# 朝 Texas InsTRUMENTS 

## TI-30Xa SOLAR School Edition

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## Table of Contents

Basic Operations ..... 2
Results ..... 3
Basic Arithmetic ..... 3
Percents ..... 4
Powers and Roots ..... 5
Logarithmic Functions ..... 5
Angle Units ..... 6
DMS ..... 6
Rectangular to Polar ..... 7
Polar to Rectangular ..... 7
Trigonometric Functions ..... 8
Hyperbolic Functions ..... 8
One-Variable Statistics ..... 9
Probability ..... 11
Clearing and Correcting ..... 12
Constants (Repeated Operations) ..... 12
Memory ..... 13
Order of Operations ..... 14
Notation ..... 15
Display Indicators ..... 16
Error Conditions ..... 17
In Case of Difficulty ..... 18
Service Information ..... 19
One-Year Limited Warranty for Commercial Electronic Product ..... 20

## Basic Operations

## TI-30Xa Solar

- To turn on the TI-30Xa Solar, expose the solar panel to light and press ©N/AC. Note: Always press ON/AC to clear the calculator because memory and display may contain incorrect numbers.
- To turn off the TI-30Xa Solar, 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．

| Bas |  |
| :---: | :---: |
| ¢⿴囗口－ |  |
| ® | Completes all pending operations． With constant（ $\mathbf{k}$ ，repeats the operation and value． |
| ＋2－ | Changes sign of value just entered． 1 $+8+\boldsymbol{+}-\square 12$ ■ |
| T0 | Parenthetical expression（up to 15 open）．$⿴ 囗 十$ closes all open parentheses． |
| 园 | Pi is calculated with 12 digits （3．14159265359），displayed with 10 digits（3．141592654）． |
|  | 2 区 $\pi$ 回 6.283185307 |

## Percents

| Percentage $(5 \%$ of 250$)$ |  |
| :--- | :--- |
| 250 ® 5 ［2nd $[\%]$ | 0.05 |
| ⿴囗 | 12.5 |

Ratio（Ratio of 250 to $5 \%$ ）

| 250 ［ 5 ［2nd［\％］ | 0.05 |
| :--- | ---: |
| 回 | 5000. |

Add－On（5\％add－on of 250）

| 250 ■ 5 ［2nd［\％］ | 12.5 |
| :--- | ---: |
| ⿴囗 | 262.5 |


| Discount（5\％discount of 250 ） |  |
| :--- | ---: |
| $250 \square 5$［2nd $[\%]$ | 12.5 |
| ⿴囗 | 237.5 |

Powers and Roots

| $11 \times$ |  | 0.375 |
| :---: | :---: | :---: |
| $\times^{2}$ |  | 38. |
| $\sqrt{x}$ | 256 $\sqrt{x}$＋ $4 \sqrt{x}$ 可 | 18. |
| 2nd［ $x^{3}$ ］ |  | 10. |
| 2nd［ $\sqrt[3]{x}$ ］ |  | 6. |
| yx |  | 125. |
| 2nd［ $\sqrt{x}$ ］ | 8 2nd［ $\sqrt{x}$ ］$]$ 3回 | 2. |


| Logarithmic Functions |  |  |
| :---: | :---: | :---: |
| LOG | 15.32 LOG | 1.185258765 |
|  | ＋12．45［0G ${ }^{\text {¢ }}$ | 2.280428117 |
| 2nd［10 ${ }^{\text {a }}$ ］ | 2 2nd［10x］$\square 10$ 这国 | 0. |
| LT | 15.32 LV | 2.729159164 |
|  | ＋ 12.45 LT 回 | 5.250879787 |
| 2nd［ $\mathrm{e}^{\mathrm{x}}$ ］ | ． 693 ［ 2nd［ $\mathrm{e}^{\mathrm{x}}$ ］ | 1.999705661 |
|  | ＋1回 | 2.999705661 |

（ $e=2.71828182846$ ）

## Angle Units

| DRG | Cycles angle-unit setting between <br> degrees, radians, and grads <br> without affecting displayed number. |
| :--- | :--- |
| 2nd [DRG-] | Cycles (converts) angle-unit setting <br> between degrees, radians, and |
|  | grads for display, entry, and |
| calculation. |  |

## DMS

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

D degrees (0-7 digits)

|  | decimal-point separator <br> MM |
| :--- | :--- |
| minutes (must be 2 digits) |  |
| SS | seconds s must be 2 digits) |
| s | fractional part of a second |

For example, enter $48^{\circ} 5^{\prime} 3.5^{\prime \prime}$ 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] | $30^{\circ} 09^{\prime} 09^{\prime \prime} 0$ |

## Rectangular to Polar

2nd $[\mathrm{R}-\mathrm{P}]$ converts rectangular coordinates $(x, y)$ to polar coordinates $(r, \theta)$.

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

| DRG (if necessary) | DEG |  |
| :--- | :--- | ---: |
| 10 2nd $[x=y] 8$ | DEG | $\mathbf{8}$ |
| 2nd $[R=P]$ (display $r)$ | DEG r | $\mathbf{1 2 . 8 0 6 2 4 8 4 7}$ |
| 2nd $[x=y]$ (display $\theta$ ) | DEG | $\mathbf{3 8 . 6 5 9 8 0 8 2 5}$ |

## Polar to Rectangular

2nd [ $\mathrm{P}-\mathrm{R}$ ] converts polar coordinates $(r, \theta)$ 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 | $\mathbf{2 . 5}$ |

## 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 $-D D$ ].

| DRG (if necessary) | DEG |  |
| :---: | :---: | :---: |
| 90 SIN | DEG | 1. |
| $\square 30 \mathrm{COS}$ | DEG | 0.866025404 |
| $\pm$ | DEG | 0.133974596 |
| 1 2nd [ $\mathrm{SIN}^{-1}$ ] | DEG | 90. |
| $\square .50$ | DEG | 89.5 |

## Hyperbolic Functions

To access hyperbolic functions, press HYP and then the function (HYP SIN, HYP COS, HYP TAAN, 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 | $\mathbf{7 4 . 2 0 3 2 1 0 5 8}$ |
| :--- | :--- |
| +2 日 | $\mathbf{7 6 . 2 0 3 2 1 0 5 8}$ |
| 5 HYP 2nd [SIN-1] | $\mathbf{2 . 3 1 2 4 3 8 3 4 1}$ |
| +2 日 | $\mathbf{4 . 3 1 2 4 3 8 3 4 1}$ |

## One-Variable Statistics

| 2nd [CSR] | Clears all statistical data. |
| :---: | :---: |
| 上+ | Enters a data point. |
| [nd] [ $\mathrm{E}-\mathrm{]}$ | Removes a data point. |
| 2nd [FRQ] | Adds or removes multiple occurrences of a data point. |
|  | Enter data point, press [2nd [FRO], enter frequency (1-99), press $\Sigma+$ to add or 2nd [ $\Sigma$-] to remove data points. |
| 2nd [ $\Sigma x$ ] | Sum. |
| 2nd [ $\left[x^{2}\right]$ | Sum of squares. |
| 2nd [ $\bar{x}$ ] | Mean. |
| 2nd [ $\sigma \times n$ ] | Population standard deviation ( $n$ weighting). |
| 2nd [ $\sigma \times n-1$ ] | 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 [ $\Sigma-$ ], and then correctly entered as 80 .


## 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 田
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 8horse race.
8 [2nd [ nPr$] 3$ 目

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

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 $\mathrm{M} 1, \mathrm{M} 2, \mathrm{M} 3$, or STAT. |
| :---: | :---: |
| CE/C CE/C | Clears display, errors, all pending operations and K , but not $\mathrm{M} 1, \mathrm{M} 2$, M 3 , or stat. |
| OFF ON/C <br> (battery) | Clears display, errors, all pending operations, K , and STAT, but not M1, M2, and мз. Sets DEG angle units, floatingdecimal format. |
| ON/AC | Clears display, errors, all pending operations, K, STAT, M1, M2, and м3. Sets deg angle units, floating-decimal format. |
| 0 [ST0 $n$ | Clears memory $n$. |
| 2nd [FLO] | Clears SCI or ENG notation. |
| 2nd [FIX] $\square^{\text {a }}$ | Clears fix notation. |
| 2nd [CSR] | lears 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. $\exists$ repeats the calculation. Another operation, ON/AC or CE/C, clears k .

| 8■7 2nd [K] | K | 7. |
| :---: | :---: | :---: |
| T | K | 15. |
| 5回 | K | 12. |
| $6.6 \square$ | K | 13.6 |

## Memory

The calculator has 3 memories. When a memory contains a number other than 0 , м1, М2, or мз displays. To clear a single memory, press 0 STO 1, 0 STO 2, or 0 STO 3. To clear all 3 memories, press ON/AC.

\begin{tabular}{|c|c|c|c|}
\hline \multirow[t]{2}{*}{ST0 \(n\)} \& \multicolumn{3}{|l|}{Stores displayed value in memory \(n\), replacing current value.} \\
\hline \& \[
\begin{aligned}
\& 23 \text { STO } 1 \\
\& +2 \text { OT } \\
\& \hline
\end{aligned}
\] \& \[
\begin{aligned}
\& \text { M1 } \\
\& \text { M1 }
\end{aligned}
\] \& \begin{tabular}{l}
23. \\
25. \\
\hline
\end{tabular} \\
\hline \(\overline{\mathrm{RCLL}} n\) \& \begin{tabular}{l}
Recalls value in (continued) RCL 1 \\
+ 3 3 -
\end{tabular} \& M1
M1 \& 23.
26. \\
\hline 2nd [SUM] \(n\) \& \begin{tabular}{l}
Adds displayed \\
\(n\). \\
(continued) \\
4 2nd [SUM] 1 \\
RCL 1
\end{tabular} \& \begin{tabular}{l}
M1 \\
M1
\end{tabular} \& \(\begin{array}{r}1 \\ 4 . \\ 4 . \\ \hline\end{array}\) \\
\hline 2nd [EXC] \(n\) \& \begin{tabular}{l}
Exchanges disp values. \\
(continued) \\
3区5 \\
2nd [EXC] 1 \\
2nd [EXC] 1
\end{tabular} \& \begin{tabular}{l}
d and \\
M1 \\
M1 \\
M1
\end{tabular} \& ry

15. 
16. 
17. <br>
\hline
\end{tabular}

## 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． |
| 5 th | Multiplication and division． |
| 6 th | Addition and subtraction． |
| 7 th | ⿴囗⿱一一completes all operations． |

The TI－30Xa uses AOS ${ }^{\text {TM }}$（Algebraic Operating System）．It stores up to 4 pending operations（ 2 when STAT is displayed）．

| Notation |  |
| :---: | :---: |
| 2nd [SCI] | Selects scientific notation. |
| 2nd [ENG] | Selects engineering notation (exponent is a multiple of 3 ). (continued) |
| 2nd [FLO] | Restores standard notation (floatingdecimal) format. |
| 2nd [FIX] $n$ | Sets decimal places to $n(0-9)$, retaining notation format. (continued) |
| 2nd [FIX]. | Removes fixed-decimal setting. |
| EE | Enters exponent. |

You can enter a value in floating-decimal, fixeddecimal, 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 $+\overparen{\square}$ after entering the mantissa.
2. Press EE.
3. Enter 1 or 2 digit exponent. If negative, press $+\therefore-$ either before or after entering exponent.

| $1.2345+\widetilde{+}$ EE $+\widetilde{C-} 65$ | $-1.2345-65$ |
| :--- | :--- |


| Display Indicators |  |
| :--- | :--- |
| M1, M2, or M3 | A value other than 0 in M1, M2, or м3. |
| 2nd | Calculator will access 2nd function <br> (printed above key) of next key pressed. |
| HYP | Calculator will access hyperbolic function <br> of next key pressed. |
| SCI or ENG | Scientific or engineering notation. |
| FIX | Fixed-decimal setting. |
| STAT | Statistical register contains data. |
| DEG, RAD, or | Specifies angle-unit setting (degrees, <br> radians, or grads). When you turn on the <br> calculator, angle units are degrees. |
| $\mathbf{x}$ | $x$-coordinate of polar to rectangular <br> conversion. |
| $\mathbf{r}$ | $r$-coordinate of rectangular to polar <br> conversion. |
| $\mathbf{I}$ | 1 or more open parentheses. <br> Error has occurred. Clear calculator and <br> begin again. |
| $\mathbf{K}$ | 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 $\mathrm{y}^{\mathrm{x}}: ~ y$ and $x=0$ or $y<0$ and $x$ not an integer.
- For $\sqrt{y}$ : $x=0$ or $y<0$ and $x$ not an odd integer.
- Dividing by 0 .
- For $\sqrt{\mathrm{x}}: x<0$.
- For LOG or LN: $x \leq 0$.
- For TAN: $x=90^{\circ},-90^{\circ}, 270^{\circ},-270^{\circ}, 450^{\circ}$, etc.
- For $\mathrm{SIN}^{-1}$ or $\mathrm{COS}^{-1}:|x|>1$.
- For TANH ${ }^{-1}:|x| \geq 1$.
- For R $\sim$ P: $x$ or $y$ has exponent $>63$.
- For nCr or nPr: $n$ or $r$ are not integers $\geq 0$.
- More than 9999 statistical data points.
- Statistical data point $x$, where $|x| \geq 1 \mathrm{E} 64$.
- 2nd [ $\Sigma$-] to remove the only data point.
- Calculating $\overline{\mathrm{x}}$, $\sigma \times \mathrm{n}$, or $\sigma \times \mathrm{n}-1$ with no data points or $\sigma \times n-1$ with one data point.
- 2nd [CSR] with no data points.


## In Case of Difficulty

Review instructions to be certain calculations were performed properly.

## Tl-30Xa Solar

If the display is blank, expose the solar panel to adequate light. Press ON/AC and try again.

## Service Information

## For General Information

| Home Page: | education.ti.com |
| :--- | :--- |
| KnowledgeBase | education.ti.com/support |
| and E-mail |  |
| Inquires: |  |


| Phone: | 1.800.TI.CARES (1.800.842.2737) <br>  <br>  <br>  <br>  <br> For U.S., Canada, Mexico, Puerto <br> Rico, and Virgin Islands only |
| :--- | :--- |
| International | education.ti.com/international |
| Information: |  |

## For Technical Support

KnowledgeBase education.ti.com/support
and Support by
E-mail:

Phone 1.972.917.8324
(not toll-free):

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