TI-30 ECO RS English
Scientific Calculator

Basic Operations

TI-30 ECO RS

- To turn on the TI-30 ECO RS, expose the solar to light and press [ON/AC]. **Note:** Always press [ON/AC] to clear the calculator because memory and display may contain incorrect numbers.
- To turn off the TI-30X ECO RS, cover the solar panel with the slide case.

2nd Functions

2nd functions are printed above the keys. [2nd] selects the 2nd function of the next key pressed. For example, 2 [2nd] [x^3] calculates the cube of 2.

Results

The calculator 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. With constant (**K**), repeats the operation and value.	
[+/−]	Changes sign of value just entered.	
	1 [+] 8 [+/−] [+] 12 [=]	**5.**
[(] [)]	Parenthetical expression (up to 15 open). [=] closes all open parentheses.	

[π]	Pi is calculated with 12 digits (3.14159265359), displayed with 10 digits (3.141592654).
2 [×] [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]	Toggles display between a mixed number and an improper fraction.	
	30 [a b/c] 4	**30⌟4**
	[2nd] [d/c]	**7_1⌟2**
	[2nd] [d/c]	**15⌟2**
	[2nd] [d/c]	**7_1⌟2**
[2nd] [F↔D]	Toggles display between fraction and decimal.	
	55 [a b/c] 24	**55⌟24**
	[2nd] [F↔D]	**2.291666667**
	[2nd] [F↔D]	**2_7⌟24**

If a result would overflow or if fixed decimal is 0, no fraction to decimal conversion occurs. It is not an error. Denominator must be a whole number ≤999.

Powers and Roots

[1/x]	8 [1/x] [+] 4 [1/x] [=]	**0.375**
[x²]	6 [x²] [+] 2 [=]	**38.**
[√x]	256 [√x] [+] 4 [√x] [=]	**18.**
[2nd] [x³]	2 [2nd] [x³] [+] 2 [=]	**10.**
[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 x^2 =	**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 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**.

Note: Before using a DMS value in a calculation, you must convert it to decimal with [2nd] [DMS▸DD].

[2nd] [DMS▸DD]	Interprets display as DMS and converts it to decimal.	
	30.09090 [2nd] [DMS▸DD]	**30.1525**
[2nd] [DD▸DMS]	Temporarily displays current value as DMS.	
	30.1525 [2nd] [DD▸DMS]	**30°09'09"0**

Rectangular to Polar

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

Convert rectangular coordinates (*10,8*) *to polar.*

[DRG] (if necessary)	**DEG**	
10 [2nd] [x▸y] 8	**DEG**	**8**
[2nd] [R▸P] (display r)	**DEG r**	**12.80624847**
[2nd] [x▸y] (display θ)	**DEG**	**38.65980825**

Polar to Rectangular

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

Convert polar coordinates (*5,30*) *to rectangular.*

[DRG] (if necessary)	**DEG**	
5 [2nd] [x▸y] 30	**DEG**	**30**
[2nd] [P▸R] (display x)	**DEG x**	**4.330127019**
[2nd] [x▸y] (display y)	**DEG**	**2.5**

Trigonometric Functions

Before using the trigonometric functions ([SIN], [COS], [TAN], [2nd] [SIN^{-1}], [2nd] [COS^{-1}], or [2nd] [TAN^{-1}]), select **DEG**, **RAD**, or **GRAD** with [DRG]. **Note:** Before using a DMS value in a calculation, you must convert it to decimal with [2nd] [DMS▸DD].

[DRG] (if necessary)	**DEG**	
90 [SIN]	**DEG**	**1.**
[−] 30 [COS]	**DEG**	**0.866025404**
[=]	**DEG**	**0.133974596**
1 [2nd] [SIN^{-1}]	**DEG**	**90.**
[−] .5 [=]	**DEG**	**89.5**

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**

One-Variable Statistics

[2nd] [CSR]	Clears all statistical data.
[Σ+]	Enters a data point.
[2nd] [Σ−]	Removes a data point.
[2nd] [FRQ]	Adds or removes multiple occurrences

	of a data point. Enter data point, press [2nd] [FRQ], enter frequency (1–99), press [Σ+] to add or [2nd] [Σ−] to remove data points.
[2nd] [Σx]	Sum.
[2nd] [Σx²]	Sum of squares.
[2nd] [x̄]	Mean.
[2nd] [σxn]	Population standard deviation (n weighting).
[2nd] [σxn-1]	Sample standard deviation (n−1 weighting).
[2nd] [n]	Number of data points.

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.*

[2nd] [CSR] (if **STAT** is displayed)		
45 [Σ+]	**n=**	**1**
55 [2nd] [FRQ] 3 [Σ+]	**n=**	**4**
60 [Σ+]	**n=**	**5**
8 [Σ+]	**n=**	**6**
8 [2nd] [Σ−]	**n=**	**5**
80 [Σ+]	**n=**	**6**
[2nd] [Σx] (sum)		**350.**
[2nd] [x̄] (mean)		**58.33333333**
[2nd] [σxn] (deviation, n weighting)		**10.67187373**
[2nd] [σxn-1] (deviation, n−1 weighting)		**11.69045194**

Probability

A **combination** is an arrangement of objects in which order is not important, as in a hand of cards. 2nd [nCr] calculates the number of possible combinations of n items taken r at a time.

Calculate the number of 5-card poker hands that can be dealt from a deck of 52 cards.

52 2nd [nCr] 5 =	**2598960.**

A **permutation** is an arrangement of objects in which the order is important, as in a race. 2nd [nPr] calculates the number of possible permutations of n items taken r at a time.

Calculate the number of possible permutations for the 1st-, 2nd-, and 3rd-place finishers (no ties) in an 8-horse race.

8 2nd [nPr] 3 =	**336.**

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

[CE/C]	Clears value (before operation key) and **K**, but not **M1**, **M2**, **M3**, or **STAT**.
[CE/C] [CE/C]	Clears display, errors, all pending operations and **K**, but not **M1**, **M2**, **M3**, or **STAT**.
[ON/AC]	Clears display, errors, all pending operations, **K**, **STAT**, **M1**, **M2**, and **M3**. Sets **DEG** angle units, floating-decimal format.
[←]	Deletes right-most character in display.
0 [STO] n	Clears memory n.
[2nd] [FLO]	Clears **SCI** or **ENG** notation.
[2nd] [FIX] [.]	Clears **FIX** notation.
[2nd] [CSR]	Clears all statistical data.

Constants (Repeated Operations)

A constant contains an operation and a value. To establish a constant, press [2nd] [K] after entering the operation and value. [=] repeats the calculation. Another operation, [ON/AC] or [CE/C] clears **K**.

8 [+] 7 [2nd] [K]	**K**	**7.**
[=]	**K**	**15.**
5 [=]	**K**	**12.**
6.6 [=]	**K**	**13.6**

Memory

The calculator has 3 memories. When a memory contains a number other than 0, **M1**, **M2**, or **M3** displays. To clear a single memory, press 0 [STO] 1, 0 [STO] 2, or 0 [STO] 3. To clear all 3 memories (solar only), press [ON/AC].

[STO] n	Stores displayed value in memory n, replacing current value.		
	23 [STO] 1	**M1**	**23.**
	[+] 2 [=]	**M1**	**25.**
[RCL] n	Recalls value in memory n.		
	(continued)		
	[RCL] 1	**M1**	**23.**
	[+] 3 [=]	**M1**	**26.**
[2nd] [SUM] n	Adds displayed value to memory n.		
	(continued)		
	4 [2nd] [SUM] 1	**M1**	**4.**
	[RCL] 1	**M1**	**27.**
[2nd] [EXC] n	Exchanges displayed and memory values.		
	(continued)		
	3 [×] 5 [=]	**M1**	**15.**
	[2nd] [EXC] 1	**M1**	**27.**
	[2nd] [EXC] 1	**M1**	**15.**

Order of Operations

1st	Expressions inside parentheses.
2nd	Single-variable functions that perform the calculation and display the result immediately (square, square root, cube, cube root, trigonometric, factorial, logarithmic, percent, reciprocals, angle conversions).
3rd	Combinations and permutations.
4th	Exponentiation and roots.
5th	Multiplication and division.
6th	Addition and subtraction.
7th	[=] completes all operations.

The TI-30 ECO RS uses AOS™ (Algebraic Operating System). It stores up to 4 pending operations (2 when **STAT** is displayed).

Notation

2nd [SCI]	Selects scientific notation.		
	12345 =		**12345.**
	2nd [SCI]	**SCI**	**1.2345 04**
2nd [ENG]	Selects engineering notation (exponent is a multiple of 3). (continued)		
	2nd [ENG]	**ENG**	**12.345 03**
2nd [FLO]	Restores standard notation (floating-decimal) format.		
2nd [FIX] n	Sets decimal places to n (0–9), retaining notation format. (continued)		
	2nd [FIX] 2	**FIX**	**12.35 03**
	2nd [FIX] 4	**FIX**	**12.3450 03**
2nd [FIX] .	Removes fixed-decimal setting.		
EE	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 EE.
3. Enter 1 or 2 digit exponent. If negative, press +/− either before or after entering exponent.

1.2345 +/− EE +/− 65	**−1.2345 −65**

Display Indicators

M1, **M2**, or **M3**	A value other than 0 in **M1**, **M2**, or **M3**.
2nd	Calculator will access 2nd function (printed above key) of next key pressed.
HYP	Calculator will access hyperbolic function of next key pressed.
SCI or **ENG**	Scientific or engineering notation.
FIX	Fixed-decimal setting.
STAT	Statistical register contains data.
DEG, **RAD**, or **GRAD**	Specifies angle-unit setting (degrees, radians, or grads). When you turn on the calculator, angle units are degrees.
x	x-coordinate of polar to rectangular conversion.
r	r-coordinate of rectangular to polar conversion.
( )	1 or more open parentheses.
Error	Error has occurred. Clear calculator and begin again.
K	Constant is active.

Error Conditions

- Number, result, or memory sum x, where $|x| > 9.999999999 \times 10^{99}$.
- More than 4 pending operations (2 when **STAT** is displayed) or more than 15 open parentheses per pending operation.
- For x!: x not an integer between 0 and 69.
- For y^x: y and $x = 0$ or $y < 0$ and x not an integer.
- For $\sqrt[x]{y}$: $x = 0$ or $y < 0$ and x not an odd integer.
- Dividing by 0.
- For $\sqrt{x}$: $x < 0$.
- For LOG or LN: $x \leq 0$.
- For TAN: x=90°, -90°, 270°, -270°, 450°, etc.
- For SIN^{-1} or COS^{-1}: $|x| > 1$.
- For $TANH^{-1}$: $|x| \geq 1$.
- For R►P: x or y has exponent > 63.
- For nCr or nPr: n or r are not integers ≥ 0.
- More than 9999 statistical data points.
- Statistical data point x, where $|x| \geq 1E64$.
- [2nd] [Σ−] to remove the only data point.
- Calculating $\bar{x}$, σx_n, or σx_{n-1} with no data points or σx_{n-1} with one data point.
- [2nd] [CSR] with no data points.

In Case of Difficulty

- Review instructions to be certain calculations were performed properly.
- If the display is blank, expose the solar panel to adequate light. Press [ON/AC] and try again.

TI Product Service and Warranty Information

TI Product and Services Information

For more information about TI products and services, contact TI by e-mail or visit the TI calculator home page on the world-wide web.

e-mail address: **ti-cares@ti.com**

internet address: **education.ti.com**

Service and Warranty Information

For information about the length and terms of the warranty or about product service, refer to the warranty statement enclosed with this product or contact your local Texas Instruments retailer/distributor.