Texas Instruments

TI-34

TI-34

Scientific Calculator

Basic Operations

- To turn on the TI-34, expose the solar panel to light and press [AC/ON]. **Note:** Always press [AC/ON] to clear the calculator because memory and display may contain incorrect numbers.
- To turn off the TI-34, cover the solar panel with the slide case.

[2nd] selects the 2nd function of the next key pressed. 2nd functions are located above a key. To cancel [2nd], press [2nd] again. For example, 8 [2nd] [$\sqrt[3]{x}$] finds the cube root of 8.

[MODE] selects a mode function. Mode functions are printed on the top half of a key. To cancel [MODE], press [CE/C]. For example, [MODE] [STAT] sets STAT mode.

Results

The TI-34 calculates up to 12 digits and can display up to 10 digits plus a minus sign (-9,999,999,999 through 9,999,999,999) and a 2-digit exponent. Results with more than 10 digits display in scientific notation.

Basic Arithmetic

[+] [−] [×] [÷]	60 [+] 5 [×] 12 [=]	**120.**
[=]	Completes all pending operations.	
[+/−]	Changes sign of value just entered.	
	1 [+] 8 [+/−] [+] 12 [=]	**5.**
	In binary, octal, or hexadecimal mode, [+/−] calculates the 2's complement of the number in the display.	
[(] [)]	Parenthetical expression (up to 15 open for each pending operation). [=] closes all open parentheses.	
[2nd] [π]	Pi is calculated with 12 digits (3.14159265359), displayed with 10 digits (3.141592654).	
	2 [×] [2nd] [π] [=]	**6.283185307**

Percents

Percentage *(5% of 250)*

250 [×] 5 [2nd] [%]	**0.05**
[=]	**12.5**

Ratio *(Ratio of 250 to 5)*

250 [÷] 5 [2nd] [%]	**0.05**
[=]	**5000.**

Add-On *(5% add-on of 250)*

250 [+] 5 [2nd] [%]	**12.5**
[=]	**262.5**

Discount *(5% discount of 250)*

250 [−] 5 [2nd] [%]	**12.5**
[=]	**237.5**

Fractions

b [a b/c] c	Enters a proper or improper fraction, **b/c** (**b** ≤ 6 digits, **c** ≤ 3 digits). When possible, improper fractions are displayed as mixed numbers.
	3 [a b/c] 4 **3 ⌟4.**
	[×] 3 [=] **2 ⌟1 ⌟4.**
	Single-variable functions display decimal results.
	1 [a b/c] 2 [x²] **0.25**
a [a b/c] b [a b/c] c	Enters the mixed fraction **a b/c**. (**a, b, c** ≤ 3 digits each, with the total digits ≤ 8).
	6 [a b/c] 4 [a b/c] 6 **6 ⌟4 ⌟6.**
	[=] **6 ⌟2 ⌟3.**
[2nd] [d/c]	Simplifies using greatest common factor (if possible), and then toggles display between improper fraction and mixed number.
	30 [a b/c] 4 **30 ⌟4.**
	[2nd] [d/c] **15 ⌟2.**
	[2nd] [d/c] **7 ⌟1 ⌟2.**
	[2nd] [d/c] **15 ⌟2.**
[a b/c]	Toggles display between fraction and decimal. **Note:** Due to display size, not all decimal numbers can toggle to fractions.
	55 [a b/c] 24 **55 ⌟24.**
	[=] **2 ⌟7 ⌟24.**
	[a b/c] **2.291666667**
	[=] **2 ⌟7 ⌟24.**

Powers and Roots

[1/x]	8 [1/x] [+] 4 [1/x] [=]	**0.375**
[x²]	6 [x²] [+] 2 [=]	**38.**
[2nd] [√x]	256 [2nd] [√x] [+] 4 [2nd] [√x] [=]	**18.**
[2nd] [∛x]	8 [2nd] [∛x] [+] 4 [=]	**6.**
[y^x]	5 [y^x] 3 [=]	**125.**
[2nd] [ˣ√y]	8 [2nd] [ˣ√y] 3 [=]	**2.**

Logarithmic Functions

[LOG]	15.32 [LOG]	**1.185258765**
	[+] 12.45 [LOG] [=]	**2.280428117**
[2nd] [10^x]	2 [2nd] [10^x] [−] 10 [x²] [=]	**0.**
[LN]	15.32 [LN]	**2.729159164**
	[+] 12.45 [LN] [=]	**5.250879787**
[2nd] [e^x]	.693 [2nd] [e^x]	**1.999705661**
	[+] 1 [=]	**2.999705661**

(e = 2.71828182846)

Angle Units

[DRG]	Cycles angle-unit setting between degrees, radians, and grads without affecting the displayed number.		
[2nd] [DRG▸]	Cycles (converts) angle-unit setting between degrees, radians, and grads for display, entry, and calculation.		
	45	**DEG**	**45.**
	[2nd] [DRG▸]	**RAD**	**0.785398163**
	[2nd] [DRG▸]	**GRAD**	**50.**
	[2nd] [DRG▸]	**DEG**	**45.**

DMS

Enter DMS (Degrees/Minutes/Seconds) values as **D.MMSSs**, using 0s as necessary:

D	degrees (0–7 digits)
.	decimal-point separator
MM	minutes (must be 2 digits)
SS	seconds (must be 2 digits)
s	fractional part of a second

For example, enter 48°5'3.5" as **48.05035**.

Before using a DMS value in a calculation, you must convert it to decimal with [▸DD].

[▸DD]	Interprets display as DMS and converts it to decimal.	
	30.09090 [▸DD]	**30.1525**
[2nd] [▸DMS]	Temporarily displays current value as DMS.	
	30.1525 [2nd] [▸DMS]	**30°09'09"**

Rectangular to Polar

[R▸P] converts rectangular coordinates (x,y) to polar coordinates (r,θ).

Convert rectangular coordinates (10,8) to polar.

[AC/ON] or [DRG] (if necessary)	DEG	0.
10 [2nd] [x⇄y] 8	DEG	8.
[R▸P] (display r)	DEG	12.80624847
[2nd] [x⇄y] (display θ)	DEG	38.65980826
[2nd] [x⇄y] (display r)	DEG	12.80624847

Polar to Rectangular

[2nd] [P▸R] converts polar coordinates (r,θ) to rectangular coordinates (x,y).

Convert polar coordinates (5,30) to rectangular.

[AC/ON] or [DRG] (if necessary)	DEG	
5 [2nd] [x⇄y] 30	DEG	30.
[2nd] [P▸R] (display x)	DEG	4.330127019
[2nd] [x⇄y] (display y)	DEG	2.5
[2nd] [x⇄y] (display x)	DEG	4.330127019

Trigonometric Functions

Before using the trigonometric functions ([SIN], [COS], [TAN], [2nd] [SIN⁻¹], [2nd] [COS⁻¹], [2nd] [TAN⁻¹]), select **DEG**, **RAD**, or **GRAD** with [DRG].

[AC/ON] or [DRG] (if necessary)	DEG	
90 [SIN]	DEG	1.
[−] 30 [COS]	DEG	0.866025403
[=]	DEG	0.133974596
1 [2nd] [SIN⁻¹]	DEG	90.
[−] .5 [=]	DEG	89.5

Note: Before using a DMS (Degree/Minute/Second) value in a calculation, you must convert it to a decimal with [▸DD].

Hyperbolic Functions

To access hyperbolic functions, press [HYP] and then the function ([HYP] [SIN], [HYP] [COS], [HYP] [TAN], [HYP] [2nd] [SIN⁻¹], [HYP] [2nd] [COS⁻¹], [HYP] [2nd] [TAN⁻¹]).

Note: **DEG**, **RAD**, or **GRAD** does not affect hyperbolic calculations.

5 [HYP] [SIN]	74.20321058
[+] 2 [=]	76.20321058
5 [HYP] [2nd] [SIN⁻¹]	2.312438341
[+] 2 [=]	4.312438341

Statistics

MODE [STAT]	Enters STAT mode.
MODE [DEC], MODE [BIN], MODE [OCT], MODE [HEX]	Designates number mode.
AC/ON	Clears all statistical data, STAT mode, and memory.
Σ+	Enters data point.
2nd [Σ−]	Removes data point.
2nd [Σx]	Sum.
2nd [Σx²]	Sum of squares.
2nd [x̄]	Mean.
2nd [σn]	Population standard deviation (n weighting).
2nd [σn−1]	Sample standard deviation (n−1 weighting).
2nd [n]	Number of data points.
CE/C	Clears current entry. Does not affect statistical data or memory.

Find the sum, mean, population standard deviation, and sample standard deviation for the data set: 45, 55, 55, 55, 60, 80. The last data point is erroneously entered as 8, removed with 2nd [Σ−], *and then correctly entered as 80.*

AC/ON (to clear data)		
MODE [STAT]	STAT	0.
45 Σ+	STAT	1.
60 Σ+	STAT	5.
55 Σ+	STAT	3.
55 Σ+	STAT	4.
55 Σ+	STAT	5.
8 Σ+	STAT	6.
8 2nd [Σ−]	STAT	5.
80 Σ+	STAT	6.
2nd [Σx] (sum)	STAT	350.
2nd [x̄] (mean)	STAT	58.33333333
2nd [Σx²] (sum of squares)	STAT	21100.
2nd [σn] (n weighting)	STAT	10.67187373
2nd [σn−1] (n−1 weighting)	STAT	11.69045194

Probability

A **factorial** is the product of the positive integers from 1 to n. (n must be a positive whole number ≤ 69.)

Using the digits 1, 3, 7, and 9 only one time each, how many 4-digit numbers can you form?

4 [2nd] [x!]	**24.**

Clearing and Correcting

[AC/ON]	Clears display, errors, all pending operations, statistical data, STAT mode and memory. Sets DEG angle units, floating-decimal format.
[CE/C]	Clears value (before pressing operation key), display, errors, all pending operations. Does not affect mode, display format, angle units, memory, or statistical data. **Note:** [CE/C] after [(], [)], [y^x], [2nd] [$\sqrt[x]{y}$], [×], [÷], [+], or [−] clears the calculator as if you had pressed [CE/C] [CE/C].
[CE/C] [CE/C]	Clears display and all pending operations.
[→]	Deletes right-most character of entry.
0 [STO]	Clears memory.

You can change from y^x, $\sqrt[x]{y}$, ×, ÷, +, −, AND, OR, XOR, or XNOR to another operation simply by pressing the intended key if the intended operation has a lower or equal priority.

Constants (Repeated Calculations)

A constant contains an operation ([+], [−], [×], [÷], [y^x], or [2nd] [$\sqrt[x]{y}$]) and a value. [=] repeats the calculation. [AC/ON], [CE/C] [CE/C], or a pending operation key clears the constant.

Calculate 2 × π, 4 × π, and 8 × π.

2 [×] [2nd] [π] [=]	**6.283185307**
4 [=]	**12.56637061**
8 [=]	**25.13274123**

Memory

0 [STO]	Clears memory.		
[STO]	Stores displayed value in memory, replacing current value.		
	23 [STO]	M	23.
	[+] 2 [=]	M	25.
[RCL]	Recalls value in memory.		
	(continued)		
	[RCL]	M	23.
	[+] 3 [=]	M	26.
[SUM]	Adds displayed value to memory.		
	(continued)		
	4 [SUM]	M	4.
	[RCL]	M	27.
[2nd] [EXC]	Exchanges displayed and memory values.		
	(continued)		
	3 [×] 5 [=]	M	15.
	[2nd] [EXC]	M	27.
	[2nd] [EXC]	M	15.

Order of Operations

1st	Expressions inside parentheses.
2nd	Single-variable functions that perform the calculation and display the result immediately (trigonometric, hyperbolic, square, square root, cube root, factorial, reciprocal, angle conversion, percent, logarithms, change sign).
3rd	Universal powers and roots.
4th	Multiplication and division.
5th	Addition and subtraction.
6th	[=] completes all operations.

The TI-34 uses the Algebraic Operating System (AOS™). It stores up to 6 pending operations (3 if STAT is displayed), and up to 15 levels of open parentheses.

The calculator allows you to enter a maximum of 6 pending operations. Pending operations are cleared when you press [CE/C] [CE/C], [AC/ON], [R▶P], [2nd] [P▶R], or [MODE] [STAT].

Number-System Modes

MODE [DEC]	Selects decimal mode.
MODE [BIN]	Selects binary (BIN) mode and converts the integer portion of the displayed number. You can enter positive binary numbers as large as 111111111 (9 digits). Numbers beyond this are interpreted as negative (2's complement) numbers.
MODE [OCT]	Selects octal (OCT) mode and converts the integer portion of the displayed number. You can enter positive octal numbers as large as 377777777. Numbers beyond this are interpreted as negative (2's complement) numbers.
MODE [HEX]	Selects hexadecimal (DEC) mode and converts the integer portion of the displayed number. You can enter positive hexadecimal numbers as large as 2540BE3FF. Numbers from FDABF41C01 through FFFFFFFFFF are interpreted as negative (2's complement) numbers. **Note:** Hexadecimal numbers between 2540BE3FF and FDABF41C01 are equivalent to decimal values that are outside the range of the calculator and therefore cause an error.

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Calculate 16+1 and display in each number mode.

16 + 1 =		**17.**
MODE [BIN]	BIN	**10001.**
MODE [OCT]	OCT	**21.**
MODE [HEX]	HEX	**11.**
MODE [DEC]		**17.**

In HEX, for hexadecimal digits A through F, press the key marked A, B, C, D, E, or F.

B and D are shown as uppercase letters on keyboard, but displayed as lowercase **b** and **d**. If you enter ABCDEF, for example, the display shows **AbCdEF.**

To display the 2's complement of the number in the display, press +/−.

Boolean Logic Operations

Logical AND, OR, XOR, XNOR, and NOT operations exist in binary, octal, and hexadecimal modes.

Except for NOT, these functions compare the corresponding bits of 2 values. The result is displayed in the current number base.

Note: Although the TI-34 does not display leading zeros for integers, 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.

[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	

What is the binary result of 9F HEX XOR 01 HEX?

[MODE] [HEX]	HEX	0.
9F [XOR] 1 [=]	HEX	9E.
[MODE] [BIN]	BIN	10011110.

Notation

[2nd] [Sci]	Selects scientific notation format.	
	12345 [=]	12345.
	[2nd] [Sci]	1.2345^{04}
[2nd] [Eng]	Selects engineering notation format (exponent is a multiple of 3).	
	(continued)	
	[2nd] [Eng]	12.345^{03}
[2nd] [FD]	Restores standard notation (floating-decimal) format.	
[2nd] [FIX] n	Sets decimal places to n (0–9), retaining notation format.	
	(continued)	
	[2nd] [FIX] 2 [=]	12.35^{03}
	[2nd] [FIX] 4 [=]	12.3450^{03}
[2nd] [FIX] [.]	Removes fixed-decimal setting.	
[EXP]	Enters exponent.	

You can enter a value in floating-decimal, fixed-decimal, or scientific notation, regardless of display format. Display format affects only results.

To enter a number in scientific notation:

1. Enter up to 10 digits for base (mantissa). If negative, press [+/−] after entering the mantissa.
2. Press [EXP].
3. Enter 1 or 2 digit exponent. If negative, press [+/−] either before or after entering exponent.

1.2345 [+/−] [EXP] [+/−] 65	-1.2345^{-65}

Display Indicators

M	Value other than 0 in memory.
E	Error condition has occurred.
2nd	Calculator will access 2nd function of next key pressed.
HYP	Calculator will access hyperbolic function of next key pressed.
BIN, OCT, or HEX	Calculator is in binary, octal, or hexadecimal mode.
STAT	Calculator is in statistics mode.
DEG, RAD, or GRAD	Specifies angle-unit setting (degrees, radians, or grads). When you turn on the calculator, angle units are degrees.
( )	1 or more open parentheses.

Error Conditions

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

- Result larger than $\pm 9.999999999 \times 10^{99}$.
- Division by zero.
- More than 15 open parentheses or 6 pending operations (3 in STAT).
- Log, ln, or 1/x of 0.
- Log, ln, or $\sqrt{x}$ of $x < 0$.
- Even root of a negative number.
- 0 to the 0th power, or 0th root of any number.
- Rectangular to polar when x or y has an exponent > 63.
- Tan of x = 90°, -90°, 270°, -270°, 450°, etc.
- Sin^{-1} or $\cos^{-1}$ of x where $|x| > 1$.
- Tanh^{-1} of x where $|x| \geq 1$.
- x! where x is not a positive integer ≤ 69.

Statistical errors

- [2nd] [Σ-] to remove the only data point.
- Calculating $\bar{x}$, σn, or σn-1 with no data points or σn-1 with one data point.
- More than 3 pending operations.

Number mode errors

- Result outside range for that number mode.
- Selecting BIN, OCT, or HEX when displayed number is outside range for that number mode.

In Case of Difficulty

- If the display is blank, expose the solar panel to adequate light. Press [AC/ON] and try again.
- Review the operating instructions.