXE]	 334 0000000516
* Computation results are displayed with the decimal portion cut off.		
$1234 + 1EF_{16} \div 24_8 = 2352_8$ $= 1258_{10}$	[SHIFT] [d] 1234 [+] [SHIFT] [h] 1EF [÷] 24 [EXE] [Dec] [EXE]	0000002352 1258
* For mixed basic arithmetic operations, multiplication and division are given computation priority over addition and subtraction.		

■ Logical operations

Logical operations are performed through logical product (AND), logical sum (OR), exclusive logical sum (XOR) and negation (NOT).

Example	Operation	Display
	[MODE] [−]	
19_{16} AND $1A_{16} = 18_{16}$	[Hex] [EXE] 19 [and] 1A [EXE]	00000018
1110_2 AND $36_8 = 1110_2$	[Bin] [EXE] 1110 [and] [SHIFT] [o] 36 [EXE]	0000000000001110
23_8 OR $61_8 = 63_8$	[Oct] [EXE] 23 [or] 61 [EXE]	0000000063
120_{16} OR $1101_2 = 12D_{16}$	[Hex] [EXE] 120 [or] [SHIFT] [b] 1101 [EXE]	0000012D
1010_2 AND (A_{16} OR 7_{16}) $= 1010_2$	[Bin] [EXE] 1010 [and] [(] [SHIFT] [h] A [or] [SHIFT] [h] 7 [)] [EXE]	0000000000001010
5_{16} XOR $3_{16} = 6_{16}$	[Hex] [EXE] 5 [SHIFT] [xor] 3 [EXE]	00000006
42_{16} XOR $B_{16} = 33_{10}$	[Dec] [EXE] 42 [SHIFT] [xor] [SHIFT] [h] B [EXE]	33
Negation of 1234_8	[Oct] [EXE] [Not] 1234 [EXE]	3777776543
Negation of $2FFFED_{16}$	[Hex] [EXE] [Not] 2FFFED [EXE]	FFD00012

2-5 STATISTICAL COMPUTATIONS

■ Standard deviation

- Standard deviation computations are performed in the SD1 mode. (Press [MODE] [×].)
- Before beginning computations, the statistical memories are cleared by pressing [SHIFT] followed by [Scl] ([AC/Scl] key) and then [EXE].
- Individual data is input using [DT] ([DT] key).
- Multiple data of the same value can be input either by repeatedly pressing [DT] or by entering the data, pressing [SHIFT], followed by [;], that represents the number of times the data is repeated, and then [DT].
- Standard deviation

$$\sigma_n = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n}} = \sqrt{\frac{\sum x^2-(\sum x)^2/n}{n}}$$ (Using the entire data of a finite population to determine the standard deviation for the population.)

$$\sigma_{n-1} = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2-(\sum x)^2/n}{n-1}}$$ (Using sample data for a population to determine the standard deviation for the population.)

- Mean

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{\sum x}{n}$$

** The values for n, $\sum x$, and $\sum x^2$ are stored in memories W, V, and U respectively, and can be obtained by pressing [ALPHA] followed by the memory name and then [EXE] (i.e. [ALPHA] [W] [EXE]).*

Example	Operation	Display
Data 55, 54, 51, 55, 53, 53, 54, 52	[MODE] [×] [SHIFT] [Scl] [EXE] (Memory clear) 55 [DT] 54 [DT] 51 [DT] 55 [DT] 53 [DT] [DT] 54 [DT] 52 [DT]	52.
** Results can be obtained in any order desired.*		
	(Standard deviation σ_n) [SHIFT] [xσn] [EXE]	1.316956719
	(Standard deviation σ_{n-1}) [SHIFT] [xσn-1] [EXE]	1.407885953
	(Mean $\bar{x}$) [SHIFT] [x̄] [EXE]	53.375
	(Number of data n) [ALPHA] [W] [EXE]	8.
	(Sum total $\sum x$) [ALPHA] [V] [EXE]	427.
	(Sum of squares $\sum x^2$) [ALPHA] [U] [EXE]	22805.
What is deviation of the unbiased variance, the difference between each datum and the mean of the above data?	(Continuing) [SHIFT] [xσn-1] [x²] [EXE]	1.982142857
	55 [−] [SHIFT] [x̄] [EXE]	1.625
	54 [−] [SHIFT] [x̄] [EXE]	0.625
	51 [−] [SHIFT] [x̄] [EXE]	−2.375
	⋮	⋮
What is $\bar{x}$ and $x\sigma_{n-1}$ for the following table?	[SHIFT] [Scl] [EXE]	
	110 [SHIFT] [;] 10 [DT]	110.
	130 [SHIFT] [;] 31 [DT]	130.
	150 [SHIFT] [;] 24 [DT]	150.
	170 [DT] [DT]	170.
	190 [DT] [DT] [DT]	190.
	[ALPHA] [W] [EXE]	70.
	[SHIFT] [x̄] [EXE]	137.7142857
	[SHIFT] [xσn-1] [EXE]	18.42898069

Class No	Value	Frequency
1	110	10
2	130	31
3	150	24
4	170	2
5	190	3

* Erroneous data clearing/correction Ⅰ (correct data operation: 51 [DT])
(1) If 50 [DT] is entered, enter correct data after pressing [CL] ([CL] key).
(2) If 49 [DT] was input a number of entries previously, enter correct data after pressing 49 [CL].

* Erroneous data clearing/correction II (correct data operation: 130 [SHIFT] [,] 31 [DT])
(1) If 120 [SHIFT] [,] is entered, enter correct data after pressing [AC].
(2) If 120 [SHIFT] [,] 31 is entered, enter correct data after pressing [AC].
(3) If 120 [SHIFT] [,] 30 [DT] is entered, enter correct data after pressing [CL].
(4) If 120 [SHIFT] [,] 30 [DT] was entered previously, enter correct data after pressing 120 [SHIFT] [,] 30 [CL].

■ Regression computation

- Regression computations are performed in the LR1 mode. (Press [MODE] [÷].)
- Before beginning computations, the tabulation memories are cleared by pressing [SHIFT] followed by [Scl] and then [EXE].
- Individual data are entered as x data [SHIFT] [,] y data [DT].
- Multiple data of the same value can be entered by repeatedly pressing [DT]. This operation can also be performed by entering x data [SHIFT] [,] y data [SHIFT] [;] followed by a value representing the number of times the data is repeated, and then [DT].
- If only x data is repeated (x data having the same value), enter [SHIFT] [,] y data [DT] or [SHIFT] [,] y data [SHIFT] [;] followed by a value representing the number of times the data is repeated, and then [DT].
- If only y data is repeated (y data having the same value), enter x data [DT] or x data [SHIFT] [;] followed by a value representing the total number of times the data is repeated, and then [DT].
- The regression formula is $y = A + Bx$, and constant term A and regression coefficient B are computed using the following formulas:

Regression coefficient of regression formula

$$B = \frac{n \cdot \Sigma xy - \Sigma x \cdot \Sigma y}{n \cdot \Sigma x^2 - (\Sigma x)^2}$$

Constant term of regression formula

$$A = \frac{\Sigma y - B \cdot \Sigma x}{n}$$

- Estimated values $\hat{x}$ and $\hat{y}$ based on the regression formula can be computed.
- The correlation coefficient r for input data can be computed using the following formula:

$$r = \frac{n \cdot \Sigma xy - \Sigma x \cdot \Sigma y}{\sqrt{\{n \cdot \Sigma x^2 - (\Sigma x)^2\}\{n \cdot \Sigma y^2 - (\Sigma y)^2\}}}$$

* *The values for n, Σx, Σx^2, Σxy, Σy, and Σy^2 are stored in memories W, V, U, R, Q and P respectively, and can be obtained by pressing [ALPHA] followed by the memory name and then [EXE] (i.e. [ALPHA] [W] [EXE]).*

◆ Linear regression

Example	Operation	Display
• Temperature and the length of a steel bar	[MODE] [÷]	
	[SHIFT] [Scl] [EXE] (Memory clear)	
Temp. 10°C / Length 1003mm	10 [SHIFT] [,] 1003 [DT]	10.
15 / 1005	15 [SHIFT] [,] 1005 [DT]	15.
20 / 1010	20 [SHIFT] [,] 1010 [DT]	20.
25 / 1011	25 [SHIFT] [,] 1011 [DT]	25.
30 / 1014	30 [SHIFT] [,] 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 $\left(\frac{\Sigma xy - n \cdot \bar{x} \cdot \bar{y}}{n-1}\right)$ can also be computed.	(Constant term A) [SHIFT] [A] [EXE]	997.4
	(Regression coefficient B) [SHIFT] [B] [EXE]	0.56
	(Correlation coefficient r) [SHIFT] [r] [EXE]	0.9826073689
	(Length at 18°C) 18 [SHIFT] [ŷ] [EXE]	1007.48
	(Temperature at 1000mm) 1000 [SHIFT] [x̂] [EXE]	4.642857142
	(Critical coefficient) [SHIFT] [r] [x²] [EXE]	0.9655172414
	(Covariance) [(] [ALPHA] [R] [−] [ALPHA] [W] [×] [SHIFT] [x̄] [×] [SHIFT] [ȳ] [)] [÷] [(] [ALPHA] [W] [−] 1 [)] [EXE]	35.

* Erroneous data clearing/correction (correct data operation: 10 [SHIFT] [,] 1003 [DT])
(1) If 11 [SHIFT] [,] 1003 is entered, enter correct data after pressing [AC].
(2) If 11 [SHIFT] [,] 1003 [DT] is entered, enter correct data after pressing [CL].
(3) If 11 [SHIFT] [,] 1003 [DT] was entered previously, enter correct data after pressing 11 [SHIFT] [,] 1003 [CL].

◆ Logarithmic regression

- The regression formula is $y=A+B\cdot \ln x$. Enter the x data as the logarithm (ln) of x, and the y data inputs the same as that for linear regression.
- The same operation as with linear regression can be used to obtain the regression coefficient and for making corrections. To obtain the estimated value $\hat{y}$, [ln] x [SHIFT] [$\hat{y}$] [EXE] is used, and to obtain estimated value $\hat{x}$, y [SHIFT] [$\hat{x}$] [EXE] [SHIFT] [e^x] [Ans] [EXE] is used.
Furthermore, Σx, Σx^2, and Σxy are obtained as $\Sigma \ln x$, $\Sigma(\ln x)^2$, and $\Sigma \ln xy$ respectively.

Example	Operation	Display
	[MODE] [÷]	
x_i / y_i	[SHIFT] [Scl] [EXE]	
29 / 1.6	[ln] 29 [SHIFT] [,] 1.6 [DT]	3.36729583
50 / 23.5	[ln] 50 [SHIFT] [,] 23.5 [DT]	3.912023005
74 / 38.0	[ln] 74 [SHIFT] [,] 38.0 [DT]	4.304065093
103 / 46.4	[ln] 103 [SHIFT] [,] 46.4 [DT]	4.634728988
118 / 48.9	[ln] 118 [SHIFT] [,] 48.9 [DT]	4.770684624
Through logarithmic regression of the above data, the regression formula and correlation coefficient are obtained. Furthermore, respective estimated values $\hat{y}$ and $\hat{x}$ can be obtained for $xi=80$ and $yi=73$ using the regression formula.	(Constant term A) [SHIFT] [A] [EXE]	−111.1283976
	(Regression coefficient B) [SHIFT] [B] [EXE]	34.0201475
	(Correlation coefficient r) [SHIFT] [r] [EXE]	0.9940139466
	($\hat{y}$ when $xi=80$) [ln] 80 [SHIFT] [$\hat{y}$] [EXE]	37.94879482
	($\hat{x}$ when $yi=73$) 73 [SHIFT] [$\hat{x}$] [EXE] [SHIFT] [e^x] [Ans] [EXE]	224.1541313

◆ Exponential regression

- The regression formula is $y=A\cdot e^{B\cdot x}(\ln y=\ln A+Bx)$. Enter the y data as the logarithm of y(ln), and the x data the same as that for linear regression.
- Correction is performed the same as in linear regression. Constant term A is obtained by [SHIFT] [e^x] [SHIFT] [A] [EXE], estimated value $\hat{y}$ is obtained by x [SHIFT] [$\hat{y}$] [EXE] [SHIFT] [e^x] [Ans] [EXE], and estimated value $\hat{x}$ is obtained by [ln] y [SHIFT] [$\hat{x}$] [EXE]. Σy, Σy^2 and Σxy are obtained by $\Sigma \ln y$, $\Sigma(\ln y)^2$ and $\Sigma x\cdot \ln y$ respectively.

Example	Operation	Display
	[MODE] [÷]	
x_i / y_i	[SHIFT] [Scl] [EXE]	
6.9 / 21.4	6.9 [SHIFT] [,] [ln] 21.4 [DT]	6.9
12.9 / 15.7	12.9 [SHIFT] [,] [ln] 15.7 [DT]	12.9
19.8 / 12.1	19.8 [SHIFT] [,] [ln] 12.1 [DT]	19.8
26.7 / 8.5	26.7 [SHIFT] [,] [ln] 8.5 [DT]	26.7
35.1 / 5.2	35.1 [SHIFT] [,] [ln] 5.2 [DT]	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 $\hat{y}$ and $\hat{x}$ when $xi=16$ and $yi=20$.	(Constant term A) [SHIFT] [e^x] [SHIFT] [A] [EXE]	30.49758743
	(Regression coefficient B) [SHIFT] [B] [EXE]	−0.04920370831
	(Correlation coefficient r) [SHIFT] [r] [EXE]	−0.997247352
	($\hat{y}$ when $xi=16$) 16 [SHIFT] [$\hat{y}$] [EXE] [SHIFT] [e^x] [Ans] [EXE]	13.87915739
	($\hat{x}$ when $yi=20$) [ln] 20 [SHIFT] [$\hat{x}$] [EXE]	8.574868046