ENGLISH

SHARP®

SCIENTIFIC CALCULATOR

MODEL **EL-501X2**

OPERATION MANUAL

19LSC53E1

• For optimal viewing use Adobe Acrobat Reader.

INTRODUCTION

About the **calculation examples (including some formulas and tables)**, refer to the second half of this manual.
Refer to the number on the right of each title on the manual for use.
After reading this manual, store it in a convenient location for future reference.

Operational Notes

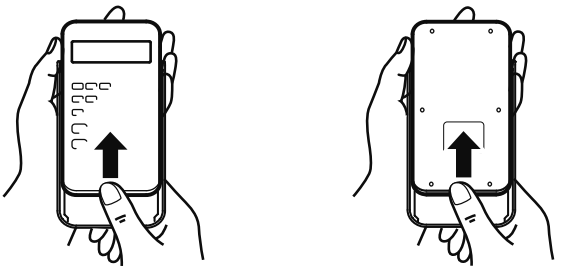
- Do not carry the calculator around in your back pocket, as it may break when you sit down. The display is made of glass and is particularly fragile.
- Keep the calculator away from extreme heat such as on a car dashboard or near a heater, and avoid exposing it to excessively humid or dusty environments.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

SHARP will not be liable nor responsible for any incidental or consequential economic or property damage caused by misuse and/or malfunctions of this product and its peripherals, unless such liability is acknowledged by law.

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

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

Hard Case



DISPLAY

(During actual use not all symbols are displayed at the same time.) If the value of mantissa does not fit within the range ±0.000000001 – ±9999999999, the display changes to scientific notation. The display mode can be changed according to the purpose of the calculation.

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

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

( ) : Appears when a calculation with parentheses is performed by pressing [(].

DEG/RAD/GRAD: Indicates angular units and changes each time [DRG] is pressed. The default setting is DEG.

CPLX : Indicates that [2ndF] [CPLX] has been pressed. Complex number mode is selected.

STAT : Indicates that [2ndF] [STAT] has been pressed. Statistics mode is selected.

b : Indicates that [2ndF] [→BIN] has been pressed. Binary system mode is selected.

o : Indicates that [2ndF] [→OCT] has been pressed. Octal system mode is selected.

H : Indicates that [2ndF] [→HEX] has been pressed. Hexadecimal system mode is selected.

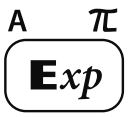
M : Indicates that a numerical value is stored in the independent memory.

E : Appears when an error is detected.

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual

In this manual, key operations are described as follows:



To specify A (HEX): A
To specify π : [2ndF] [π]
To specify E*x*p : [Exp]

Functions that are printed in orange above the key require [2ndF] to be pressed first before the key. Numbers are not shown as keys, but as ordinary numbers.

Power On and Off

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

Clearing Numbers 【1】

- Press [ON/C] to clear the entries except for a numerical value in the independent memory and statistical data.
- Press [CE] to clear the number entered prior to use of function key.
- In case of one digit correction of the entered number, press [→] (right shift key).
- The exchange key ([2ndF] [↕]) is used to exchange the number being displayed with the number stored in the working register.

Priority Levels in Calculation

This calculator performs operations according to the following priority:

① Functions such as sin, x^2, and %
② y^x, $\sqrt[x]{y}$
③ ${}_nC_r$, ${}_nP_r$
④ ×, ÷
⑤ +, −
⑥ =, M+ and other calculation ending instruction

- Calculations which are given the same priority level are executed in sequence.
- If parentheses are used, parenthesized calculations have precedence over any other calculations.
- Parentheses can be continuously used up to 15 times unless pending calculations exceed 4.

INITIAL SET UP

Mode Selection

Normal mode: [2ndF] [OFF] [ON/C]
Used to perform arithmetic operations and function calculations. b, o, H, **CPLX** and **STAT** are not displayed.

Binary, Octal, Decimal, or Hexadecimal system mode:
[2ndF] [►BIN], [2ndF] [►OCT], [2ndF] [►DEC] or [2ndF] [►HEX]

Complex number mode: [2ndF] [CPLX]
Used to perform arithmetic operations with complex numbers. To clear this mode, press [2ndF] [CPLX].

Statistics mode: [2ndF] [STAT]
Used to perform statistical calculations. To clear this mode, press [2ndF] [STAT].
When executing mode selection, statistical data will be cleared even when reselecting the same mode.

- By pressing [2ndF] [OFF] or Automatic power off function, the mode is cleared and returned to the normal mode.

Selecting the Display Notation and Decimal Places

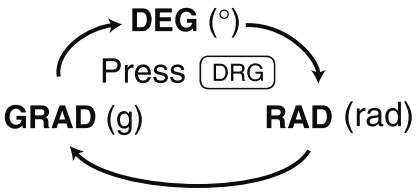
- When calculation result is displayed in the floating point system, pressing [F↔E] displays the result in the scientific notation system.
  Pressing [F↔E] once more displays the result again in the floating point system.
- Pressing [2ndF] [TAB] and any value between 0 and 9 specifies the number of decimal places in the calculation result.
  To clear the setting of decimal places, press [2ndF] [TAB] [•].

100000÷3=		
[Floating point]	[ON/C] 100000 [÷] 3 [=]	33’333.33333
[TAB set to 2]	[2ndF] [TAB] 2	33’333.33
→[Scientific notation]	[F↔E]	3.33×10^{04}
→[Floating point]	[F↔E] [2ndF] [TAB] [•]	33’333.33333

- If the value for floating point system does not fit in the following range, the calculator will display the result using scientific notation system:
  $0.000000001 \leq |x| \leq 9999999999$

Determination of the Angular Unit

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



SCIENTIFIC CALCULATIONS

- Calculate in the normal mode.
- In each example, press [ON/C] to clear the display.

Arithmetic Operations 【2】

- The closing parenthesis [)] just before [=] or [M+] may be omitted.
- When entering only a decimal place, it is not necessary to press [0] before [•].

Constant Calculations

- In the constant calculations, the addend becomes a constant. Subtraction and division are performed in the same manner. For multiplication, the multiplicand becomes a constant.

Functions

- Refer to the calculation examples of each function.
- For most calculations using functions, enter numerical values before pressing the function key.

Random Numbers

A pseudo-random number with three significant digits can be generated by pressing [2ndF] [RANDOM]. Random number generation is not possible when binary/octal/hexadecimal system mode is set.

Angular Unit Conversions 【5】

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

Memory Calculations 【6】

This calculator has one independent memory (M). It is available in the normal mode and binary, octal, hexadecimal system mode.

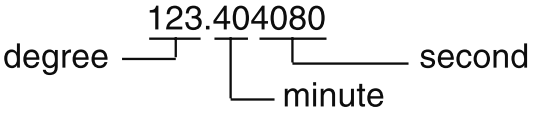
- The independent memory is indicated by the three keys: [STO], [RCL], [M+].
  Before starting a calculation, clear the memory by pressing [ON/C] and [STO].
- A value can be added to or subtracted from an existing memory value. When subtracting a number from the memory, press [+/−] and [M+].
- The contents of the memory are retained even when the calculator is turned off. A value stored in memory will thus remain until it is changed or until the battery runs out.

Chain Calculations 【7】

This calculator allows the previous calculation result to be used in the following calculation.
The previous calculation result will not be recalled after entering multiple instructions.

Time, Decimal and Sexagesimal Calculations 【8】

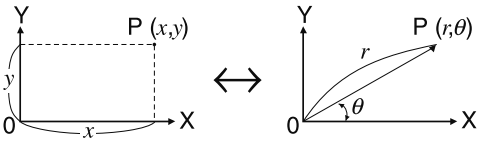
This calculator performs decimal-to-sexagesimal conversion and sexagesimal-to-decimal conversion. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Notation for sexagesimal is as follows:



Note: When the calculation or conversion result is converted, a residual may occur.

Coordinate Conversions 【9】

- Before performing a calculation, select the angular unit.



Rectangular coord. Polar coord.

Modify Function 【10】

In this calculator, calculation results are internally obtained in scientific notation with up to 12 digits for the mantissa. However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display. By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

BINARY, OCTAL, DECIMAL, AND HEXADECIMAL OPERATIONS (N-BASE) 【11】

This calculator can perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, octal, decimal, and hexadecimal numbers.

When performing calculations in each system, first set the calculator in the desired mode before entering numbers.

It can also perform conversions between numbers expressed in binary, octal, decimal and hexadecimal systems.

Conversion to each system is performed by the following keys:

2ndF →BIN : Converts to the binary system. "b" appears.

2ndF →OCT : Converts to the octal system. "o" appears.

2ndF →HEX : Converts to the hexadecimal system. "H" appears.

2ndF →DEC : Converts to the decimal system. "b", "o", and "H" disappear from the display.

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

Note: In this calculator, the hexadecimal numbers A – F are entered by pressing A [Exp], B [y^x], C [$\sqrt{\ }$], D [→DEG], E [ln], and F [log], and displayed as follows:

A → A, B → b, C → C, D → d, E → E, F → F

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

COMPLEX NUMBER CALCULATIONS 【12】

To carry out addition, subtraction, multiplication, and division using complex numbers, press [2ndF] [CPLX] to select the complex number mode.

- A complex number is represented in the a + bi format. The "a" is the real part while the "bi" is the imaginary part. When inputting the real part, after inputting the number press [a]. When inputting the imaginary part, after inputting the number press [b]. To obtain the result press [=].
- Immediately after completing calculation, you can recall the value of the real part with [a], and the value of the imaginary part with [b].
- If the complex numbers are represented as polar coordinates, press [2ndF] [→xy] after they are input with [a] and [b].

STATISTICAL CALCULATIONS 【13】

Press [2ndF] [STAT] to select statistics mode.
The following statistics can be obtained:

$\overline{x}$	Mean of samples (x data)
sx	Sample standard deviation (x data)
σx	Population standard deviation (x data)
n	Number of samples
Σx	Sum of samples (x data)
Σx^2	Sum of squares of samples (x data)

Data Entry and Correction

Entered data are kept in memory until [2ndF] [STAT] or [2ndF] [OFF] are pressed. Before entering new data, clear the memory contents.

[Data Entry]

Data [DATA]

Data [×] *frequency* [DATA] (To enter multiples of the same data)

[Data Correction]

Correction prior to pressing [DATA]:

Delete incorrect data with [ON/C].

Correction after pressing [DATA]:

Reenter the data to be corrected and press [2ndF] [CD].

- The number displayed after pressing [DATA] or [2ndF] [CD] during data entry or correction is the number of samples (n).

Statistical Calculation Formulas 【14】

In the statistical calculation formulas, an error will occur when:

- the absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100}.
- the denominator is zero.
- an attempt is made to take the square root of a negative number.

ERROR AND CALCULATION RANGES

Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. In the case of an error, the display will show "E".

An error can be cleared by pressing [ON/C].

Calculation Ranges 【15】

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

  $\pm 10^{-99} \sim \pm 9.999999999 \times 10^{99}$ and 0.

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

BATTERY REPLACEMENT

Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion. Be sure to observe the following handling rules:

- Make sure the new battery is the correct type.
- When installing, orient the battery properly as indicated in the calculator.
- The battery is factory-installed before shipment, and may be exhausted before it reaches the service life stated in the specifications.

When to Replace the Battery

If the display has poor contrast, the battery requires replacement.

Caution

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

Replacement Procedure

1. Turn the power off by pressing [2ndF] [OFF].
2. Remove the battery cover on the back of the unit. (Fig. 1)
3. Remove the used battery by prying it out with a ball-point pen or other similar pointed device. (Fig. 2)
4. Install one new battery. Make sure the "+" side is facing up.
5. Replace the battery cover by reversing the removal procedure.
6. Press the RESET switch (on the front).

• Make sure that the display appears as shown below. If the display does not appear as shown, remove the battery, reinstall it and check the display once again.

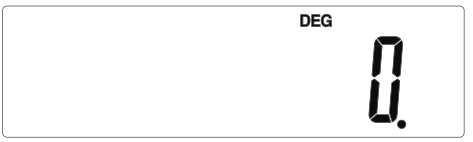


Fig. 1

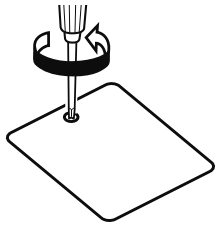
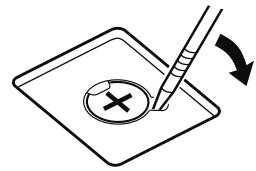


Fig. 2



Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 7 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, binary/octal/hexadecimal number calculations, complex number calculations, statistical calculations, etc.
Internal calculations:	Mantissas of up to 12 digits
Pending operations:	4 calculations
Power source:	1.5 V ⎓ (DC): Alkaline battery (LR1130 or equivalent) × 1
Operating time:	Approx. 5000 hours when continuously displaying 55'555. at 25°C (77°F). Varies according to use and other factors.
Operating temperature:	0°C – 40°C (32°F – 104°F)
External dimensions:	72.5 mm (W) × 127 mm (D) × 13 mm (H) 2-27/32" (W) × 5" (D) × 1/2" (H)
Weight:	Approx. 68 g (0.15 lb) (Including battery)

SHARP

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CALCULATION EXAMPLES

【1】 ON/C CE → ↕

3×	3 ×	***3.***
	ON/C	***0.***
4×5	4 × 5	***5.***
↓	CE	***0.***
4×6+7=	6 + 7 =	***31.***
134	134	***134.***
↓	→ →	***1.***
123	23	***123.***
$3^4 \rightarrow 4^3$	3 y^x 4 2ndF ↕ =	***64.***

【2】 + − × ÷ ( ) +/− Exp

45+285÷3=	ON/C 45 + 285 ÷ 3 =	***140.***
$\frac{18+6}{15-8}$ =	(18 + 6) ÷ (15 − 8 =	***3.428571429***
42×(−5)+120=	42 × 5 +/− + 120 =	***−90.***
$(5\times10^3)\div(4\times10^{-3})$=	5 Exp 3 ÷ 4 Exp 3 +/− =	***1'250'000.***

【3】

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

【4】

[sin] [cos] [tan] [$\sin^{-1}$] [$\cos^{-1}$] [$\tan^{-1}$] [π] [DRG] [hyp]
[arc hyp] [ln] [log] [e^x] [10^x] [$1/x$] [x^2] [x^3] [$\sqrt{\ }$]
[y^x] [$\sqrt[x]{y}$] [$\sqrt[3]{\ }$] [n!] [nPr] [nCr] [%]

sin60[°]=	[ON/C] 60 [sin]	***0.866025403***
$\cos\frac{\pi}{4}$[rad]=	[DRG] [2ndF] [π] [÷] 4 [=] [cos]	***0.707106781***
$\tan^{-1}1$=[g]	[DRG] 1 [2ndF] [$\tan^{-1}$] [DRG]	***50.***
(cosh 1.5 + sinh 1.5)^2 =	[ON/C] [(] 1.5 [hyp] [cos] [+] 1.5 [hyp] [sin] [)] [x^2]	***20.08553692***
$\tanh^{-1}\frac{5}{7}$ =	5 [÷] 7 [=] [2ndF] [arc hyp] [tan]	***0.895879734***
ln 20 =	20 [ln]	***2.995732274***
log 50 =	50 [log]	***1.698970004***
e^3 =	3 [2ndF] [e^x]	***20.08553692***
$10^{1.7}$ =	1.7 [2ndF] [10^x]	***50.11872336***
$\frac{1}{6}+\frac{1}{7}$=	6 [2ndF] [$1/x$] [+] 7 [2ndF] [$1/x$] [=]	***0.309523809***

$8^{-2} - 3^4 \times 5^2 =$	8 [y^x] 2 [+/−] [−] 3 [y^x] 4 [×] 5 [x^2] [=]	***–2'024.984375***
$(12^3)^{\frac{1}{4}} =$	12 [y^x] 3 [y^x] 4 [2ndF] [$1/x$] [=]	***6.447419591***
$8^3 =$	8 [2ndF] [x^3]	***512.***
$\sqrt{49} - \sqrt[4]{81} =$	49 [$\sqrt{}$] [−] 81 [2ndF] [$\sqrt[x]{y}$] 4 [=]	***4.***
$\sqrt[3]{27} =$	27 [2ndF] [$\sqrt[3]{}$]	***3.***
$4! =$	4 [2ndF] [n!]	***24.***
${}_{10}P_3 =$	10 [2ndF] [nPr] 3 [=]	***720.***
${}_5C_2 =$	5 [2ndF] [nCr] 2 [=]	***10.***
$500 \times 25\% =$	500 [×] 25 [2ndF] [%] [=]	***125.***
$120 \div 400 = ?\%$	120 [÷] 400 [2ndF] [%] [=]	***30.***
$500 + (500 \times 25\%) =$	500 [+] 25 [2ndF] [%] [=]	***625.***
$400 - (400 \times 30\%) =$	400 [−] 30 [2ndF] [%] [=]	***280.***

• The range of the results of inverse trigonometric functions

	$\theta = \sin^{-1} x,\ \theta = \tan^{-1} x$	$\theta = \cos^{-1} x$
DEG	$-90 \le \theta \le 90$	$0 \le \theta \le 180$
RAD	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$	$0 \le \theta \le \pi$
GRAD	$-100 \le \theta \le 100$	$0 \le \theta \le 200$

【5】 DRG▶

90°→ [rad]	ON/C 90 2ndF DRG▶	***1.570796327***
→ [g]	2ndF DRG▶	***100.***
→ [°]	2ndF DRG▶	***90.***
$\sin^{-1}0.8$ = [°]	0.8 2ndF $\sin^{-1}$	***53.13010235***
→ [rad]	2ndF DRG▶	***0.927295218***
→ [g]	2ndF DRG▶	***59.03344706***
→ [°]	2ndF DRG▶	***53.13010235***

【6】 RCL STO M+

	ON/C STO 8 × 2 = STO	***16.***
24÷(8×2)=	24 ÷ RCL =	***1.5***
(8×2)×5=	RCL × 5 =	***80.***
	ON/C STO	
12+5	12 + 5 = M+	***17.***
–) 2+5	2 + 5 = +/– M+	***–7.***
+)12×2	12 × 2 = M+	***24.***
M	RCL	***34.***
$1= ¥110	110 STO	***110.***
¥26,510=$?	26510 ÷ RCL =	***241.***
$2,750=¥?	2750 × RCL =	***302'500.***
r = 3cm	3 STO	***3.***
πr^2 = ?	2ndF π × RCL	
	x^2 =	***28.27433388***

【7】

6+4=ANS	ON/C 6 + 4 =	***10.***
ANS+5	+ 5 =	***15.***
44+37=ANS	44 + 37 =	***81.***
$\sqrt{ANS}$=	$\sqrt{\ }$	***9.***

【8】 ➡DEG ➡D.MS

12°39'18"05 → [10]	ON/C 12.391805 ➡DEG	***12.65501389***
123.678 → [60]	123.678 2ndF ➡D.MS	***123.404080***
sin62°12'24" = [10]	62.1224 ➡DEG sin	***0.884635235***

【9】 a b →rθ →xy

$\begin{pmatrix} x = 6 \\ y = 4 \end{pmatrix} \rightarrow \begin{pmatrix} r = \\ \theta = [°] \end{pmatrix}$	ON/C 6 a 4 b	
	2ndF →rθ [r]	***7.211102551***
	b [θ]	***33.69006753***
	a [r]	***7.211102551***
$\begin{pmatrix} r = 14 \\ \theta = 36[°] \end{pmatrix} \rightarrow \begin{pmatrix} x = \\ y = \end{pmatrix}$	14 a 36 b	
	2ndF →xy [x]	***11.32623792***
	b [y]	***8.228993532***
	a [x]	***11.32623792***

【10】 MDF TAB

5÷9=ANS	ON/C 2ndF TAB 1	
ANS×9=	5 ÷ 9 =	***0.6***
[FIX,TAB=1]	× 9 = *1	***5.0***
	5 ÷ 9 = 2ndF MDF	***0.6***
	× 9 = *2	***5.4***
	2ndF TAB •	

*1 $5.55555555555 \times 10^{-1} \times 9$

*2 0.6×9

【11】 [►BIN] [►OCT] [►HEX] [►DEC]

DEC(25)→BIN	[ON/C] [2ndF] [►DEC] 25 [2ndF] [►BIN]	***11001*** b
HEX(1AC)	[ON/C] [2ndF] [►HEX] 1AC	
→ BIN	[2ndF] [►BIN]	***110101100*** b
→ OCT	[2ndF] [►OCT]	***654*** o
→ DEC	[2ndF] [►DEC]	***428.***
BIN(1010–100)	[ON/C] [2ndF] [►BIN] [(] 1010 [−] 100 [)]	
×11 =	[×] 11 [=]	***10010*** b
HEX(1FF)+	[ON/C] [2ndF] [►HEX] 1FF [2ndF] [►OCT] [+]	
OCT(512)=	512 [=]	***1511*** o
HEX(?)	[2ndF] [►HEX]	***349*** H
2FEC–	[ON/C] [STO] [2ndF] [►HEX] 2FEC [−]	
2C9E=(A)	2C9E [M+]	***34E*** H
+)2000–	2000 [−]	
1901=(B)	1901 [M+]	***6FF*** H
(C)	[RCL]	***A4d*** H
→ DEC	[2ndF] [►DEC]	***2'637.***

【12】 CPLX a b →rθ →xy

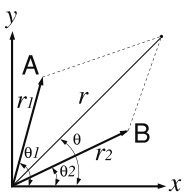
CPLX

	2ndF CPLX	***0.***
$(12-6i)+(7+15i)$	12 a 6 +/− b + 7 a 15 b	
$-(11+4i)=$	− 11 a 4 b =	***8.***
	b	***5.***
	a	***8.***

$6\times(7-9i)\times$	6 a × 7 a 9 +/− b ×	
$(-5+8i)=$	5 +/− a 8 b =	***222.***
	b	***606.***

$$\frac{16\times(\sin30°+i\cos30°)}{(\sin60°+i\cos60°)}=$$

16 a × 30 sin a 30 cos b
÷ 60 sin a 60 cos b
= ***13.85640646***
b ***8.***



8 a 70 b 2ndF →xy
+ 12 a 25 b 2ndF →xy
= 2ndF →rθ [r] ***18.5408873***
b [θ] ***42.76427608***

$r1 = 8,\ \theta1 = 70°$
$r2 = 12,\ \theta2 = 25°$
↓
$r = ?,\ \theta = ?°$

$(1+i)$	1 a 1 b =	***1.***
↓	2ndF →rθ [r]	***1.414213562***
$r = ?,\ \theta = ?°$	b [θ]	***45.***

【13】 STAT DATA CD $\bar{x}$ Sx σx n Σx Σx^2

DATA		STAT
95	2ndF STAT	*0.*
80	95 DATA	*1.*
80	80 × 2 DATA	*3.*
75	75 × 3 DATA	*6.*
75	50 DATA	*7.*
75		
50		
$\bar{x}=$	$\bar{x}$	*75.71428571*
$\sigma x=$	2ndF σx	*12.37179148*
$n=$	n	*7.*
$\Sigma x=$	2ndF Σx	*530.*
$\Sigma x^2=$	2ndF Σx^2	*41'200.*
$sx=$	Sx	*13.3630621*
$sx^2=$	x^2	*178.5714286*

DATA		STAT
	2ndF STAT 2ndF STAT	*0.*
30	30 DATA	*1.*
40	40 × 2 DATA	*3.*
40	50 DATA	*4.*
50		
↓	50 2ndF CD	*3.*
	40 × 2 2ndF CD	*1.*
DATA		
30		
45		
45	45 × 3 DATA	*4.*
45	60 DATA	*5.*
60		

【14】

$$\bar{x} = \frac{\Sigma x}{n} \qquad \sigma x = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n}}$$

$$sx = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n-1}}$$

$\Sigma x = x_1 + x_2 + \cdots + x_n$

$\Sigma x^2 = x_1^2 + x_2^2 + \cdots + x_n^2$

Function	Dynamic range
sin x, cos x, tan x	DEG: $\|x\| < 10^{10}$ $(\tan x : \|x\| \neq 90\ (2n-1))^*$ RAD: $\|x\| < \frac{\pi}{180} \times 10^{10}$ $(\tan x : \|x\| \neq \frac{\pi}{2}(2n-1))^*$ GRAD: $\|x\| < \frac{10}{9} \times 10^{10}$ $(\tan x : \|x\| \neq 100\ (2n-1))^*$
$\sin^{-1}x$, $\cos^{-1}x$	$\|x\| \leq 1$
$\tan^{-1}x$, $\sqrt[3]{x}$	$\|x\| < 10^{100}$
ln x, log x	$10^{-99} \leq x < 10^{100}$
e^x	$-10^{100} < x \leq 230.2585092$
10^x	$-10^{100} < x < 100$
sinh x, cosh x tanh x	$\|x\| \leq 230.2585092$
$\sinh^{-1} x$	$\|x\| < 10^{50}$
$\cosh^{-1} x$	$1 \leq x < 10^{50}$
$\tanh^{-1} x$	$\|x\| < 1$
x^2	$\|x\| < 10^{50}$
x^3	$\|x\| < 2.15443469 \times 10^{33}$

$\sqrt{x}$	$0 \leq x < 10^{100}$
$1/x$	$\|x\| < 10^{100}$ $(x \neq 0)$
n!	$0 \leq n \leq 69^*$
${}_nP_r$	$0 \leq r \leq n \leq 9999999999^*$ $\frac{n!}{(n-r)!} < 10^{100}$
${}_nC_r$	$0 \leq r \leq n \leq 9999999999^*$ $0 \leq r \leq 69$ $\frac{n!}{(n-r)!} < 10^{100}$
→D.MS →DEG	$\|x\| < 1 \times 10^{100}$
$x, y \rightarrow r, \theta$	$\sqrt{x^2 + y^2} < 10^{100}$

$r, \theta \rightarrow x, y$	$0 \leq r < 10^{100}$ DEG: $\lvert \theta \rvert < 10^{10}$ RAD: $\lvert \theta \rvert < \frac{\pi}{180} \times 10^{10}$ GRAD : $\lvert \theta \rvert < \frac{10}{9} \times 10^{10}$
DRG ▶	DEG→RAD, GRAD→DEG: $\lvert x \rvert < 10^{100}$ RAD→GRAD: $\lvert x \rvert < \frac{\pi}{2} \times 10^{98}$
y^x	• $y > 0$: $-10^{100} < x \log y < 100$ • $y = 0$: $0 < x < 10^{100}$ • $y < 0$: $x = n$ $(0 < \lvert x \rvert < 1: \frac{1}{x} = 2n-1,\ x \neq 0)$*, $-10^{100} < x \log \lvert y \rvert < 100$
$x\sqrt{y}$	• $y > 0$: $-10^{100} < \frac{1}{x} \log y < 100\ (x \neq 0)$ • $y = 0$: $0 < x < 10^{100}$ • $y < 0$: $x = 2n-1$ $(0 < \lvert x \rvert < 1 : \frac{1}{x} = n,\ x \neq 0)$*, $-10^{100} < \frac{1}{x} \log \lvert y \rvert < 100$
(A+Bi)+(C+Di) (A+Bi)–(C+Di)	$\lvert A \pm C \rvert < 10^{100}$ $\lvert B \pm D \rvert < 10^{100}$
(A+Bi)×(C+Di)	$(AC - BD) < 10^{100}$ $(AD + BC) < 10^{100}$
(A+Bi)÷(C+Di)	$\frac{AC + BD}{C^2 + D^2} < 10^{100}$ $\frac{BC - AD}{C^2 + D^2} < 10^{100}$ $C^2 + D^2 \neq 0$
→DEC →BIN →OCT →HEX	DEC : $\lvert x \rvert \leq 9999999999$ BIN : $1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 111111111$ OCT : $4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$ HEX : FDABF41C01 $\leq x \leq$ FFFFFFFFFF $0 \leq x \leq$ 2540BE3FF

* n, r: integer