TEXAS INSTRUMENTS

TI-35X
TI-36X SOLAR

Owner's manual for the TI-36X Solar and TI-35X Scientific Calculators

TI-35X

This manual is destinated for two versions of calculators:

TI-35X BATTERY POWERED
TI-36X SOLAR - SOLAR POWERED

If your calculator is BATTERY POWERED (TI-35X), please note the following modifications to the manual:

KEYS

TI-36X SOLAR : [CE/C] TI-35X : [ON/C]

[AC/ON] [OFF]

ADDITIONAL FEATURES ON TI-35X

- **Constant Memory**
  The Constant Memory feature holds a number in memory even when the calculator is turned off.

- **Automatic Power Down (APD™)**
  The Automatic Power Down is a power-saving feature that turns the calculator off automatically after about 10 minutes of nonuse.

BATTERY REPLACEMENT

Note: Your calculator cannot hold data in memory when the batteries are removed or become discharged.

The calculator uses two batteries. For up to 1000 hours of operation use: Panasonic LR-44, Ray-O-Vac RW-82, Union Carbide (Eveready) A-76, or the equivalent. For up to 2500 hours of operation use: Mallory 10L14 or D357, Union Carbide (Eveready) 357, Panasonic WL-14, Toshiba G-13, Ray-O-Vac RW-42, or the equivalent.

1. Turn the calculator off and place it face down on a table or desk.
2. Using a small Phillips screwdriver, remove the screws from the back case.
3. Lift the bottom edge of the back case, and then lift off the whole back case.
4. Remove the discharged batteries and install the new ones positive side up, as shown in the diagram inside the battery compartment.

   Caution: Avoid contact with the other calculator components while changing the batteries.
5. Replace the back case, top edge first, and then replace the screws.
6. Press the [ON/C] key twice.

   Caution: Dispose of old batteries properly. Do not incinerate the batteries or leave them within reach of children.

Reminder – In Case of difficulty

If the calculator does not respond as you expect, it may be a special mode. Press [AC/ON] to restore the calculator to normal settings.

Key Index

This index provides a quick page reference to the description of each key.

				[AC/ON] 2
	[DRG►] 22 [DRG] 22	[x!] 30 [10^x] 21	[$\sqrt[3]{x}$] 19 [e^x] 21	[CONST] 27 [FIX] 10
[3rd] 6	[HYP] 7	[LOG] 21	[LN] 21	[CE/C] 13
	D [c] 40 27 [SIN⁻¹] 24	E [g] 40 27 [COS⁻¹] 24	F [m_F] 40 27 [TAN⁻¹] 24	[%] [e] 16 27 [$\sqrt[x]{y}$] 20
[2nd] 6	[SIN] 24	[COS] 24	[TAN] 24	[y^x] 19
[STAT1] 32 [CSR] 31	A [h] 40 27 [FRQ] 32	B [N_A] 40 27 [x̄] 32	C [R] 40 27 [σxn-1] 32	[π] [G] 8 27 [σxn] 32
[x⇄y] 14	[1/x] 19	[x^2] 19	[$\sqrt{x}$] 19	[÷] 15
[STAT2] 34 [Σ-] 32	[DEC] 38 [n] 32	[HEX] 39 [ȳ] 35	[OCT] 38 [σyn-1] 35	[BIN] 38 [σyn] 35
[Σ+] 32	[EE] 10	[(] 12	[)] 12	[X] 15
[AND] 41 [Σx] 32	[OR] 41 [Σx^2] 32	[XOR] 41 [Σy] 35	[XNOR] 41 [Σy^2] 35	[NOT] 41 [Σxy] 35
[STO] 17	[7] 8	[8] 8	[9] 8	[−] 15
[EXC] 17 [SUM] 18	[COR] 35 [ITC] 35	[FLO] 9 [SLP] 35	[SCI] 9 [x'] 35	[ENG] 9 [y'] 35
[RCL] 17	[4] 8	[5] 8	[6] 8	[+] 15
[F◄►D] 37 [d/c] 37	[►cm] 28 [►in] 28	[►l] 28 [►gal] 28	[►kg] 28 [►lb] 28	[►DMS] 23 [►DD] 23
[ab/c] 37	[1] 8	[2] 8	[3] 8	
[nCr] 30 [nPr] 30	[►°C] 28 [►°F] 28	[►g] 28 [►oz] 28	[R►P] 26 [P►R] 25	
[→] 8	[0] 8	[.] 8	[+/−] 8	[=] 15

TI-36X SOLAR / TI-35X

Table of Contents

Turning the Calculator On and Off

The calculator turns on automatically when you expose the solar panel to an adequate light source. Before using the calculator, however, you should always clear it by pressing [AC/ON] .

Note: When the calculator is first exposed to light, random segments and indicators may appear in the display. The three memories and the statistical registers also may contain random values. Pressing [AC/ON] clears these values.

When you press [AC/ON], "0." and DEG appear in the display. The calculator is then ready for you to begin your calculations.

The calculator turns off automatically when the solar panel is no longer exposed to an adequate light source. (You can easily turn the calculator off by closing the carrying case.) The display, any pending operations, the automatic constant, the memories, and the statistical registers are cleared.

Note: The calculator does not actually turn off until approximately 10 to 20 seconds after you remove it from the light source. If you re-expose the solar panel to light within approximately 10 seconds, the calculator is not cleared.

Clearing the Calculator

The [AC/ON] key resets the calculator to the decimal mode with floating-decimal display, and resets the angle units to degrees (DEG). This key also clears the display, memories, statistical registers, error conditions, and pending operations.

Clearing the Display and Pending Operations

The [CE/C] key clears incorrect entries, error conditions, the display, and pending operations. Pressing [CE/C] does not affect the mode, display format, angle units, memories, or statistical registers.

- To clear an incorrect numerical entry, press [CE/C] once.
- To clear an error condition, indicated by Error in the display, press [CE/C] once.
- To clear the display and all pending operations, press [CE/C] twice.

Clearing a Memory

To clear one of the three memories, press [STO] followed by 1, 2, or 3 when a zero is in the display.

Clearing the Statistical Registers

The statistical registers are cleared when you press [3rd] [STAT1] or [3rd] [STAT 2].

During a series of statistics calculations, you can press [2nd] [CSR] to clear previous data before entering each new data set.

Note: If you press [2nd] [CSR] when the calculator is not in a statistics mode, an error message appears.

The Display

The display shows entries and results with a maximum of 10 significant digits (plus a two-digit exponent in scientific and engineering notations). However, the calculator uses a maximum of 12 digits internally. To present additional information about the calculator, special indicators may also appear in the display.

Indicator	Meaning
M	At least one memory contains a number other than zero.
2nd	The calculator will access the second function of the next key pressed.
3rd	The calculator will access the third function of the next key pressed.
HYP	The calculator will access the hyperbolic function of the next key pressed.
BIN	The calculator is in the binary number mode.
OCT	The calculator is in the octal number mode.
HEX	The calculator is in the hexadecimal number mode.

Indicator	Meaning
STAT	The calculator is in either the one-variable or the two-variable statistics mode.
DEG	The angle units are set to degrees.
RAD	The angle units are set to radians.
GRAD	The angle units are set to grads.
x	The coordinates you entered have been converted to rectangular, and the x-coordinate is displayed.
r	The coordinates you entered have been converted to polar, and the r-coordinate is displayed.
( )	There are one or more open parentheses.

Alternate-Function Keys

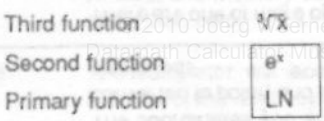
Most keys can perform more than one function. The [2nd], [3rd], and [HYP] keys give you access to alternate functions.

Note: If you press [2nd], [3rd], or [HYP] and then a key with no alternate function, the key performs its normal function. If you press [2nd], [3rd], or [HYP] by mistake, press it again to cancel its effect.

The [2nd] and [3rd] Alternate-Function Keys

The "second" function of a key is marked on the upper half of the key.

The "third" function of a key is marked above the key.



To perform a second or a third function, press [2nd] or [3rd], as applicable, and then press the appropriate function key.

For example, to find the cube root of a number (the third function of the [LN] key), enter the number, press [3rd], and then press the [LN] key.

In this guide, second and third functions are shown in brackets ([ ]). The above example would be shown as "Press [3rd] [$\sqrt[3]{x}$]."

Note: *Some of the keys have two functions marked above them. Those functions are described under "Physical Constants" and "Number-System Modes" in this guide.*

HYP --Hyperbolic Function Key

The HYP key lets you use the trigonometric keys to perform hyperbolic functions. Press HYP or HYP 2nd and then press the trig function key.

For example:

- Press HYP SIN to find the hyperbolic sine.
- Press HYP 2nd [SIN^{-1}] to find the inverse hyperbolic sine.

Data Entry Keys

The keys listed on this page are used to enter numeric values.

[0] - [9], A - F --Digit Entry Keys

These keys enter digits in the display. (<A>-<F> are available only in the hexadecimal mode.) You can enter a maximum of 10 digits and a decimal point. (If you start with a decimal point, the limit is nine digits.)

[·] --Decimal-Point Key

This key enters a decimal point in a numeric value in the decimal number mode.

[←] --Backspace key

This key removes the most recently entered digit from the display.

[+/−]--Change-Sign Key

This key changes the sign of the number in the display. To enter a negative number, first enter the number as a positive value, and then press [+/−]. (In the binary, octal, or hexadecimal number mode, [+/−] calculates the two's complement of the number in the display.)

[3rd] [π]--Pi Key Sequence

This key sequence enters the value of pi to twelve digits, 3.14159265359. The display shows the value rounded to ten digits, 3.141592654.

Display Formats

After you select a display format, all results are displayed in this format until you select another.

3rd [FLO]--**Floating-Decimal Key Sequence**

This key sequence removes scientific or engineering notation and restores the decimal display format. Results are displayed in the following range, using the currently selected fix decimal setting.

-9999999999 to -0.000000001,
0,
0.000000001 to 9999999999

Note: Any results outside of this range are automatically displayed in scientific notation.

3rd [SCI]--**Scientific Notation Key Sequence**

This key sequence selects scientific notation, in which a result is expressed as a base value (mantissa) times 10 raised to some power (exponent).

In scientific notation, the calculator always displays "normalized" results. (That is, the result has a single digit to the left of the decimal point.)

3rd [ENG]--**Engineering Notation Key Sequence**

This key sequence selects engineering notation. This is like scientific notation, except that all exponents are multiples of 3.

[EE] --Exponent Entry Key

This key lets you enter a number using scientific notation. You can enter a number as small as $\pm 1 \times 10^{-99}$ and as large as $\pm 9.999999999 \times 10^{99}$.

Note: The number is displayed in decimal display format unless you have selected scientific or engineering notation or the number is outside the decimal display range.

To enter such a number:

1. Enter the mantissa. If it is negative, press [+/−] .
2. Press [EE]. 00 appears in the right side of the display. If you have not first entered a mantissa, the calculator ignores this key.
3. Enter the exponent. If it is negative, press [+/−] . If you press an incorrect digit key, simply re-enter the correct digits. (The calculator uses only the last two digits entered as the exponent.)
4. Press [=] to enter the number.

[2nd] [FIX]--Fixed-Decimal Key Sequence

This key sequence enables you to set the number of decimal places displayed in a result.

- To set the number of decimal places, press [2nd] [FIX] and then press the appropriate digit key (0 - 9).
- To remove the fixed-decimal setting, press [2nd] [FIX] [·] . (Pressing [AC/ON] also removes the setting.)

If a result has more than the selected number of decimal places, the displayed result is rounded. If a result has less than the selected number of decimal places, trailing zeros are inserted.

Changing Display Formats

To convert a result from one format to another, simply press the [3rd] [FLO] (floating-decimal), [3rd] [SCI] (scientific), [3rd] [ENG] (engineering), or [2nd] [FIX] key sequence, depending on the display format you desire.

To convert a number that you enter:

1. Enter the number.
2. Press [=].
3. Press the desired key sequence.

Algebraic Operating System

The AOS™ Algebraic Operating System completes all operations according to their relative priorities. Calculations have generally to be entered as they are written.

Pending Operations and Parentheses

A pending operation is any operation that is delayed until you press a key with an equal or lower priority. The parentheses keys help you arrange the order of completion for a calculation.

Pending Operations

The operations (y^x, $\sqrt[x]{y}$, x, ÷, +, -, AND, OR, XOR, and XNOR) are pending operations. If you enter 4 [x] 5, for example, the result is not displayed until you complete the operation by pressing an appropriate key, such as [=]. Until completed, 4 [x] 5 creates a pending multiplication.

The calculator allows you to enter a maximum of four pending operations, except in the statistics modes, where the limit is one pending operation. If you attempt to enter more, an error condition occurs.

Pending operations are cleared when you press [CE/C] [CE/C], [AC/ON], or any statistics key.

[(], [)] --Parentheses Keys

These keys open and close a parenthetical expression. A set of operations enclosed in parentheses is given priority over operations outside the parentheses. Within each level of parentheses, the calculator operates according to the rules of AOS.

With each pending operation, you can enter up to 15 levels of open parentheses.

Correcting Entry Errors

If you enter an incorrect number or function, you can always clear the calculation and begin again. Often, however, you can correct the error without clearing the entire calculation.

[CE/C] **--Clear Entry/Clear Key**

This key clears pending operations or incorrect entries.

- To clear all pending operations, press [CE/C] twice.
- To clear a numeric entry, press [CE/C] once.

Note: When clearing an incorrect entry, be sure to press [CE/C] before you press [(], [)], [y^x], [2nd] [$\sqrt[x]{y}$], [x], [÷], [+], or [−]. Pressing [CE/C] following any of these keys clears the calculator as if you had pressed [CE/C] twice.

After clearing an incorrect entry and entering the correct value, you can continue your calculation.

Correcting Pending Operations

If you incorrectly use a pending operation (y^x, $\sqrt[x]{y}$, x, ÷, +, -, AND, OR, XOR, or XNOR), you may or may not be able to correct it.

- If the incorrect operation has an equal or higher priority than the intended operation, you can press the correct operation key immediately after the incorrect one and continue with the calculation.

- If the incorrect operation has a lower priority than the intended operation, simply pressing the correct key may not correct the problem. If there are any pending operations, pressing a lower-priority operation key completes the previous pending operations. In this case, you should press [CE/C] [CE/C] to clear the calculation and begin again.

[x⇆y] --x Exchange y Key

This key sequence exchanges:

- The values of x and y in universal power and root calculations.
- The minuend and subtrahend in subtraction.
- The divisor and dividend in division.
- The r and θ coordinates in polar/rectangular conversions.
- The dependent and independent variables in two-variable statistics.
- The two items n and r in combinations and permutations.
- The retained value and the displayed value in a repeated calculation.

Basic Operations

Arithmetic Functions

The [+], [−], [x], and [÷] keys perform the arithmetic operations of addition, subtraction, multiplication, and division.

The [=] key completes all pending operations and displays the result.

Rounding and Accuracy

Even though a calculation can produce a 12-digit result, the display can show only 10 digits. Results are, therefore, rounded to a 10-digit standard display or to a 10-digit mantissa and 2-digit exponent for scientific notation.

Repeated Calculations

Any time you perform a calculation that uses one of the operations +, -, x, ÷, y^x, $\sqrt[x]{y}$, AND, OR, XOR, or XNOR, the calculator retains both the operation and the number you entered after the operation key.

If you then enter another number and press [=], the calculator applies the retained operation and number and evaluates the resulting expression.

The retained operation and number are cleared when you press [AC/ON], [CE/C] [CE/C], or a pending operation key.

Percentage Calculations

[3rd] [%]--Percent Key Sequence

This key sequence automatically divides the number in the display by 100, converting the number to its equivalent decimal percent.

For example, if you enter 43.9 and press [3rd] [%], 0.439 is displayed.

In the chart below, the "principal amount" is the number in the display immediately after you press [x], [+], [−], or [÷].

Operation	Key Sequence	Function
Percentage	[x] n [3rd] [%] [=]	Calculates n% of the principal amount.
Add-On	[+] n [3rd] [%] [=]	Calculates n% of the principal amount and adds the percentage to the number.
Discount	[−] n [3rd] [%] [=]	Calculates n% of the principal amount and subtracts the percentage from the number.
Percentage Ratio	[÷] n [3rd] [%] [=]	Divides the principal amount by n%.

Memory Operations

The calculator has three memories, numbered 1 through 3.

STO *n*--Store Key Sequence

This key stores the displayed number in memory *n*, replacing the previous memory contents. To clear a memory, use STO *n* when 0 is displayed.

RCL *n*--Recall Key Sequence

This key displays (recalls) the number stored in memory *n*, without affecting the memory contents.

Example : Using memory 1, store and recall 45.68.

Enter	Press	Display	
45.68	STO 1	M	45.68
	CE/C CE/C	M	0.
	RCL 1	M	45.68

3rd [EXC] *n*--Exchange Key Sequence

This key sequence exchanges the displayed number with the number in memory *n*. For example, the key sequence 98 3rd [EXC] 3 stores the number 98 in memory 3 and displays the number that was previously in memory 3.

Example : Store 55.4 in memory 3 and use 3rd [EXC] to exchange a displayed value with the stored value.

Enter	Press	Display	
55.4	STO 3	M	55.4
67	3rd [EXC] 3	M	55.4
	3rd [EXC] 3	M	67.

2nd [SUM] *n*--Sum Key Sequence

This key sequence adds the displayed number to the number in memory *n*. For example, if 85 is in memory 2 and you press 15 2nd [SUM] 2, the number in memory 2 is then 100. The 15 remains in the display.

Note: If you want to add to the current contents of a memory, use 2nd [SUM] *n*. However, if you are beginning a new problem, be sure to use STO *n* to store the first number. (This clears the previous contents.) You can then use 2nd [SUM] *n* to add subsequent numbers.

Example:

28.3 x 7 = 198.1
173 + 16 = 189
312 - 42 + 7.8 = 277.8
Total 664.9

Enter	Press		Display	Memory1
28.3	x		28.3	0
7	= STO 1	M	198.1	198.1
173	+	M	173.	198.1
16	= 2nd [SUM] 1	M	189.	387.1
312	−	M	312.	387.1
42	+	M	270.	387.1
7.8	= 2nd [SUM] 1	M	277.8	664.9
	RCL 1	M	664.9	664.9

Reciprocals, Powers, and Roots

The [1/x], [x²], [√x], and [3rd] [∛x] keys calculate the reciprocal, square, square root, and cube root of the displayed number. These are immediate functions that operate only on the displayed number.

Example : Calculate $\sqrt{(3^2 + 4^2)}$

Enter	Press	Display
3	[x²] [+]	9.
4	[x²]	16.
	[=]	25.
	[√x]	5.

[y^x]-Universal Power Key

This key raises any positive or negative number to any power (within the range of the calculator).

1. Enter the number (y) that you want to raise to a power.
2. Press [y^x] .
3. Enter the power (x).
4. Press [=] or any key that completes the operation.

Example : $2.86^{-.42} = 0.643170721$

Enter	Press	Display
2.86	[y^x]	2.86
.42	[+/−]	-0.42
	[=]	0.643170721

2nd [$\sqrt[y]{}$]--Universal Root Key Sequence

This key sequence calculates any root of any positive number (within the range of the calculator) and any odd-numbered integer root of a negative number.

1. Enter the number (y) whose root you want to find.
2. Press 2nd [$\sqrt[y]{}$].
3. Enter the root (x).
4. Press = or any key that completes the operation.

Example : $\sqrt[3.12]{1460} = 10.33274375$

Enter	Press	Display
1460	2nd [$\sqrt[y]{}$]	1460.
3.12	=	10.33274375

Logarithms and Antilogarithms

The logarithm key sequences perform common and natural logarithms and common and natural antilogarithms.

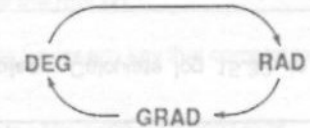
Key Sequence	Function
LOG	Calculates the common logarithm (base 10) of the number in the display.
LN	Calculates the natural logarithm (base e) of the number in the display. (The value of e is 2.718281828.)
2nd [10^x]	Calculates the common antilogarithm of the number in the display (10 raised to the power of the number).
2nd [e^x]	Calculates the natural antilogarithm of the number in the display (e raised to the power of the number).

Examples : Calculate log 15.32, ln 203.451, and $e^{-.69315}$.

Enter	Press	Display
15.32	LOG	1.185258765
203.451	LN	5.31542519
.69315	+/− 2nd [e^x]	0.49999859

Angle Units

The angle units setting is important when you are performing trigonometric calculations and polar/rectangular conversions. The current angle setting is indicated by DEG, RAD, or GRAD in the display.
The calculator is automatically set to the degree mode when you press [AC/ON] . Each time you press [2nd] [DRG] or [3rd] [DRG►], the setting advances from one unit to the next in the following order:



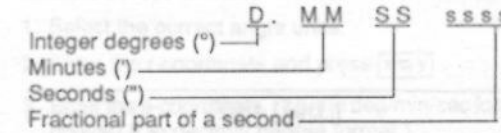
Key Sequence	Function
[2nd] [DRG]	Changes the angle setting without affecting the angle in the display.
[3rd] [DRG►]	Changes the angle setting and converts the angle in the display to the new units.

Example : Convert 90° to radians, grads, and then back to degrees.
Note: If necessary, press [2nd] [DRG] until DEG is displayed before performing this example.

Enter	Press	Display	Comment
90		90	Degrees
	[3rd] [DRG►]	1.570796327	Radians
	[3rd] [DRG►]	100.	Grads
	[3rd] [DRG►]	90.	Degrees

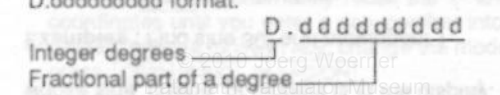
Deg/Min/Sec and Decimal Degrees

In deg/min/sec, angles are represented by the D.MMSSssssss format.



When you enter minutes and seconds, remember to include zeros where needed to place the digits in the proper positions. For example, the angle 9° 7' 50" is entered as 9.075.

In decimal degrees, angles are represented by the D.ddddddddd format.



Note: The key sequences below also apply to hours/min/sec and decimal hours.

Key Sequence	Function
[3rd] [►DMS]	Converts an angle from decimal degrees to deg/min/sec. Enter the angle as D.ddddddddd and press [3rd] [►DMS].
[2nd] [►DD]	Converts an angle from deg/min/sec to decimal degrees. Enter the angle as D.MMSSssssss and press [2nd] [►DD].

Note: The calculator can perform these conversions in any angle units setting.

Trigonometric Functions

[SIN], [COS], [TAN] --Trig Keys

These keys calculate the sine, cosine, and tangent of the angle in the display.

Note: The calculator interprets the angle in the units (DEG, RAD, or GRAD) selected by the [2nd] [DRG] or [3rd] [DRG►] key sequence. Also, if you enter an angle in deg/min/sec format, you must convert it to decimal degrees before using these functions.

[2nd] [SIN⁻¹], [2nd] [COS⁻¹], [2nd] [TAN⁻¹]
Inverse Trig Key Sequences

These keys calculate the angle (in the units selected) whose sine, cosine, or tangent is in the display.

Examples : Find sine 30° and arctangent 1.

Note: If necessary, press [2nd] [DRG] until DEG is displayed before performing this example.

Enter	Press	Display
30	[SIN]	0.5
1	[2nd] [TAN⁻¹]	45.

Polar/Rectangular Conversions

[2nd] [P►R]--**Polar to Rectangular Key Sequence**

To convert from polar to rectangular:

1. Select the correct angle units.
2. Enter the r-coordinate and press [x⇆y].
3. Enter the θ-coordinate. (If θ is in deg/min/sec format, convert it to decimal degree format.)
4. Press [2nd] [P►R] to convert the coordinates and display the x-coordinate.
5. Press [x⇆y] to display the y-coordinate.

Note: To recall the x-coordinate, press [x⇆y]. You can use [x⇆y] to alternately recall the x- and y-coordinates until you enter a new number into the display, press a function key, change the mode, or press [CE/C] [CE/C] or [AC/ON].

Example : Convert the polar coordinates (r = 10,θ = -45°) to rectangular coordinates.

Note: If necessary, press [2nd] [DRG] until DEG is displayed before performing this example.

Enter	Press	Display
	[AC/ON]	0.
10	[x⇆y]	0.
45	[+/—]	-45
	[2nd] [P►R]	7.071067812
	[x⇆y]	-7.071067812

[3rd] [R ► P]--Rectangular to Polar Key Sequence

To convert from rectangular to polar:

1. Select the correct angle units.
2. Enter the x-coordinate and press [x ⇄ y].
3. Enter the y-coordinate.
4. Press [3rd] [R►P] to convert the coordinates and display the r-coordinate.
5. Press [x ⇄ y] to display the θ-coordinate.

Note: To recall the r-coordinate, press [x ⇄ y]. You can use [x ⇄ y] to alternately recall the r- and θ-coordinates until you enter a new number into the display, press a function key, change the mode, or press [CE/C] [CE/C] or [AC/ON].

Example: Convert the rectangular coordinates (x = 5, y = 6) to polar coordinates.

Note: If necessary, press [2nd] [DRG] until DEG is displayed before performing this example.

Enter	Press	Display
	[AC/ON]	0.
5	[x ⇄ y]	0.
6	[3rd] [R►P]	7.810249676
	[x ⇄ y]	50.19442891

Physical Constants

In addition to π, the values for eight physical constants are built into the calculator. The symbol for each constant is marked above and to the right of its key.

To use one of the physical constants, press [3rd] [CONST] and then the key marked with the applicable symbol. For example, to use Avogadro's number press [3rd] [CONST] [N_A].

Physical Constant		Value
c	(Speed of Light)	299,792,458 meters per second
g	(Gravitational Acceleration)	9.80665 meters per second^2
m_e	(Electron Mass)	$9.1093897 \times 10^{-31}$ kilograms
e	(Electron Charge)	$1.60217733 \times 10^{-19}$ coulombs
h	(Planck's Constant)	$6.6260755 \times 10^{-34}$ Joule seconds
N_A	(Avogadro's Number)	6.0221367×10^{23} molecules per mole
R	(Ideal Gas Constant)	8.31451 Joules per mole °Kelvin
G	(Universal Gravitation)	6.67259×10^{-11} Newton meters^2 per kilogram^2

Metric Conversions

The Metric conversions shown below are available in the decimal mode only.

To convert:	Press	Formula
centimeters to inches	2nd [⌐ in]	cm ÷ 2.54
inches to centimeters	3rd [⌐ cm]	in x 2.54
liters to U.S. liquid gallons	2nd [⌐ gal]	l ÷ 3.785411784
U.S. liquid gallons to liters	3rd [⌐ l]	gal x 3.785411784
kilograms to pounds mass	2nd [⌐ lb]	kg ÷ .45359237
pounds to kilograms	3rd [⌐ kg]	lb x .45359237
Celsius to Fahrenheit	2nd [⌐ °F]	°C x 9/5 + 32
Fahrenheit to Celsius	3rd [⌐ °C]	(°F - 32) x 5/9
grams to ounces avoirdupois	2nd [⌐ oz]	g ÷ 28.349523125
ounces avoirdupois to grams	3rd [⌐ g]	oz x 28.349523125

Examples: Convert 300 grams to ounces.
Convert 1/2 gallon to liters.

Enter	Press	Display
300	2nd [⌐ oz]	10.58218858
.5	3rd [⌐ l]	1.892705892

Hyperbolic Functions

HYP--Hyperbolic Key

This key enables you to use the trigonometric keys to perform hyperbolic functions. The HYP 2nd key sequence enables you to perform inverse hyperbolic functions.

Key Sequence	Function
HYP SIN	sinh
HYP 2nd [SIN^{-1}]	sinh^{-1}
HYP COS	cosh
HYP 2nd [COS^{-1}]	cosh^{-1}
HYP TAN	tanh
HYP 2nd [TAN^{-1}]	tanh^{-1}

Example : Calculate sinh 3 and tanh^{-1} 0.5.

Enter	Press	Display
3	HYP SIN	10.01787493
.5	HYP 2nd [TAN^{-1}]	0.549306144

Combinations, Permutations and Factorials

A combination is an arrangement of objects in which the order is not important. A permutation is an arrangement in which the order is important.

[3rd][nCr]--**Combination Key Sequence**

This key sequence calculates the number of combinations of n items taken r at a time.

1. Enter n and press [x⇆y] .
2. Enter r.
3. Press [3rd] [nCr].

[2nd][nPr]--**Permutation Key Sequence**

This key sequence calculates the number of permutations of n items taken r at a time.

1. Enter n and press [x⇆y] .
2. Enter r.
3. Press [2nd] [nPr].

Example : Find the number of possible permutations for the first-, second-, and third-place finishers (no ties) in an eight-horse race.

Enter	Press	Display
8	[x⇆y]	0.
3	[2nd] [nPr]	336.

Factorials

[3rd][x!]--**Factorial Key Sequence**

This key sequence calculates the factorial of the displayed number. The displayed number must be a non-negative integer ≤ 69.

Statistics Modes

[3rd] [STAT 1] and [3rd] [STAT 2]--
Statistics-Mode Key Sequences

Each of these key sequences selects one of the statistics modes: one-variable or two-variable. In these modes, some of the operating features are limited, as described below.

- You can enter only one pending operation.
- Although you can perform basic arithmetic, permutations, combinations, and polar/rectangular conversions, you must press [=] to complete each operation before entering the result as data.

Clearing the Statistical Registers

Entering either statistics mode clears the statistical registers.

You can also use one of the following methods.

- Pressing [AC/ON] clears the statistical registers, but also clears the statistics mode and the calculator memories.
- During a series of statistics calculations, you can press [2nd] [CSR] to clear previous data before entering each new data set. This method does not affect the memories.

Note: If you press [2nd] [CSR] when the calculator is not in a statistics mode, an error message appears.

One-Variable Statistics

To enter one-variable data values:

1. Press [3rd] [STAT 1] to select the one-variable statistics mode. The STAT indicator appears.

2. Enter a data value and press the [Σ+] key.

3. Continue until all the data values are entered. If you enter an incorrect value, remove it by re-entering the value and pressing [2nd] [Σ-] instead of [Σ+] .

   Each time you press [Σ+] or [2nd] [Σ-], the display shows the number of data values currently in the registers.

To enter repeated values (such as 94, 94, 94) using a single entry, enter 94 [2nd] [FRQ] 3 [Σ+] .

Analyzing the Data

You can perform these calculations on the data.

Calculation	Key Sequence
Mean	[2nd] [$\bar{x}$]
"n-1 weighted" sample standard deviation	[2nd] [σxn-1]
"n weighted" population standard deviation	[2nd] [σxn]
Sum of data values	[2nd] [Σx]
Sum of squares	[2nd] [Σx^2]
Number of data values	[2nd] [n]

Example : Analyze the following test scores: 96, 81, 87, 70, 93, and 77, assuming that the six students are the entire population.

Procedure	Press	Display
Select mode.	[3rd] [STAT 1]	0.
Clear (if necessary).	[2nd] [CSR]	0.
Enter 1st value.	96 [Σ+]	1.
Enter 2nd value.	81 [Σ+]	2.
Enter 3rd value (with mistake).	97 [Σ+]	3.
Remove mistake.	97 [2nd] [Σ-]	2.
Enter 3rd value.	87 [Σ+]	3.
Enter 4th value.	70 [Σ+]	4.
Enter 5th value.	93 [Σ+]	5.
Enter last value.	77 [Σ+]	6.
Calculate mean (class average).	[2nd] [X̄]	84.
Find population standard deviation.	[2nd] [σxn]	9.018499506
Calculate variance.	[x²]	81.33333333
Find sum of values.	[2nd] [Σx]	504.
Find sum of squares.	[2nd] [Σx²]	42824.

Two-Variable Statistics

To enter two-variable data pairs:

1. Press [3rd] [STAT 2] to select the two-variable statistics mode. The STAT indicator appears.

2. Enter an x value, press [x⇆y], enter the y value, and press [Σ+].

3. Continue until all the data pairs are entered. If you enter an incorrect value, remove it by re-entering the pair of values and pressing [2nd] [Σ-] instead of [Σ+].

   Each time you press [Σ+] or [2nd] [Σ-], the display shows the number of data pairs currently in the registers.

To enter repeated data pairs using a single entry, press [2nd] [FRQ] n (where n is the number of repeated pairs) before pressing [Σ+].

To enter data for trend-line analysis, you need only enter the initial value of x. After entering each y value and pressing [Σ+], press [x⇆y] to increment the x value by one.

Analyzing Two-Variable Data

You can perform these calculations on the data.

Calculation	Key Sequence
Mean	2nd [$\bar{x}$] or 2nd [$\bar{y}$]
sample standard deviation	2nd [σxn-1] or 2nd [σyn-1]
population standard deviation	2nd [σxn] or 2nd [σyn]
Sum of data values	2nd [Σx] or 2nd [Σy]
Sum of squares	2nd [Σx^2] or 2nd [Σy^2]
Sum of the xy products	2nd [Σxy]
Number of data pairs	2nd [n]
Correlation coefficient	3rd [COR]
Intercept	2nd [ITC]
Slope	2nd [SLP]
Predicted x value	trial y 2nd [x']
Predicted y value	trial x 2nd [y']

Linear Regression Example:
Given the following x,y data pairs, predict the corresponding y value for an x value of 9. Calculate the correlation coefficient, slope, and intercept of the line, the mean of the x values, and the mean of the y values.

x,y data pairs: (4,5), (4,5), (9,9), (2,3)

Procedure	Press	Display
Select mode	[3rd] [STAT 2]	0.
Clear (if necessary)	[2nd] [CSR]	0.
Enter the two identical data pairs.	4 [x⇆y] 5 [2nd] [FRQ] 2 [Σ+]	2.
Enter 3rd data pair.	9 [x⇆y] 9 [Σ+]	3.
Enter 4th data pair.	2 [x⇆y] 3 [Σ+]	4.
Predict y for an x of 9.	9 [2nd] [y']	9.074766355
Find correlation coefficient.	[3rd] [COR]	0.998030525
Find slope.	[2nd] [SLP]	0.841121495
Find intercept.	[2nd] [ITC]	1.504672897
Find mean of x values.	[2nd] [x̄]	4.75
Find mean of y values.	[2nd] [ȳ]	5.5

Fractions

Entering Fractions

To enter a pure fraction (such as 1/6) as **a/b**, enter the digits for **a**, press [ab/c] , and enter the digits for **b**. You can use as many as six digits for **a** and three digits for **b**. The display shows "⌟" to separate **a** from **b**.

To enter a mixed fraction (such as 3 1/6) as **a b/c**, enter the digits for **a**, press [ab/c], enter the digits for **b**, press [ab/c] , and enter the digits for **c**. You can use as many as three digits each for **a**, **b**, and **c**, provided you do not exceed a total of eight digits. The display shows "_" to separate **a** from **b** and "⌟" to separate **b** from **c**.

Converting Fractions

To alternate between the proper and improper form of a mixed fraction, press [2nd] [d/c].

To alternate between the fractional and decimal form of a number, press [3rd] [F↔D].

Example: Display the result of 3 1/6 - 7/8 as an improper fraction and as a decimal number.

Procedure	Press	Display
Calculate 3 1/6 - 7/8	3 [ab/c] 1 [ab/c] 6 [—] 7 [ab/c] 8 [=]	2_7⌟24
Convert to improper	[2nd] [d/c]	55⌟24
Convert to decimal	[3rd] [F↔D]	2.291666667

Number-System Modes

[3rd] [DEC]--Decimal-Mode Key Sequence

This key sequence selects the decimal mode. When you press [3rd] [DEC], the number in the display is automatically converted to its decimal equivalent.

Note: Normally, you should keep the calculator in the decimal mode. Some of the calculator operating features are limited in the other modes.

[3rd] [BIN]--Binary-Mode Key Sequence

This key sequence selects the binary mode and shows the BIN indicator. In this mode, you can only perform arithmetic operations with binary numbers (integers only).

When you press [3rd] [BIN], the integer portion of the number in the display is automatically converted to its binary equivalent. (If you attempt to convert a number that is outside the range of binary numbers, an error condition occurs.)

You can enter positive binary numbers as large as 111111111 (9 digits). Numbers beyond this are interpreted as negative (two's complement) numbers.

[3rd] [OCT]--Octal-Mode Key Sequence

This key sequence selects the octal mode and shows the OCT indicator. In this mode, you can only perform arithmetic operations with octal numbers (integers only).

When you press [3rd] [OCT], the integer portion of the number in the display is automatically converted to its octal equivalent. (If you attempt to convert a number that is outside the range of octal numbers, an error condition occurs.)

You can enter positive octal numbers as large as 3777777777. Numbers beyond this are interpreted as negative (two's complement) numbers.

[3rd] [HEX]--**Hexadecimal-Mode Key Sequence**

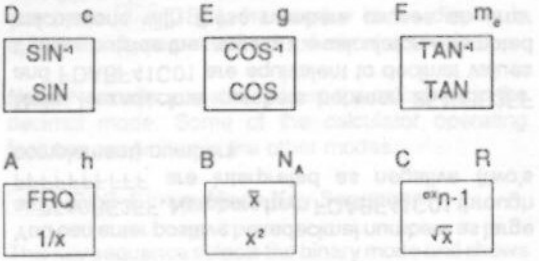
This key sequence selects the hexadecimal mode and shows the HEX indicator. In this mode, you can only perform arithmetic operations with hexadecimal numbers (integers only).

When you press [3rd] [HEX], the integer portion of the number in the display is automatically converted to its hexadecimal equivalent. (If you attempt to convert a number that is outside the range of hexadecimal numbers, an error condition occurs.)

You can enter positive hexadecimal numbers as large as 2540BE3FF. Numbers from FDABF41C01 through FFFFFFFFFF are interpreted as negative (two's complement) numbers.

Note: Hexadecimal numbers between 2540BE3FF and FDABF41C01 are equivalent to decimal values that are outside the range of the calculator. Attempted calculations with these numbers causes an error condition.

To enter the hexadecimal digits A through F, use the keys shown below. In the hexadecimal mode, the calculator reassigns these six keys so that the letters A through F are their only functions.



Although B and D are shown as uppercase letters on the keyboard, they are displayed as lowercase b and d. If you enter ABCD, for example, the display shows AbCd.

Two's Complement

To display the two's complement of the number in the display, press [+/—].

Boolean Logic Operations

You can perform logical AND, OR, XOR, XNOR, and NOT operations in the decimal, binary, octal, and hexadecimal modes.

Except for NOT, these functions compare the corresponding bits of two values. The result is displayed in the current number base.

Note: Although the calculator does not display leading zeros for integers, the logical operations treat each value as a 10-digit binary number. (A displayed value of 0, for example, is treated as 0000000000_{BIN}, and a displayed value of 1 is treated as 0000000001_{BIN}.) Keep this in mind if you see unexpected results.

Function	Effect on each bit of the result		
AND	0 AND 0 = 0	0 AND 1 = 0	1 AND 1 = 1
OR	0 OR 0 = 0	0 OR 1 = 1	1 OR 1 = 1
XOR	0 XOR 0 = 0	0 XOR 1 = 1	1 XOR 1 = 0
XNOR	0 XNOR 0 = 1	0 XNOR 1 = 0	1 XNOR 1 = 1
NOT	NOT 0 = 1	NOT 1 = 0	

Example

What is the binary result of $9F_{HEX}$ XOR 01_{HEX}?

Procedure	Press	Display
Select mode.	3rd [HEX]	HEX 0
Find hex result.	9F 3rd [XOR] 1 =	HEX 9E
Convert to binary.	3rd [BIN]	BIN 10011110

Error Conditions

When an error condition occurs, Error appears in the display. The calculator will not accept a keyboard entry until you press [CE/C] to clear the error condition. (Pressing [CE/C] [CE/C] clears the condition and all pending operations.)

General Error Conditions

The error conditions listed in this section can occur in most calculator modes. Errors occur when you attempt to carry out an incorrect calculation or a result which is not within the capability range of the calculator. Examples :

- Divide a number by zero.
- Use more than 15 levels of open parentheses or more than four pending operations. (one pending operation in the statistics mode.)
- Calculate log, ln, or $\sqrt{x}$ of a negative number.
- Calculate $\sin^{-1}$ or $\cos^{-1}$ of a number whose absolute value is greater than 1.
- Calculate x! of a number that is not a positive integer less than or equal to 69.

In Case of Difficulty

1. If the digits fail to appear in the display, be sure that all of the solar panel is exposed to an adequate light source.

2. Press [AC/ON] to reset the calculator. Then try the calculation again. Review the operating instructions to be certain the calculations were performed properly.

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