TI-30X II S :
A Guide for Teachers

Developed by
Texas Instruments Incorporated

Activities developed by
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Illustrated by
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About the Authors

Gary Hanson and Aletha Paskett are math teachers in the Jordan Independent School District in Sandy, Utah. They developed the Activities section and assisted in evaluating the appropriateness of the examples in the How to Use the TI-30 X IIS section of this guide.

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How the Teacher Guide is Organized

This guide consists of two sections: Activities and How to Use the TI-30 X IIS. The Activities section is a collection of activities for integrating the TI-30 X IIS into mathematics instruction. The How To Use the TI-30 X IIS section is designed to help you teach students how to use the calculator.

Activities
The activities are designed to be teacher-directed. They are intended to help develop mathematical concepts while incorporating the TI-30 X IIS as a teaching tool. Each activity is self-contained and includes the following:
- An overview of the mathematical purpose of the activity.
- The mathematical concepts being developed.
- The materials needed to perform the activity.
- The detailed procedure, including step-by-step TI-30 X IIS key presses.
- A student activity sheet.

How to Use the TI-30 X IIS
This section contains examples on transparency masters. Chapters are numbered and include the following:
- An introductory page describing the calculator keys presented in the example, the location of those keys on the TI-30 X IIS, and any pertinent notes about their functions.
- Transparency masters following the introductory page provide examples of practical applications of the key(s) being discussed. The key(s) being discussed are circled on the TI-30 X IIS keyboard.

Things to Keep in Mind
- While many of the examples on the transparency masters may be used to develop mathematical concepts, they were not designed specifically for that purpose.
- For maximum flexibility, each example and activity is independent of the others. Select the transparency master appropriate for the key you are teaching, or select the activity appropriate for the mathematical concept you are teaching.
- If an example does not seem appropriate for your curriculum or grade level, use it to teach the function of a key (or keys), and then provide relevant examples of your own.
- To ensure that everyone starts at the same point, have students reset the calculator by pressing ON and CLEAR simultaneously or by pressing [2nd] [RESET] and then selecting Y (yes).

Conventions Used in the Teacher Guide
- In the text, brackets [ ] around a key's symbol/name indicate that the key is a second, or alternate, function.
  For example: [SIN⁻¹]
- On the transparency masters, second functions are shown just as they appear on the keyboard.
  For example: \( \text{SIN}^{-1} \)

How to Order Additional Teacher Guides
To place an order or to request information about Texas Instruments (TI) calculators, use our e-mail address: ti-cares@ti.com visit our TI calculator home page: www.ti.com/calc or, call our toll-free number: 1-800-TI-CARES (1-800-842-2737)
Two-Line Display
The first line (entry line) displays an entry of up to 88 digits (47 digits for the stat and constant entry lines). Entries begin on the left; those with more than 11 digits scroll to the right. Press \( \text{1} \) and \( \text{2} \) to scroll the entry line. Press 2nd \( \text{1} \) or 2nd \( \text{2} \) to move the cursor immediately to the beginning or end of the entry.

The second line (result line) displays a result of up to 10 digits, plus a decimal point, negative sign, \( \times 10 \) indicator, and 2-digit positive or negative exponent. Results that exceed the digit limit are displayed in scientific notation.

Display Indicators
Refer to Appendix B for a list of the display indicators.

Order of Operations
The TI-30X IIS uses the Equation Operating System (EOS\textsuperscript{TM}) to evaluate expressions. The operation priorities are listed on the transparency master in Chapter 4, Order of Operations and Parentheses (page 41). Because operations inside parentheses are performed first, you can use \( \text{1} \) \( \text{2} \) to change the order of operations and, therefore, change the result.

2nd Functions
Pressing 2nd displays the 2nd indicator, and then accesses the function printed above the next key pressed. For example, 2nd \( \sqrt{\text{25}} \) \( \text{1} \) \( \text{ENTER} \) calculates the square root of 25 and returns the result, 5.

Menus
Certain TI-30X IIS keys display menus:

- \( \text{MEMVAR} \), 2nd [RCL], 2nd [STO], 2nd [STAT], 2nd [STATVAR], 2nd [EXIT STAT], 2nd [PRB], 2nd [DRG], 2nd [R-►P], 2nd [SCI/ENG], 2nd [FIX] and 2nd [RESET].

Press \( \text{1} \) or \( \text{2} \) to move the cursor and underline a menu item. To return to the previous screen without selecting the item, press \( \text{CLEAR} \). To select a menu item:

- Press \( \text{ENTER} \) while the item is underlined, or
- For menu items followed by an argument value (for example, \( nPr \)), enter the value while the item is underlined. The item and the argument value are displayed on the previous screen.

Previous Entries
After an expression is evaluated, use \( \text{1} \) \( \text{2} \) and \( \text{1} \) \( \text{2} \) to scroll through previous entries, which are stored in the TI-30X IIS history. You cannot retrieve previous entries while in STAT mode.

Error Messages
Refer to Appendix C for a listing of the error messages.

Last Answer (Ans)
The most recently calculated result is stored to the variable Ans. Ans is retained in memory, even after the TI-30X IIS is turned off. To recall the value of Ans:

- Press 2nd [ANS] (Ans displays on the screen), or
- Press any operation key (\( + \), \( - \), etc.) as the first part of an entry. Ans and the operator are both displayed.
Resetting the TI-30X IIS

Pressing [ON] and [CLEAR] simultaneously or pressing [2nd] [RESET] and then selecting Y (yes) resets the calculator.

Resetting the calculator:

- Returns settings to their defaults—standard notation (floating decimal) and degree (DEG) mode.

- Clears memory variables, pending operations, entries in history, statistical data, constants, and Ans (Last Answer).

**Note:** The examples on the transparency masters assume all default settings.

**Automatic Power Down™ (APD™)**

If the TI-30X IIS remains inactive for about 5 minutes, APD turns it off automatically. Press [ON] after APD. The display, pending operations, settings, and memory are retained.
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The Better Batter — The FIX Key

Overview

Students use 2nd [FIX] on the TI-30X IIS to change numbers to different place values. Students calculate batting averages using the TI-30X IIS and then round their answers to 3 decimal places.

Math Concepts

• rounding
• place value
• division
• comparing and ordering decimals

Materials

• TI-30X IIS
• pencil
• student activity

Introduction

1. Have students practice rounding the following numbers to 3 decimal places using pencil and paper.
   a. 2.35647 2.356
   b. 15.3633 15.363
   c. 0.02698 0.027
2. Have students round the following numbers to 4 decimal places using the TI-30X IIS.
   a. 4.39865 4.3987
   b. 72.965912 72.9659
   c. 0.29516 0.2952
   d. 0.00395 0.0040

Activity

Present the following problem to students:

You are going to play Virtual Baseball. You need to select 9 players from the list to be on your team. Choose the players with the best batting averages. Find the batting averages (number of hits ÷ number of times at bat) rounded to 3 decimal places for each player. Make a list of your players in order, from highest to lowest.

See the table on page 3 for solutions.
### The Better Batter — The FIX Key (Continued)

<table>
<thead>
<tr>
<th>Player</th>
<th>Number of Hits</th>
<th>Number of Times at Bat</th>
<th>Batting Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Ripken</td>
<td>122</td>
<td>368</td>
<td>0.332</td>
</tr>
<tr>
<td>Puckett</td>
<td>119</td>
<td>363</td>
<td>0.328</td>
</tr>
<tr>
<td>Molitor</td>
<td>119</td>
<td>364</td>
<td>0.327</td>
</tr>
<tr>
<td>Greenwell</td>
<td>104</td>
<td>334</td>
<td>0.311</td>
</tr>
<tr>
<td>Tartabull</td>
<td>103</td>
<td>311</td>
<td>0.331</td>
</tr>
<tr>
<td>Palmeiro</td>
<td>120</td>
<td>366</td>
<td>0.328</td>
</tr>
<tr>
<td>Franco</td>
<td>109</td>
<td>344</td>
<td>0.317</td>
</tr>
<tr>
<td>Joyner</td>
<td>105</td>
<td>338</td>
<td>0.311</td>
</tr>
<tr>
<td>Boggs</td>
<td>106</td>
<td>329</td>
<td>0.322</td>
</tr>
<tr>
<td>Baines</td>
<td>91</td>
<td>290</td>
<td>0.314</td>
</tr>
<tr>
<td>Sax</td>
<td>113</td>
<td>388</td>
<td>0.291</td>
</tr>
<tr>
<td>Williams</td>
<td>20</td>
<td>74</td>
<td>0.270</td>
</tr>
<tr>
<td>Sheridan</td>
<td>15</td>
<td>63</td>
<td>0.238</td>
</tr>
<tr>
<td>Barfield</td>
<td>64</td>
<td>284</td>
<td>0.225</td>
</tr>
<tr>
<td>Mattingly</td>
<td>109</td>
<td>367</td>
<td>0.297</td>
</tr>
<tr>
<td>Hall</td>
<td>87</td>
<td>280</td>
<td>0.311</td>
</tr>
</tbody>
</table>
Problems

1. Round the following numbers to 3 decimal places.
   
   a. 2.35647
   
   b. 15.3633
   
   c. 0.02698

2. Using the TI-30X IIS, round the following numbers to 4 decimal places.
   
   a. 4.39865
   
   b. 72.965912
   
   c. 0.29516
   
   d. 0.00395
The Better Batter — The FIX Key

Problem

You are going to play Virtual Baseball. You need to select 9 players from the list to be on your team. Choose the players with the best batting averages.

Procedure

1. Find the batting averages (number of hits ÷ number of times at bat) rounded to 3 decimal places for each player.

<table>
<thead>
<tr>
<th>Player</th>
<th>Number of Hits</th>
<th>Number of Times at Bat</th>
<th>Batting Average (rounded to 3 decimal places)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Ripken</td>
<td>122</td>
<td>368</td>
<td>0.334</td>
</tr>
<tr>
<td>Puckett</td>
<td>119</td>
<td>363</td>
<td>0.326</td>
</tr>
<tr>
<td>Molitor</td>
<td>119</td>
<td>364</td>
<td>0.326</td>
</tr>
<tr>
<td>Greenwell</td>
<td>104</td>
<td>334</td>
<td>0.311</td>
</tr>
<tr>
<td>Tartabull</td>
<td>103</td>
<td>311</td>
<td>0.330</td>
</tr>
<tr>
<td>Palmeiro</td>
<td>120</td>
<td>366</td>
<td>0.330</td>
</tr>
<tr>
<td>Franco</td>
<td>109</td>
<td>344</td>
<td>0.313</td>
</tr>
<tr>
<td>Joyner</td>
<td>105</td>
<td>338</td>
<td>0.310</td>
</tr>
<tr>
<td>Boggs</td>
<td>106</td>
<td>329</td>
<td>0.326</td>
</tr>
<tr>
<td>Baines</td>
<td>91</td>
<td>290</td>
<td>0.311</td>
</tr>
<tr>
<td>Sax</td>
<td>113</td>
<td>388</td>
<td>0.291</td>
</tr>
<tr>
<td>Williams</td>
<td>20</td>
<td>74</td>
<td>0.286</td>
</tr>
<tr>
<td>Sheridan</td>
<td>15</td>
<td>63</td>
<td>0.233</td>
</tr>
<tr>
<td>Barfield</td>
<td>64</td>
<td>284</td>
<td>0.227</td>
</tr>
<tr>
<td>Mattingly</td>
<td>109</td>
<td>367</td>
<td>0.300</td>
</tr>
<tr>
<td>Hall</td>
<td>87</td>
<td>280</td>
<td>0.307</td>
</tr>
</tbody>
</table>

2. Make a list of your players in order, from highest to lowest.

Player 1 ________________ Player 6 ________________
Player 2 ________________ Player 7 ________________
Player 3 ________________ Player 8 ________________
Player 4 ________________ Player 9 ________________
Player 5 ________________
**Star Voyage — Scientific Notation**

**Overview**

Students investigate scientific notation by changing numbers into scientific notation, and then using them in calculations.

**Math Concepts**

- scientific notation
- addition
- division

**Materials**

- TI-30X IIS
- pencil
- student activity

**Introduction**

Set up the activity by telling your students:

*The standard form for scientific notation is* \( a \times 10^n \), *where* \( a \) *is greater than or equal to 1 and less than 10, and* \( n \) *is an integer.*

1. Have students practice writing the following numbers in scientific notation using pencil and paper.
   
   a. 93 000 000  \( 9.3 \times 10^7 \)
   
   b. 384 000 000 000  \( 3.84 \times 10^{11} \)
   
   c. 0.00000000000234  \( 2.34 \times 10^{-12} \)
   
   d. 0.0000000157  \( 1.57 \times 10^{-8} \)

2. Have students change the following numbers into scientific notation using the TI-30X IIS.
   
   a. 12 000 000  \( 1.2 \times 10^7 \)
   
   b. 974 000 000  \( 9.74 \times 10^8 \)
   
   c. 0.0000034  \( 3.4 \times 10^{-6} \)
   
   d. 0.00000004  \( 4 \times 10^{-9} \)

**Note:** Answers assume the default floating decimal setting.

3. Have students change the following numbers into floating decimal (standard notation).
   
   a. 5.8 \( \times 10^7 \)  \( 58 000 000 \)
   
   b. 7.32 \( \times 10^5 \)  \( 732 000 \)
   
   c. 6.2 \( \times 10^{-6} \)  \( 0.0000062 \)
   
   d. 3 \( \times 10^{-8} \)  \( 0.00000003 \)

**Note:** To enter a negative number, press \( \) and then enter the number.

---

1. Enter the first number.  12000000
2. Press \( \text{2nd} \) [SCI/ENG].  

**Note:**

1. Enter 5.8; press \( \text{2nd} \) EE.  5.8e
2. Enter 7; press \( \text{2nd} \) [SCI/ENG].  
3. Press \( \) .  
4. Press \( \) ENTER \( \) ENTER.  

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TI-30X IIS: A Guide for Teachers
Activity

Present the following problem to students:

You are a captain of a starship. You have been assigned to go to Alpha Centauri and you have 5 years to get there. The distance from the sun to Alpha Centauri is $2.5 \times 10^{13}$ miles. The distance from the earth to the sun is approximately $9.3 \times 10^7$ miles. Your ship can travel at the speed of light. You know that light can travel a distance of $6 \times 10^{12}$ miles in 1 light year. Will you be able to get to Alpha Centauri on time?

Procedure

1. Using the TI-30X IIS, find the total distance you need to travel.

$$2.5 \times 10^{13} + 9.3 \times 10^7 = 2.5000093 \times 10^{13} \text{ miles}$$

2. Next, find out how long it will take you to travel the distance. (distance traveled ÷ 1 light year)

$$2.5000093 \times 10^{13} ÷ 6 \times 10^{12} = 4.166682167 \text{ years}$$

3. Can you make the trip in the given time?

Yes

Extension

Now that you have been successful, you have been asked to make another trip. The distance from the Sun to Delta Centauri is $9 \times 10^{13}$ miles. How long will it take you to get there from Earth?

≈15 years

Hint: Make sure your calculator is in scientific notation mode before beginning addition.

Hint: The Earth is approximately $9.3 \times 10^7$ miles from the Sun.
**Problems**

1. Write the following numbers in scientific notation.

<table>
<thead>
<tr>
<th>Standard Notation</th>
<th>Scientific Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 93 000 000</td>
<td>____________________</td>
</tr>
<tr>
<td>b. 384 000 000 000</td>
<td>____________________</td>
</tr>
<tr>
<td>c. 0.0000000000234</td>
<td>____________________</td>
</tr>
<tr>
<td>d. 0.000000157</td>
<td>____________________</td>
</tr>
</tbody>
</table>

2. Using the TI-30X IIS, change the following numbers into scientific notation.

<table>
<thead>
<tr>
<th>Standard Notation</th>
<th>Scientific Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 12 000 000</td>
<td>____________________</td>
</tr>
<tr>
<td>b. 974 000 000</td>
<td>____________________</td>
</tr>
<tr>
<td>c. 0.0000034</td>
<td>____________________</td>
</tr>
<tr>
<td>d. 0.00000004</td>
<td>____________________</td>
</tr>
</tbody>
</table>

3. Using the TI-30X IIS, change the following numbers into floating decimal notation (standard).

<table>
<thead>
<tr>
<th>Scientific Notation</th>
<th>Standard Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. $5.8 \times 10^7$</td>
<td>____________________</td>
</tr>
<tr>
<td>b. $7.32 \times 10^5$</td>
<td>____________________</td>
</tr>
<tr>
<td>c. $6.2 \times 10^{-6}$</td>
<td>____________________</td>
</tr>
<tr>
<td>d. $3 \times 10^{-8}$</td>
<td>____________________</td>
</tr>
</tbody>
</table>
Star Voyage —
Scientific Notation

Problem
You are a captain of a starship. You have been assigned to go to Alpha Centauri, and you have 5 years to get there. The distance from the Sun to Alpha Centauri is $2.5 \times 10^{13}$ miles. The distance from the Earth to the Sun is approximately $9.3 \times 10^7$ miles. Your ship can travel at the speed of light. You know that light can travel a distance of $6 \times 10^{12}$ miles in 1 light year. Will you be able to get to Alpha Centauri on time?

Procedure
1. Using the TI-30X IIS, find the total distance that you need to travel.

   ________________________________________________________________________

   Hint: Make sure your calculator is in scientific notation mode before you begin addition.

2. Next, find out how long it will take you to travel the distance. (distance traveled ÷ 1 light year) ____________________________________________________________

   ________________________________________________________________________

3. Can you make the trip in the given time? ________________________________

Extension
Now that you have been successful, you have been asked to make another trip. The distance from the Sun to Delta Centauri is $9 \times 10^{13}$ miles. How long will it take you to get there from Earth?

   Hint: The Earth is approximately $9.3 \times 10^7$ miles from the Sun.
Overview

Students practice solving sine, cosine, and tangent ratios, and solve problems involving trigonometric ratios.

Introduction

Introduce the trigonometric ratios to students.

\[
\begin{align*}
\sin &= \text{opposite leg} \div \text{hypotenuse} \\
\cos &= \text{adjacent leg} \div \text{hypotenuse} \\
\tan &= \text{opposite leg} \div \text{adjacent leg}
\end{align*}
\]

1. Have students find the trigonometric ratios for the triangle using the above definitions. Round to the nearest hundredth if necessary. (Use \text{2nd} [\text{FIX}] for rounding.)
   
   \[
   \begin{align*}
a. \quad \sin C &= \frac{3}{5} = 0.60 \\
b. \quad \cos C &= \frac{4}{5} = 0.80 \\
c. \quad \tan C &= \frac{3}{4} = 0.75 \\
d. \quad \sin A &= \frac{4}{5} = 0.80 \\
e. \quad \cos A &= \frac{3}{5} = 0.60 \\
f. \quad \tan A &= \frac{4}{3} = 1.33
   \end{align*}
   \]

2. Have students find the value of each ratio using the TI-30X IIS. Round to the nearest 10 thousandth.
   
   \[
   \begin{align*}
a. \quad \sin 71^\circ &= 0.9455 \\
b. \quad \tan 31^\circ &= 0.6009 \\
c. \quad \cos 25^\circ &= 0.9063
   \end{align*}
   \]

3. Have students find the measure of each angle using the TI-30X IIS. Round to the nearest degree.
   
   \[
   \begin{align*}
a. \quad \sin B &= 0.4567 \quad 27 \text{ degrees} \\
b. \quad \cos A &= 0.6758 \quad 47 \text{ degrees} \\
c. \quad \tan C &= 5.83 \quad 80 \text{ degrees}
   \end{align*}
   \]
Activity

Present the following problem to students:

You need to build a ramp to your front door. The distance from the ground to the bottom of the door is 1.5 feet. You don't want the angle of incline to be more than 6 degrees. The distance from the street to the door is 20 feet. Is there enough room to build the ramp?

Procedure

1. Make a drawing of the problem.

2. Use the trigonometric ratio

   \[ \tan = \frac{\text{opposite leg}}{\text{adjacent leg}} \]

   to find angle \( A \).

   Angle \( A \) is 4.3 degrees (rounded to the nearest tenth). Yes, there is enough room to build the ramp.

Extension

Present the following problem to students:

You want to start the ramp 15 feet away from the door. Can you do that and still have the angle of incline be less than 6 degrees?

Yes, angle \( A \) is 5.7º.
Problems

1. Find the trigonometric ratios for the triangle. Round to the nearest hundredth. (Use [2nd] [FIX] for rounding.)
   a. \( \sin C \) _______________________
   b. \( \cos C \) _______________________
   c. \( \tan C \) _______________________
   d. \( \sin A \) _______________________
   e. \( \cos A \) _______________________
   f. \( \tan A \) _______________________  

2. Using the TI-30X IIS, find the value of each ratio. Round to the nearest ten thousandth.
   a. \( \sin 71^\circ \) _______________________
   b. \( \tan 31^\circ \) _______________________
   c. \( \cos 25^\circ \) _______________________  

3. Using the TI-30X IIS, find the measure of each angle. Round to the nearest degree.
   a. \( \sin B = 0.4567 \) _______________________
   b. \( \cos A = 0.6758 \) _______________________
   c. \( \tan C = 5.83 \) _______________________

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Problem
You need to build a ramp to your front door. The distance from the ground to the bottom of the door is 1.5 feet. You don’t want the angle of incline to be more than 6 degrees. The distance from the street to the door is 20 feet. Is there enough room to build the ramp?

Procedure
1. Make a drawing of the problem.

2. Use the trigonometric ratio $\tan = \frac{\text{opposite leg}}{\text{adjacent leg}}$ to find angle $A$. (Round your answer to the nearest tenth.)

3. Is there room to build the ramp?

Extension
You want to start the ramp 15 feet away from the door. Can you do that and still have the angle of incline be less than 6 degrees?
What’s My Score? — 1-Variable Statistics

Overview
Students use the given test scores to find averages.

Math Concepts
• averages

Materials
• TI-30X II S
• pencil
• student activity

Introduction
Discuss finding averages with your students.

Activity
Present the following problem to students:

You and your friend are having a contest. The one who gets the highest average on their math tests for one quarter wins. Your scores are 98, 89, 78, 98, and 100. Your friend's scores are 89, 89, 97, 90, and 100. Who is the winner?

Procedure
1. Have students find the average of their scores using the TI-30X II S. Remember to enter 2 as the frequency for 98 and 1 for all others.

   1. Press [2nd] [STAT] [VAR] to select 1-VAR mode.

   2. Press [DATA] and enter your first score.
      \[ X_1 = 98 \]

   3. Press \( \mathbf{\Theta} \) and enter 2 as the frequency for 98.
      \[ \text{FRQ} = 2 \]

   4. Press \( \mathbf{\Theta} \). Continue entering your scores and frequencies, pressing \( \mathbf{\Theta} \) after each score and frequency.

   5. When finished, press [STATVAR] \( \mathbf{\Theta} \) to select \( \mathbf{\Theta} \), the average. Write it down.
      \[ n \ \mathbf{\Theta} \ \mathbf{Sx} \ \mathbf{\Theta} \ x \ \mathbf{\Theta} \\
      92.6 \]
What’s My Score? — 1-Variable Statistics (Continued)

2. Now find the average of your friend’s scores. Remember to put 2 as the frequency for 89 and 1 for all others.

3. Who won?

   Your friend: 93 (You had 92.6.)

Extension

Present the following problem to students:

Your friend took a test on the day you were absent and scored 95. What score do you need to get so that you are the winner?

The score you need: 98

Note: Make sure you exit the STAT mode before going on to another problem.

1. Press \text{2nd} [\text{STAT}] \circ \circ \text{ENTER} to select \text{CLRDATA}.
2. Press [DATA] and enter the friend’s first score. \(X_1 = 89\)
3. Continue entering the friend’s scores and frequencies, following steps 3 and 4 on the previous page.
4. When finished, press \text{STATVAR} \circ \circ \circ \text{Sx} \circ \circ \circ \circ \circ \text{to select } \bar{x}, \text{ the average. Write it down.}

   \[n \bar{x} Sx \sigma_x\]
   \[93.0\]

1. Press \text{2nd} [\text{STAT}] and \circ \circ \text{to CLRDATA. Press [ENTER].}
2. Recalculate your friend’s average, making sure to include the new score.
3. Use guess and check to figure out what score you need to get.
4. To exit STAT mode, press \text{2nd} [\text{EXIT STAT}] \text{ENTER}. 
What’s My Score? — 1-Variable Statistics

Problems

1. You and your friend are having a contest. Whoever gets the highest average on their math tests for one quarter wins. Your scores are 98, 89, 78, 98, and 100. Your friend’s scores are 89, 89, 97, 90, and 100. Who is the winner?
   
   Your average _______________________

   Your friend’s average _______________________

2. Your friend took a test on the day you were absent and scored 95. What score do you need to get so that you are the winner?

   Your friend’s new average _______________________

   The score you need _______________________

---

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Heart Rates — 1-Variable Statistics

Overview
Students use the statistics functions of the TI-30X IIS calculator to investigate the effect of exercise on heart rate.

Math Concepts
- mean, minimum, maximum, and range

Materials
- TI-30X IIS
- stopwatch or a watch with a second hand
- student activity

Introduction
Students may be placed in smaller groups for this activity to minimize the amount of data to be entered. Ask students:

- What do you think the average heart rate is for someone your age?
- What about after exercising?

Activity
Have students complete the following investigation to check their estimations.

1. Have students check their resting heart rate by timing their pulse for 1 minute. (You could have them time for 10 seconds and then multiply by 6, but this could be the quietest minute of your day!)

2. Collect data on the chart. Enter each student’s heart rate and a mark in the frequency column. As other students have the same heart rate, add another tally mark in the frequency column.

3. Enter the heart rate data into the TI-30X IIS.
   a. Enter the first heart rate on the chart as the first X value, and the number of tallies for that heart rate as the frequency.
   b. You must press \( \Box \) between entries. For example, enter the first heart rate, and then press \( \Box \). Enter the first frequency, and then press \( \Box \).

For example, assume a class of 22 students:

<table>
<thead>
<tr>
<th>Rate</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>3</td>
</tr>
<tr>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>62</td>
<td>6</td>
</tr>
<tr>
<td>63</td>
<td>3</td>
</tr>
<tr>
<td>64</td>
<td>1</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
</tr>
</tbody>
</table>

1. Press \( \text{2nd [STAT] ENTER} \).
2. Press \( \text{DATA} \) to enter the heart rates and frequencies.
   \( X1= \)
3. Enter first heart rate and press \( \Box \).
   \( FRQ= \)
4. Enter the first frequency and press \( \Box \).
5. Continue entering until you have entered all the heart rates and frequencies.
4. Check the statistics calculations. After students display $\Sigma x$ (Sigma $x$), explain that $\Sigma x$ is the sum of all the heart rates. Ask students:
   - How many heartbeats were there in one minute?
   - Is the average heart rate higher or lower than you expected?

5. Now we will see the effect of some exercise on heart rate. Tell students:
   
   If at any point during this portion of the activity you experience pain, weakness, or shortness of breath, stop immediately.

6. Have the students run in place for 2 minutes and then give them these instructions:
   a. Time your pulse for 1 minute.
   b. Record your heart rate as before.
   c. Enter the data into the calculator.
   d. Compare the average heart rate after running with the resting heart rate.

7. Now have the students do jumping jacks for 2 minutes. Instruct them to time their pulse for 1 minute again and record as before. Have them enter the data into the calculator again and calculate the average heart rate after jumping jacks. Compare to the other 2 averages.

8. How fit is the class? If the class (or individual) heart rate after jumping jacks is less than 90, then you are in great shape. If it is higher than 125, then you are in poor shape.

9. Instruct students to make a histogram of the 3 sets of data they collected. Ask students:
   - How are the histograms the same?
   - How are they different?
   - Is the data grouped the same, or is it more spread out in one graph compared to another?

Note: The numbers show the results for the example described above. Your students’ results will vary depending on the size of group and the heart rate readings.
Heart Rates —
1-Variable Statistics

Problem
What do you think the average heart rate is for someone your age? What about after exercising?

Procedure
1. Use this table to record your class or group data (resting).

<table>
<thead>
<tr>
<th>Heartbeats per minute (resting)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. What is the class (group) average? ____________________________

3. What is the total number of heartbeats for the minute? ______________
Heart Rates —
1-Variable Statistics

4. Use this table to record your class or group data (running).

<table>
<thead>
<tr>
<th>Heartbeats per minute (running)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. What is the class (group) average? ________________________________

6. What is the total number of heartbeats for the minute? _______________
7. Use this table to record your class or group data (jumping).

<table>
<thead>
<tr>
<th>Heartbeats per minute (jumping)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. What is the class (group) average? ________________________________

9. What is the total number of heartbeats for the minute? ______________

10. How fit is the class? _____________________________________________
    ___________________________________________________________________

**Note:** If the class (or individual) heart rate after jumping jacks is less than 90, then you are in great shape. If it is higher than 125, then you are in poor shape.
11. Now make a histogram for each of the 3 sets of data you collected.

<table>
<thead>
<tr>
<th>Resting</th>
<th>Running</th>
<th>Jumping</th>
</tr>
</thead>
</table>

12. How are the histograms the same? How are they different? ______________

_________________________________________________________________

_________________________________________________________________

13. Is the data grouped the same or is it more spread out in one graph compared to another? _____________________________

_________________________________________________________________

_________________________________________________________________


**WNBA Stats — 2-Variable Statistics**

### Overview

Students use WNBA statistics to explore the relationship between 2 variables. They use the TI-30 X IIS to compute the regression equation and evaluate some values.

### Math Concepts

- 2-variable statistics

### Materials

- TI-30 X IIS
- pencils
- student activity

### Activity

Present the following problem to students:

*Do you think WNBA (Women’s National Basketball Association) playing time (in minutes per game) is related to how many points a player scores? Do you think it is related to how many rebounds a player gets? Or is it related to the player’s field goal percentage?*

### Procedure

1. Put the calculator in **STAT** mode and choose **2-VAR** statistics.

2. Using the table in the activity (page 26), enter the data. Enter points per game as the **X**-variable and minutes per game (playing time) as the **Y**-variable.

   - Press `2nd [STAT]` and then `1-VAR 2-VAR`.
   - Press `Enter` to select **2-VAR**.

   2. Enter **10.1** (points per game for the first player, Rhonda Mapp).
   
   
   4. Enter **21.7** (minutes per game for Rhonda Mapp).
   
   5. Press `2` and enter data for the second player.
   
   6. Enter data for each player in the table. Press `1` after entering each data point.
3. Calculate the statistical data.

You may want to fix the decimal to 2 places before doing the statistical calculations.

Ask students:
- What is the average points scored for the players shown?
- What is the average playing time?
- What is the total number of points scored per game for all the given players?

You may want to discuss the other statistical variables and what they mean.

4. The form of the equation is $y = ax + b$. Write the equation for the line of best fit (round to the nearest hundredth).

$$1.56x + 7.02$$

5. The closer the correlation coefficient value is to 1 (or –1), the better the correlation between the two variables. Write the correlation coefficient.

$r = .91$

6. Now calculate how many minutes you would expect a player to play if she averages 15 points per game.

1. Press $\text{2nd}$ [FIX].
   $\text{F0123456789}$

2. Press 2.

1. Press $\text{STATVAR}$.
   $\begin{array}{cccc}
   n & \bar{x} & Sx & \sigma \\
   \bar{x} & 12.00 & \\
   Sx & 9.33 & \\
   \sigma & 21.59 & \\
   \end{array}$

2. Press $\bigcirc$ to $\bar{x}$.
   $\begin{array}{cccc}
   n & \bar{x} & Sx & \sigma \\
   \bar{x} & 12.00 & \\
   Sx & 9.33 & \\
   \sigma & 21.59 & \\
   \end{array}$

3. Press $\bigcirc \bigcirc \bigcirc$ to $\bar{y}$.
   $\begin{array}{cccc}
   n & \bar{x} & Sx & \sigma \\
   \bar{x} & 12.00 & \\
   Sx & 9.33 & \\
   \sigma & 21.59 & \\
   \end{array}$

4. Press $\bigcirc \bigcirc \bigcirc$ to $\Sigma x$.
   $\begin{array}{cccc}
   \Sigma x & Sx & \sigma \\
   Sx & 112.00 & \\
   \sigma & \\
   \end{array}$

1. Press $\bigcirc$ until you get to $a$.
   This is the slope of the line of best fit.
   $\Sigma XY a b r$
   $1.56$

2. Press $\bigcirc$ to $b$. This is the y-intercept of the line.
   $\Sigma XY a b r$
   $7.02$

3. Press $\bigcirc$ to $r$. This is the correlation coefficient.
   $\Sigma XY a b r$
   $.91$

1. Press $\bigcirc \bigcirc$ to $y'$.
   $x' y'$

2. Press $\text{ENTER}$.

3. Type 15 $\text{[]}$ and press $\text{ENTER}$.
   $y'(15)$
   $30.44$
7. Now calculate how many points you would expect a player to score if she plays 35 minutes a game.

8. Discuss the correlation as a class. Ask students:
   - Are there other factors affecting the players’ minutes per game besides points scored?
   - What about defense, rebounding, etc.?

**Extension**

Now have students use the calculator to investigate the correlation of the other data in the chart such as the relation of field goal percentage to minutes per game, or rebounds per game to minutes per game. (Remember, since you have already entered the minutes in \( y \), you only need to enter the new data in \( x \).)

Ask students:

*Which 2 variables have the closest correlations? (That is, which have the correlation coefficient closest to 1 or –1?)*
Problem

Do you think WNBA playing time (in minutes per game) is related to how many points a player scores? Do you think it is related to how many rebounds a player gets? Or is it related to the player’s field goal percentage?

Procedure

Use the following table of data to explore the relationships of different pairs of data. Begin by entering the points per game as the $x$-variable and the minutes per game as the $y$-variable.

<table>
<thead>
<tr>
<th>Player</th>
<th>Field Goal Percentage</th>
<th>Points per Game</th>
<th>Rebounds per Game</th>
<th>Minutes per Game</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rhonda Mapp</td>
<td>.506</td>
<td>10.1</td>
<td>4.3</td>
<td>21.7</td>
</tr>
<tr>
<td>2. Vicky Bullet</td>
<td>.441</td>
<td>13.3</td>
<td>6.5</td>
<td>31.6</td>
</tr>
<tr>
<td>3. Janeth Arcain</td>
<td>.426</td>
<td>6.8</td>
<td>3.6</td>
<td>21.9</td>
</tr>
<tr>
<td>4. Cynthia Cooper</td>
<td>.446</td>
<td>22.7</td>
<td>3.7</td>
<td>35</td>
</tr>
<tr>
<td>5. Elena Baranova</td>
<td>.420</td>
<td>12.9</td>
<td>9.3</td>
<td>33.6</td>
</tr>
<tr>
<td>6. Malgozata Dydek</td>
<td>.482</td>
<td>12.9</td>
<td>7.6</td>
<td>28</td>
</tr>
<tr>
<td>7. Heidi Burge</td>
<td>.509</td>
<td>6.7</td>
<td>3.3</td>
<td>16.7</td>
</tr>
<tr>
<td>8. Keri Chaconas</td>
<td>.297</td>
<td>4.8</td>
<td>.8</td>
<td>13.2</td>
</tr>
<tr>
<td>9. Rebecca Lobo</td>
<td>.484</td>
<td>11.7</td>
<td>6.9</td>
<td>29.2</td>
</tr>
<tr>
<td>10. Coquese Washington</td>
<td>.294</td>
<td>1.9</td>
<td>.9</td>
<td>8.1</td>
</tr>
<tr>
<td>11. Toni Foster</td>
<td>.467</td>
<td>4.9</td>
<td>1.9</td>
<td>13.6</td>
</tr>
<tr>
<td>12. Maria Stepanova</td>
<td>.426</td>
<td>3.3</td>
<td>1.9</td>
<td>6.5</td>
</tr>
</tbody>
</table>
Extension

Use the calculator to investigate the correlation of the other data in the table such as the relation of field goal percentage to minutes per game, or rebounds per game to minutes per game. (Remember, since you have already entered the minutes per game in Y, you only need to enter the new data in X.)

1. What is the average field goal percentage?

2. Write the equation for the line of best fit.

3. Write the correlation coefficient.

4. What is the average number of rebounds per game?

5. Write the equation for the line of best fit.

6. What is the total number of rebounds per game for all the given players?

7. Write the equation for the line of best fit.

8. Write the correlation coefficient.

9. Which 2 variables have the closest correlation? (That is, which have the correlation coefficient closest to 1 or –1?)
**How to Use the TI-30X II S**

<table>
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<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
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<td>TI-30X II S Basic Operations</td>
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<td>33</td>
</tr>
<tr>
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<td>36</td>
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<td>Order of Operations and Parentheses</td>
<td>40</td>
</tr>
<tr>
<td>Constant</td>
<td>43</td>
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<tr>
<td>Decimals and Decimal Places</td>
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<td>Memory</td>
<td>47</td>
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<td>Fractions</td>
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<td>Pi</td>
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<td>Powers, Roots, and Reciprocals</td>
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<td>Probability</td>
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<td>Notation</td>
<td>88</td>
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<tr>
<td>Angle Settings and Conversions</td>
<td>94</td>
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<tr>
<td>Polar and Rectangular Conversions</td>
<td>98</td>
</tr>
<tr>
<td>Hyperbolics</td>
<td>100</td>
</tr>
</tbody>
</table>
Keys
1. ON turns on the calculator.
2. 2nd turns on the 2nd indicator and accesses the function shown above the next key you press.
3. 2nd [OFF] turns off the calculator and clears the display.
4. ENTER completes the operation or executes the command.
5. 2nd [ANS] recalls the most recently calculated result and displays it as Ans.
6. ( and ) move the cursor left and right to scroll the entry line. Press 2nd ( or 2nd ) to scroll to the beginning or end of the entry line.
   ( and ) move the cursor up and down through previous entries. 2nd ( or 2nd ) scroll to the beginning or end of history.
7. 2nd [RESET] displays the RESET menu.

RESET: N Y
- Press ENTER when N (no) is underlined to return to the previous screen without resetting the calculator.
- Press ENTER when Y (yes) is underlined to reset the calculator. The message MEM CLEARED is displayed.

Note: Pressing ON and CLEAR simultaneously resets the calculator immediately. No menu or message is displayed.

Notes
- The examples on the transparency masters assume all default settings.
- Resetting the calculator:
  — Returns settings to their defaults: floating decimal (standard) notation and degree (DEG) mode.
  — Clears memory variables, pending operations, entries in history, statistical data, constants, and Ans (Last Answer).
- The entry line can contain up to 88 characters. When ← or → appear in the display, the entry line contains more characters to the left or right. When ↑ or ↓ appear, more characters are located above or below the entry line.
- Press ON after Automatic Power Down™ (APD™). The display, pending operations, settings, and memory are retained.
**Second, Off, Arrows, Equals**

Enter $46 - 23$. Change 46 to 41
Change 23 to 26 and complete the operation. Enter $81 + 57$ and complete the operation. Scroll to see your previous entries.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>$46 \phantom{\text{+}} 23$</td>
<td>$46-23$</td>
</tr>
<tr>
<td>$\phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} 6 \phantom{\text{+}}$</td>
<td>$41-26$ $\phantom{\text{t}}$</td>
</tr>
<tr>
<td>$81\phantom{\text{+}}57 \phantom{\text{+}}$</td>
<td>$81+57$ $\phantom{\text{t}}$</td>
</tr>
<tr>
<td>$2nd \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}}$</td>
<td>$\phantom{\text{t}}$</td>
</tr>
<tr>
<td>$\phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}} \phantom{\text{+}}$</td>
<td>$81+57$ $\phantom{\text{t}}$</td>
</tr>
</tbody>
</table>
# Reset

Reset the calculator.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd 0</td>
<td>RESET: N Y</td>
</tr>
<tr>
<td></td>
<td>DEG</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RESET: N Y</td>
</tr>
<tr>
<td></td>
<td>DEG</td>
</tr>
<tr>
<td>ENTER</td>
<td>MEM CLEARED</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>CLEAR</td>
<td></td>
</tr>
</tbody>
</table>

Pressing ON and CLEAR at the same time also resets the calculator immediately. No menu or message is displayed.

Using 2nd 0 or ON and CLEAR returns all settings to their defaults and clears the memory.
Use Last Answer (Ans) to calculate \((2+2)^2\).

Press Display

\[
\begin{array}{c}
2 + 2 \text{ ENTER} \\
\text{Display: } 2+2 \\
4. \text{ DEG}
\end{array}
\]

\[
\begin{array}{c}
\text{2nd } (-) \times^2 \\
\text{Display: } \text{Ans}^2 \\
16. \text{ DEG}
\end{array}
\]
Clear, Insert, and Delete

Keys
1. **CLEAR** clears characters and error messages. Once the display is clear, it moves the cursor to the most recent entry.

2. **2nd [INS]** lets you insert a character at the cursor.

3. **DEL** deletes the character at the cursor. Hold **DEL** down to delete all characters to the right. Then, each time you press **DEL**, it deletes 1 character to the left of the cursor.

Notes
- The examples on the transparency masters assume all default settings.
- Pressing **CLEAR** does not affect the memory, statistical registers, angle units, or numeric notation.
Delete and Insert

Enter $4569 + 285$, and then change it to $459 + 2865$. Complete the problem.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4569 + 285$</td>
<td>$4569+285$ DEG</td>
</tr>
<tr>
<td>$\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow$</td>
<td>$459+285$ DEG</td>
</tr>
<tr>
<td>$\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow$ DEL</td>
<td>$459+2865$ DEG</td>
</tr>
<tr>
<td>$2nd \ DEL \ 6$</td>
<td>$459+2865$ DEG</td>
</tr>
<tr>
<td>$\text{ENTER}$</td>
<td>$459+2865 \ \ \ 3324$, DEG</td>
</tr>
</tbody>
</table>
## Clear

Enter 21595.
Clear the 95.
Clear the entry.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>21595</td>
<td>21595</td>
</tr>
<tr>
<td>☛ ☛ CLEAR</td>
<td>215</td>
</tr>
<tr>
<td>CLEAR</td>
<td></td>
</tr>
</tbody>
</table>

(Clear to right)
(Clear entry)
### Basic Math

#### Keys

1. `+` adds.
2. `-` subtracts.
3. `×` multiplies.
4. `÷` divides.
5. `ENTER` completes the operation or executes the command.
6. `[(-)` lets you enter a negative number.
7. `[2nd] [%]` changes a real number to a percent.

#### Notes

- The examples on the transparency masters assume all default settings.
- The TI-30X II S allows implied multiplication. **Example:** `3 (4 + 3) = 21`
- Do not confuse `[+]` with `(-)`. `(-)` allows subtraction.
- Results of percent calculations display according to the decimal notation mode setting.
Add, Subtract, Multiply, Divide, Equals

Find:

\[ 2 + 54 - 6 = \]
\[ 16 \times 21 = \]
\[ 78 \div 2 = \]
\[ 12 \times (5 + 6) = \]

Press

Display

2 \(+\) 54 \(-\) 6

2+54-6

\(\text{DEG}\)

16 \(\times\) 21

16*21

\(\text{DEG}\)

78 \(\div\) 2

78/2

\(\text{DEG}\)

12 \(\times\) (5 + 6)

12*(5+6)

\(\text{DEG}\)
The temperature in Utah was $-3^\circ \text{C}$ at 6:00 a.m. By 10:00 a.m. the temperature had risen 12$^\circ \text{C}$. What was the temperature at 10:00 a.m.?

Press

\[
\begin{array}{ll}
\text{(-)} & 3 \quad + \quad 12 \\
\text{ENTER} & \end{array}
\]

Display

\[
\begin{array}{ll}
-3 + 12 \\
9.9 \text{ DEG} & \end{array}
\]
Percent

Mike makes $80 per week. He saves 15% of his earnings. How much does Mike save per week?

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>2nd (%) × 80</td>
<td>15%×80</td>
</tr>
</tbody>
</table>

Press Display
Order of Operations and Parentheses

Keys
1. [open] opens a parenthetical expression.
2. [close] closes a parenthetical expression.

Notes
- The examples on the transparency masters assume all default settings.
- The transparency master showing the Equation Operating System (EOS™) demonstrates the order in which the TI-30X IIS completes calculations.
- Operations inside parentheses are performed first. Use [open] [close] to change the order of operations and, therefore, change the result.

Example: 1 + 2 x 3 = 7
(1 + 2) x 3 = 9
<table>
<thead>
<tr>
<th><strong>Equation Operating System</strong> EOS™</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 (first)</strong></td>
<td>Expressions inside [ ]</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Functions that need a [ ] and precede the expression, such as the \textbf{SIN}, \textbf{LOG}, or \textbf{2nd RST} menu items</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Functions entered after the expression, such as ( \chi^2 ) and angle unit modifiers ( (\circ, ', '' , r, g) )</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Fractions</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Exponentiation ( (\wedge) ) and roots ( (2nd \ overpower) )</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Negation ( ([ - ]) )</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Permutations ( (nPr) ) and combinations ( (nCr) )</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Multiplication, implied multiplication, and division</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Addition and subtraction</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Conversions ( (2nd Abc, 2nd Abc, 2nd PRB, and \textbf{DMS}) )</td>
</tr>
<tr>
<td><strong>11 (last)</strong></td>
<td>\textbf{ENTER} completes all operations and closes all open parentheses.</td>
</tr>
</tbody>
</table>
Order of Operations

1 + 2 \times 3 =

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 \text{+} 2 \times 3</td>
<td>1 + 2 \times 3</td>
</tr>
</tbody>
</table>

(1 + 2) \times 3 =

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1 + 2) \times 3</td>
<td>(1 + 2) \times 3</td>
</tr>
</tbody>
</table>

Order of Operations
**Keys**

1. **2nd [K]** turns on the constant mode and lets you define a constant. A \( K \) displays when the constant mode is on.

2. **ENTER** places the contents of \( K \) at the end of the expression in the display.

**Notes**

- The examples on the transparency masters assume all default settings.
- All functions, except statistics, work in constant mode.
- To enter a constant:
  1. Press **2nd [K]**. If a constant is already stored, press **CLEAR** to clear it.
  2. Enter your constant (any set of operations, functions, and values).
  3. Press **ENTER** to turn on the constant mode. \( K \) appears in the display.
  4. Press **CLEAR** to clear the display.
  5. Enter an initial value. If you do not enter a value, 0 is assumed, and **Ans** will appear in the display.
  6. Press **ENTER** to place the contents of \( K \) at the end of the expression and evaluate it.
  7. Continue pressing **ENTER** to repeat the constant.

The result is stored in **Ans**, which is displayed, and the constant is used to evaluate the new expression.
### Constant

Three people babysit for $3.25 each per hour. First person works 16 hours. Second person works 12 hours. Third person works 17 hours. How much did each person earn?

Press | Display
--- | ---

| 2nd K ÷ | K = |
| x 3.25 ENTER | K = *3.25 |
| CLEAR |  |
| 16 ENTER | 16*3.25 52.5 |
| 12 ENTER | 12*3.25 39. |
| 17 ENTER | 17*3.25 55.25 |
| 2nd K ÷ |  |

(Concept mode is off.)
Decimals and Decimal Places

Keys

1. 1 enters a decimal point.

2. \textbf{2nd} [\textbf{FIX}] displays the following menu, which lets you set the number of decimal places.

\begin{equation*}
\begin{array}{ccccccc}
\text{F} & \text{0} & \text{1} & \text{2} & \text{3} & \text{4} & \text{5} & \text{6} & \text{7} & \text{8} & \text{9} \\
\end{array}
\end{equation*}

\textbf{F} \quad \text{Sets floating decimal (standard) notation.}

\textbf{0-9} \quad \text{Sets the number of decimal places.}

Notes

- The examples on the transparency masters assume all default settings.

- \textbf{2nd} [\textbf{FIX}] \textbf{c} removes the setting and returns to standard notation (floating decimal).

- The \textbf{FIX} setting affects all decimal results and the mantissa of scientific and engineering notation results.

- The TI-30X IIS automatically rounds the result to the number of decimal places selected. For example, when the decimal is set to 2 places, 0.147 becomes 0.15 when you press \textbf{ENTER}. The TI-30X IIS also rounds or pads resulting values with trailing zeros to fit the selected setting. For example, when the decimal is set to 5 places, 0.147 becomes 0.14700 when you press \textbf{ENTER}.

- All results are displayed to the \textbf{FIX} setting until you clear the setting by either pressing \textbf{2nd} [\textbf{FIX}] \textbf{c} or selecting \textbf{F} (floating) on the decimal notation menu. Resetting the calculator also clears the \textbf{FIX} setting.

- After pressing \textbf{2nd} [\textbf{FIX}], you can select the number of decimal places in 2 ways:
  - Press 1 or 2 to move to the number of decimal places you want, and then press \textbf{ENTER}, or
  - Press the number key that corresponds to the number of decimal places you want.

- \textbf{FIX} affects only the results, not the entry.
## Decimal, FIX

Round 12.345 to the hundredths place, to the tenths place, and then cancel the FIX setting.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 [2nd] 3 4 5</td>
<td>12.345</td>
</tr>
<tr>
<td>[2nd]</td>
<td>F0123456789</td>
</tr>
<tr>
<td>[2nd]</td>
<td>F0123456789</td>
</tr>
<tr>
<td>[2nd] 1</td>
<td>12.345</td>
</tr>
<tr>
<td>[2nd] [2nd]</td>
<td>12.345</td>
</tr>
<tr>
<td>[2nd]</td>
<td>12.345</td>
</tr>
</tbody>
</table>
Memory

Keys

1. STAT displays the following menu of variables.
   A B C D E
   Lets you select a variable in which to store the displayed value. The new variable replaces any previously stored value.

rand

Let's you set a seed value for random integers.

2. MEMVAR displays the following menu of variables.
   A B C D E
   Lets you view the stored value before pasting it in variable form to the display.

3. 2nd [CLRVAR] clears all variables.

4. 2nd [RCL] displays the following menu of variables.
   A B C D E
   Lets you view the stored value before pasting it to the display.

Notes

- The examples on the transparency masters assume all default settings.

- You can store a real number or an expression that results in a real number to a memory variable.

- When you select a variable using MEMVAR, the variable name (A, B, C, D, or E) is displayed on the entry line.

  When you select a variable using 2nd [RCL], the value of the stored variable is displayed on the entry line.

- Resetting the calculator clears all memory variables.

- For more about rand, see Chapter 11, Probability (page 68).
**Store, Memory Variable, Clear Variable**

Test scores: 96, 76, 85.
Weekly scores: 92, 83, 97, and 86.
Find the average of test and weekly scores. Find the final average.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 + 76 + 85</td>
<td>257.257.</td>
</tr>
<tr>
<td>÷ 3</td>
<td>85.66666667 DEG</td>
</tr>
<tr>
<td>STO→ ENTER</td>
<td>Ans→A</td>
</tr>
<tr>
<td>92 + 83 + 97 + 86</td>
<td>358.358.</td>
</tr>
<tr>
<td>÷ 4</td>
<td>89.5 DEG</td>
</tr>
<tr>
<td>+ MEMVAR ENTER</td>
<td>Ans+Å</td>
</tr>
<tr>
<td>÷ 2</td>
<td>87.58333333 DEG</td>
</tr>
</tbody>
</table>

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Ti-30 X IIS: A Guide for Teachers
Which would be the better buy:
3 cassette tapes for $7.98, or
4 cassette tapes for $9.48?

Press

Display

7 ÷ 9 8 ÷ 3

7.98/3

2.66

DEG

STO► ENTER

Ans→A

2.66

DEG

9 ÷ 4 8 ÷ 4

9.48/4

2.37

DEG

STO► ▶ ENTER

Ans→B

2.37

DEG

View the first price again.

RCL

2nd STO►

View the second price again.

STO► ◄ ENTER

A B C D E

2.66

DEG

2.37

DEG
### Store, Recall

<table>
<thead>
<tr>
<th>Shop</th>
<th>Purchases</th>
<th>Qty</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>shirts</td>
<td>2</td>
<td>$13.98 ea.</td>
</tr>
<tr>
<td>B</td>
<td>ties</td>
<td>3</td>
<td>$7.98 ea.</td>
</tr>
<tr>
<td>C</td>
<td>belt</td>
<td>1</td>
<td>$6.98</td>
</tr>
<tr>
<td></td>
<td>suspenders</td>
<td>1</td>
<td>$9.98</td>
</tr>
</tbody>
</table>

How much did you spend at each shop, and how much did you spend altogether?

Press

\[ 2 \times 13 \cdot 98 \]

Display

\[ 2 \times 13.98 \]

\[ 27.96 \text{ DEG} \]

\[ \to A B C D E \]

\[ 27.96 \text{ DEG} \]

\[ \text{Ans}\to A \]

\[ 27.96 \text{ DEG} \]

\[ 3 \times 7 \cdot 98 \]

Display

\[ 3 \times 7.98 \]

\[ 23.94 \text{ DEG} \]

Cont. (Continued)
### Store, Recall (Continued)

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
</table>
| **STO** ▶️ ○ **ENTER** | Ans → B  
23.94 DEG |
| **2nd** ▶️ **STO** ▶️ | Ans → C  
16.96 DEG |
| **STO** ▶️ ○ ○ **ENTER** | Ans → C  
16.96 DEG |
| **RCL** | Ans → C  
16.96 DEG |
| **2nd** ▶️ **STO** ▶️ | Ans → C  
16.96 DEG |
| **2nd** ▶️ **STO** ▶️ ○ ○ **ENTER** | Ans → C  
16.96 DEG |
| **RCL** | Ans → C  
16.96 DEG |
Keys
1. \( \text{Abc} \) lets you enter mixed numbers and fractions.

2. \( 2\text{nd} \) \( \text{Abc}+\cdot/\text{Abc} \) converts a simple fraction to a mixed number or a mixed number to a simple fraction.

3. \( 2\text{nd} \) \( [\text{F-D}] \) converts a fraction to its decimal equivalent or changes a decimal to its fractional equivalent, if possible.

Notes
- The examples on the transparency masters assume all default settings.
- To enter a mixed number or a fraction, press \( \text{Abc} \) between the whole number and the numerator and between the numerator and the denominator.
- You can enter a fraction or mixed number anywhere you can enter a decimal value.
- You can use fractions and decimals together in a calculation.
- Fractional results and entries are automatically reduced to their lowest terms.
- Fractional calculations can show fractional or decimal results.
  — When possible, calculations involving 2 fractions or a fraction and any integer will display fractional results.
  — Calculations involving a fraction and a decimal will always display results as decimals.
- For a mixed number, the whole number can be up to 3 digits, the numerator can be up to 3 digits, and the denominator can be any number through 1000.
- For a simple fraction, the numerator can be up to 6 digits and the denominator can be any number through 1000.
Fractions

At the party, you ate $\frac{5}{6}$ of the pepperoni pizza and $\frac{1}{10}$ of the sausage pizza. How much pizza did you eat?

Press: $5 \text{ Ab/c } 6 + 1 \text{ Ab/c } 10 \text{ ENTER}$

Display: $5 \frac{6+1}{10} \text{ 14/15 DEG}$
## Mixed Numbers

A baby weighed 4 3/8 pounds at birth. In the next 6 months, she gained 2 3/4 pounds. How much does she weigh?

Press | Display
--- | ---
4 \(\text{Ab/c}\) 3 \(\text{Ab/c}\) | \(4 \frac{3}{8} + 2 \frac{3}{4}\) \(\text{Ab/c}\) 4 | \(7 \frac{1}{8}\) \(\text{DEG}\)
Sam is making his birthday cake. The recipe calls for 3 1/2 cups of flour. He has only a 1/2-cup measuring cup. To find out how many times Sam must use his measuring cup, change the mixed number to a fraction.

\[
3 \frac{1}{2} \div \frac{1}{2} = 7
\]

Press Display

3 \( \text{Ab/c} \) 1 \( \text{Ab/c} \) 2

\[ 3, 1, 2 \]

DEG

2nd \( \text{Ab/c} \)

\[ 3, 1, 2 \text{ Ab/c } \]

\[ 7/2 \]

DEG

Enter

Show the mixed number again.

2nd \( \text{Ab/c} \) \( \text{Ab/c} \)

\[ \text{Ans } \text{Ab/c} \] \[ \text{Ab/c} \]

\[ 3, 1, 2 \]

DEG
Juan swims 20 laps in 5.72 minutes. Mary swims 20 laps in 5 3/4 minutes. Change Mary’s time to a decimal to determine who swims faster.

Press | Display
---|---
5 \( \text{A} \) \( \text{b/c} \) 3 \( \text{A} \) \( \text{b/c} \) \( \text{F} \leftrightarrow \text{D} \) | 5 \( \frac{3}{4} \) \( \text{F} \leftrightarrow \text{D} \) DEG
4 \( \text{2nd} \) \( \text{PRB} \) \( \text{ENTER} \) | 5 \( \frac{3}{4} \) \( \text{F} \leftrightarrow \text{D} \) ¹ 5.75 DEG

Fraction to Decimal
Decimal to Fraction

Change 2.25 to its fractional equivalent.

Press | Display
--- | ---
2 [F<>D] 25 | 2.25 [F<>D] 2 1/4
2nd [PRB] ENTER | 2.25 [F<>D] 2 1/4 DEG
Keys
1. \( \pi \) displays the value of pi rounded to 10 digits (3.141592654).

Notes
- The examples on the transparency masters assume all default settings.
- Internally, pi is stored to 13 digits (3.141592653590).
- After pressing [2nd] [\( \text{fix} \)], you can select the number of decimal places in 2 ways:
  - Press 1 or 2 to move to the number of decimal places you want, and then press [ENTER], or
  - Press the number key that corresponds to the number of decimal places you want.

The transparency masters show both ways.
Circumference

Use this formula to find the amount of border you need if you want to put a circular border all the way around the tree.

\[ C = 2\pi r = 2 \times \pi \times 15 \text{m} \]

Press Display

\[ 2 \times \pi \times 15 \]

\[ 2\times\pi\times1.5 \]

\[ 9.424777961 \text{ DEG} \]
Area

Use this formula to find how much of a lawn would be covered by the sprinkler. Round your answer to the nearest whole number, and then return to floating decimal mode.

\[ A = \pi r^2 = \pi \times 4^2 \]

Press Display

\[ \pi \times 4 \ x^2 \]  
\[ \text{Enter} \]  

\[ \text{FIX} \] \[ \text{2nd} \] \[ . \] \[ \) \]  
\[ \text{Enter} \]  

\[ \text{FIX} \] \[ \text{2nd} \] \[ . \] \[ \) \]
Powers, Roots, and Reciprocals

Keys
1. \( x^2 \) squares the value.
2. \( 2\text{nd} \sqrt{} \) calculates the square root.
3. \( 2\text{nd} \sqrt[n]{} \) calculates the specified root \((x)\) of the value.
4. \( \frac{1}{x} \) calculates the reciprocal.
5. \( 2\text{nd} \) raises a value to a specified power.

Notes
- The examples on the transparency masters assume all default settings.
- To use \( 2\text{nd} \), enter the base, press \( \sqrt[n]{} \), and then enter the exponent.
- The base (or mantissa) and the exponent may be either positive or negative. Refer to Domain under Error Messages in Appendix C (page C-1) for restrictions.
- The result of calculations with \( 2\text{nd} \) must be within the range of the TI-30X IIS.
- A sign change takes precedence over exponents.

Example:
- \((-5)^2 = 25\)
- \((-5)^2 = 25\)
Squares

Use this formula to find the size of the tarpaulin needed to cover the entire baseball infield.

\[ A = x^2 = 27.4^2 \]

Press Display

\[
\begin{align*}
27.4 \quad x^2 \quad \text{ENTER} \quad 27.4^2 \\
or \quad 27.4 \quad \uparrow \quad 2 \quad \text{ENTER} \quad 27.4^2
\end{align*}
\]

750.76 \text{ DEG}
Square Roots

Use this formula to find the length of the side of a square clubhouse if 3 m$^2$ of carpet would cover the floor. Round your answer to 0 decimal places.

$$L = \sqrt{x} = \sqrt{3}$$

3 m$^2$ of carpet

Press

<table>
<thead>
<tr>
<th>2nd $\sqrt{}$</th>
<th>3</th>
<th>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Display

$$\sqrt{3} = 1.732050808$$

$$\sqrt{3} = 2.$$
Cubes

Use this formula to find the volume of a cube with sides 2.3 meters long. Change your answer to a fraction.

\[ V = L^3 = 2.3^3 \]

Press Display

2 \[ \boxed{3} \] \[ \boxed{3} \]

\[ 2.3^3 \]

\[ 12.167 \]

\[ \text{Ans} \]

\[ 12.167/1000 \]

DEG
Powers

Fold a piece of paper in half, in half again, and so on until you cannot physically fold it in half again. How many sections would there be after 10 folds? After 15 folds?

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2 \downarrow 10 \text{ ENTER}$</td>
<td>$2^{10}$ $1024 \text{ DEG}$</td>
</tr>
<tr>
<td>$2 \downarrow 15 \text{ ENTER}$</td>
<td>$2^{15}$ $32768 \text{ DEG}$</td>
</tr>
</tbody>
</table>
Roots

If the volume of a cube is 125 cm$^3$, what is the length of each side?

Press | Display
--- | ---
3 $\text{2nd} \sqrt{125}$ | $3 \sqrt{125}$

5.

DEG

$\sqrt{2}$

Press | Display
--- | ---
$\sqrt{}$ | $\sqrt{}$

$\sqrt{2}$

Press | Display
--- | ---
$\sqrt{2}$ | $\sqrt{2}$

$\sqrt{2}$

Press | Display
--- | ---
$\sqrt{2}$ | $\sqrt{2}$

$\sqrt{2}$
The chart below shows the amount of time spent building model ships.

<table>
<thead>
<tr>
<th>Ships</th>
<th>Time Spent Building</th>
<th>Portion Completed Per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sailing</td>
<td>10 hrs.</td>
<td>?</td>
</tr>
<tr>
<td>Steam</td>
<td>5 hrs.</td>
<td>?</td>
</tr>
<tr>
<td>Luxury</td>
<td>5 1/3 hrs.</td>
<td>?</td>
</tr>
</tbody>
</table>

How much of each model was completed per hour?

Press Display

**Sailing ship:**

10 \( x^{-1} \) 2nd [PRB]  

10 \( x^{-1} \) 2nd [PRB]  

**Steam ship:**

5 \( x^{-1} \) 2nd [PRB]  

5 \( x^{-1} \) 2nd [PRB]  

**Luxury liner:**

5 \( Ab/c \) 1 \( Ab/c \) 3  

5 \( Ab/c \) 1 \( Ab/c \) 3  

\( 5^{-1} F \leftrightarrow D \)

\( 5^{-1} F \leftrightarrow D \)

\( \frac{1}{10} \)  

\( \frac{1}{5} \)  

\( 3 \) \( Ab/c \) 1 \( Ab/c \) 3  

\( 3 \) \( Ab/c \) 1 \( Ab/c \) 3  

\( 5^{-1} F \leftrightarrow D \)

\( 5^{-1} F \leftrightarrow D \)

\( \frac{1}{10} \) \( \text{DEG} \)  

\( \frac{1}{5} \) \( \text{DEG} \)  

\( \frac{3}{16} \) \( \text{DEG} \)
Keys

1. PRB displays the following menu of functions.

- nPr: Calculates the number of possible permutations.
- nCr: Calculates the number of possible combinations.
- !: Calculates the factorial.
- RAND: Generates a random 10-digit real number between 0 and 1.
- RANDI: Generates a random integer between 2 numbers that you specify.

Notes

- The examples on the transparency masters assume all default settings.
- A combination is an arrangement of objects in which the order is not important, as in a hand of cards.
- A permutation is an arrangement of objects in which the order is important, as in a race.
- A factorial is the product of all the positive integers from 1 to n, where n is a positive whole number ≤ 69.
- To control a sequence of random numbers, you can store (STO) an integer to RAND just as you would store values to memory variables. The seed value changes randomly when a random number is generated.
- For RANDI, use a comma to separate the 2 numbers that you specify.
Combination (nCr)

You have space for 2 books on your bookshelf. You have 4 books to put on the shelf. Use this formula to find how many ways you could place the 4 books in the 2 spaces.

\[ 4 \text{nCr} 2 = x \]

AB and BA count as only 1 combination.

AB  AC  AD
BA  BC  BD
CA  CB  CD
DA  DB  DC

Press Display

4 PRB \( \downarrow \) \( nPr \) \( nCr \) \( ! \) \( \rightarrow \) DEG

2 ENTER

4 \text{nCr} 2

6.

DEG
Permutation (nPr)

Four different people are running in a race. Use this formula to find how many different ways they can place 1st and 2nd.

\[ 4 \text{nPr} 2 = x \]

AB and BA count as 2 permutations.

AB AC AD
BA BC BD
CA CB CD
DA DB DC

Press Display

4 PRB

\[ \text{nPr} \quad \text{nCr} \quad ! \quad - \]

DEG

2 ENTER

\[ 4 \text{nPr} 2 \]

12
**Factorial (!)**

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

\[ 4! = x \]

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

Press Display

4

\[ nPr \quad nCr \quad ! \quad - \]

**DEG**

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td>ENTER</td>
<td></td>
</tr>
</tbody>
</table>

4!

\[ 24 \]

---

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Random (RAND)

Generate a sequence of random numbers.

Press Display

PRB PRB PRB

RAND RAND RANDI

DEG

ENTER ENTER

RAND t

0.839588694

DEG

ENTER

RAND t

0.482688185

DEG

Results will vary.
Random (RAND)

Set 1 as the current seed and generate a sequence of random numbers.

Press | Display
--- | ---
1STO↓ | \( \frac{\text{rand}}{310000.} \)
ENTER | 1→rand
PRB | \( \frac{\text{RAND}}{0.000018633} \)
ENTER ENTER | \( \frac{\text{RAND}}{0.745579721} \)

PRB | \( \frac{\text{RAND}}{0.} \)
Random Integer (RAND)

Generate a random integer from 2 through 10.

Press: PRB 1

Display: ~ RAND RANDI

Contents: ~ RANDI(2, 10)

Results will vary.
**Keys**

1. **[2nd] [STAT]** displays a menu from which you can select **1-VAR, 2-VAR** or **CLRDATA**.

   **1-VAR**
   Analyzes data from 1 set of data with 1 measured variable—x.

   **2-VAR**
   Analyzes paired data from 2 sets of data with 2 measured variables—x, the independent variable, and y, the dependent variable.

   **CLRDATA**
   Clears data values without exiting **STAT** mode.

2. **[DATA]** lets you enter data points (x for 1-VAR stats; x and y for 2-VAR stats).

3. **[2nd] [EXIT STAT]** displays the following menu that lets you clear data values and exit **STAT** mode.

   **EXIT ST: Y \ N**
   - Press **[ENTER]** when Y (yes) is underlined to clear data values and exit **STAT** mode.
   - Press **[ENTER]** when N (no) is underlined to return to the previous screen without exiting **STAT** mode.

4. **[STAT VAR]** displays the menu of variables with their current values.

   - **n** Number of x (or x,y) data points.
   - **x̄** or **ȳ** Mean of all x or y values.
   - **Sx** or **Sy** Sample standard deviation of x or y.
   - **σx** or **σy** Population standard deviation of x or y.
   - **Σx** or **Σy** Sum of all x values or y values.
   - **Σx²** or **Σy²** Sum of all x² values or y² values.
   - **Σxy** Sum of (x × y) for all xy pairs in 2 lists.
   - **a** Linear regression slope.
   - **b** Linear regression y-intercept.
   - **r** Correlation coefficient.

**Notes**

- The examples on the transparency masters assume all default settings.
- To save the last data point or frequency value entered, you must press **[ENTER]** or **[0]**.
- You can change data points once they are entered.
## Entering 1-VAR Stat Data

Five students took a math test. Using their scores, enter the data points—85, 85, 97, 53, 77.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd [STAT</td>
<td>1-VAR 2-VAR</td>
</tr>
<tr>
<td>ENTER DATA</td>
<td>STAT DEG</td>
</tr>
<tr>
<td>85</td>
<td>$X_1=85$</td>
</tr>
<tr>
<td></td>
<td>STAT DEG</td>
</tr>
<tr>
<td>2</td>
<td>$FRQ=2$</td>
</tr>
<tr>
<td></td>
<td>STAT DEG</td>
</tr>
<tr>
<td>97</td>
<td>$X_2=97$</td>
</tr>
<tr>
<td></td>
<td>STAT DEG</td>
</tr>
<tr>
<td>53</td>
<td>$X_3=53$</td>
</tr>
<tr>
<td></td>
<td>STAT DEG</td>
</tr>
<tr>
<td>77 ENTER</td>
<td>$X_4=77$</td>
</tr>
<tr>
<td></td>
<td>STAT DEG</td>
</tr>
</tbody>
</table>

Continued
Viewing the Data (Continued)

Find the number of data points \((n)\), the mean \((\bar{x})\), the sample standard deviation \((s_x)\), the population standard deviation \((\sigma x)\), the sum of the scores \((\Sigma x)\), and the sum of the squares \((\Sigma x^2)\).

Press  
Display

\[
\begin{array}{|c|c|}
\hline
\text{STATVAR} & n \quad \bar{x} \quad Sx \quad \sigma x \\
\text{STAT} & 5. \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
n \quad \bar{x} \quad Sx \quad \sigma x \\
\text{STAT} & 79.4 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
n \quad \bar{x} \quad Sx \quad \sigma x \\
\text{STAT} & 16.39512123 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
n \quad \bar{x} \quad Sx \quad \sigma x \\
\text{STAT} & 14.66424222 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
\Sigma x \quad \Sigma x^2 \\
\text{STAT} & 397. \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|}
\hline
\Sigma x \quad \Sigma x^2 \\
\text{STAT} & 32597. \\
\hline
\end{array}
\]

Continued
Removing Data Points  (Continued)

Return to the first data point. Display the lowest score, drop it, and then find the new mean ($\bar{x}$). Clear all data by exiting STAT mode.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>$x_1=85$</td>
</tr>
<tr>
<td>STAT</td>
<td>DEG</td>
</tr>
<tr>
<td>↓ ↓ ↓ ↓ ↓</td>
<td></td>
</tr>
<tr>
<td>↓ 0 ENTER</td>
<td>$x_3=53$</td>
</tr>
<tr>
<td>STAT</td>
<td>DEG</td>
</tr>
<tr>
<td>STATVAR</td>
<td>$n \bar{x} Sx \sigma x$</td>
</tr>
<tr>
<td>STAT</td>
<td>DEG</td>
</tr>
<tr>
<td>EXIT STAT</td>
<td></td>
</tr>
<tr>
<td>2nd STATVAR</td>
<td></td>
</tr>
<tr>
<td>ENTER</td>
<td>EXIT ST: $Y$ $N$</td>
</tr>
<tr>
<td>STAT</td>
<td>DEG</td>
</tr>
</tbody>
</table>

2nd EXIT STAT
The table below shows the number of pairs of athletic shoes sold by a small shoe store. Enter this data as the data points.

<table>
<thead>
<tr>
<th>Month</th>
<th>Total No. (x)</th>
<th>Brand A (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>58 (x1)</td>
<td>35 (y1)</td>
</tr>
<tr>
<td>May</td>
<td>47 (x2)</td>
<td>28 (y2)</td>
</tr>
</tbody>
</table>

Press

<table>
<thead>
<tr>
<th>STAT</th>
<th>1-VAR</th>
<th>2-VAR</th>
<th>DEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>DATA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENTER | DATA

`x_1 =` 58

`y_1 =` 35

`x_2 =` 47

`y_2 =` 28

Continued
If the store sells 32 pairs of shoes in June, predict the June sales of Brand A. When finished, exit STAT mode and clear all data points.

Press | Display
--- | ---
STATVAR | \( \sum x' \ y' \) STAT DEG
ENTER 32 | \( y' (32) \) 18.45454545 STAT DEG
EXIT STAT | EXIT ST: Y N STAT DEG
2nd STATVAR | 
ENTER | 

STATVAR

Viewing the Data (Continued)
Trigonometry

Keys
1. \( \text{TAN} \) calculates the tangent.
2. \( 2\text{nd} \ [\text{TAN}^{-1}] \) calculates the inverse tangent.
3. \( \text{COS} \) calculates the cosine.
4. \( 2\text{nd} \ [\text{COS}^{-1}] \) calculates the inverse cosine.
5. \( \text{SIN} \) calculates the sine.
6. \( 2\text{nd} \ [\text{SIN}^{-1}] \) calculates the inverse sine.

Notes
- The examples on the transparency masters assume all default settings.
- Before starting a trigonometric calculation, be sure to select the appropriate angle mode setting (degree, radian, or gradient—See Chapter 16, Angle Settings and Conversions). The calculator interprets values according to the current angle-unit mode setting.
- \( \boxed{} \) ends a trig function.
Tangent

Use this formula to find the distance from the lighthouse to the boat. Round your answer to the nearest whole number, and then return to floating decimal mode.

\[ D = \frac{78}{\tan 27^\circ} \]

Press

| 78 | ÷ | TAN |
| 27 | ) | ENTER |

Display

\[ 78/\tan (27) = 153.0836194 \text{ DEG} \]

FIX

| 2nd | • | • |

Press

| ENTER |

Display

\[ 78/\tan (27) = 153.0836194 \text{ DEG} \]

Press

| FIX |

Press

| 2nd | • | • |

Display

\[ 78/\tan (27) = 153.0836194 \text{ DEG} \]
Inverse Tangent

Use this formula to find the angle of depression. Round your answer to the nearest tenth, and then return to floating decimal mode.

\[ \tan x = \frac{600}{2500} \]

Press Display

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TAN</strong> [1]</td>
<td></td>
</tr>
<tr>
<td><strong>600 ÷</strong></td>
<td>( \tan^{-1} \frac{600}{25} )</td>
</tr>
<tr>
<td><strong>2500 [ENTER]</strong></td>
<td>( 13.49573328 ) DEG</td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>.</strong> <strong>.</strong></td>
<td>( \tan^{-1} (600/25) )</td>
</tr>
<tr>
<td><strong>13.5</strong></td>
<td></td>
</tr>
<tr>
<td><strong>.</strong> <strong>.</strong></td>
<td>( 13.49573328 ) DEG</td>
</tr>
</tbody>
</table>

Inverse Tangent
Cosine

Use this formula to find how far the base of the ladder is from the house. Round your answer to the nearest whole number, and then return to floating decimal mode.

\[ D = 5 \times \cos 75 \]

Press Display

\[
\begin{align*}
5 \times \cos \quad & 5 \times \cos \\
75 \quad \) \quad & 1.294095226
\end{align*}
\]

\[
\begin{align*}
\text{FIX} \quad & 5 \times \cos \\
2nd \quad & 0.123456789
\end{align*}
\]

\[
\begin{align*}
\text{ENTER} \quad & 5 \times \cos \\
\text{FIX} \quad & 1.294095226
\end{align*}
\]

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Inverse Cosine

Use this formula to find the angle of the ski jump. Round your answer to the nearest tenth, and then return to floating decimal mode.

\[ \cos x = \frac{453}{500} \]

Press Display

\[ \text{COS}^{-1} \]
\[ \text{2nd} \ \text{COS} \]
\[ 453 \div \]
\[ 500 \]
\[ ) \ \text{ENTER} \]
\[ \cos^{-1} \left( \frac{453}{50} \right) \]
\[ 25.04169519 \]

DEG

Press Display

\[ \text{COS}^{-1} \]
\[ \text{2nd} \ \text{COS} \]
\[ 453 \div \]
\[ 500 \]
\[ ) \ \text{ENTER} \]
\[ \cos^{-1} \left( \frac{453}{50} \right) \]
\[ 25.0 \]

DEG

Press Display

\[ \text{COS}^{-1} \]
\[ \text{2nd} \ \text{COS} \]
\[ 453 \div \]
\[ 500 \]
\[ ) \ \text{ENTER} \]
\[ \cos^{-1} \left( \frac{453}{50} \right) \]
\[ 25.04169519 \]

DEG
Sine

Use this formula to find the length of the ramp. Round your answer to the nearest whole number, and then return to floating decimal mode.

\[ D = \frac{15}{\sin 12} \]

Press Display

\[
\begin{array}{l}
1 \div 5 \div \text{SIN} \\
12 \) \text{ ENTER} \\
\text{FIX} \\
\text{2nd} \cdot \text{ ENTER} \end{array}
\]

\[
\begin{array}{l}
1.5/\sin (12) \rightarrow 1 \\
7.214601517 \text{ DEG} \\
7.713456789 \text{ DEG} \\
1.5/\sin (12) \rightarrow 1 \\
7.214601517 \text{ DEG}
\end{array}
\]
Inverse Sine

Use this formula to find the angle of the conveyor belt. Round your answer to the nearest tenth, and then return to floating decimal mode.

\[ \sin x = \frac{13}{20} \]

**Press**

1. \[ \text{2nd} \ \sin^{-1} \ 13 \div 20 \]
2. \( \) ENTER
3. FIX
4. \[ \text{2nd} \ \text{Fix} \]
5. ENTER

**Display**

1. \( \sin^{-1} \left( \frac{13}{20} \right) \)
2. \( 40.5 \)
3. \( \text{DEG} \)
4. \[ \text{F0123456789} \text{DEG} \]
5. \( \sin^{-1} \left( \frac{13}{20} \right) \)
6. \( 40.5 \)
7. \( \text{DEG} \)
8. \( \text{F0123456789} \text{DEG} \)
9. \( \sin^{-1} \left( \frac{13}{20} \right) \)
10. \( 40.5 \)
11. \( \text{DEG} \)
12. \( \text{F0123456789} \text{DEG} \)
Keys

1. \(2^{nd}\) [SCI/ENG] displays the following numeric notation mode menu.

   - **FLO**: Restores standard mode (floating decimal).
   - **SCI**: Turns on scientific mode and displays results as a number from 1 to 10 \((1 \leq n < 10)\) times 10 to an integer power.
   - **ENG**: Turns on engineering mode and displays results as a number from 1 to 1000 \((1 \leq n < 1000)\) times 10 to an integer power. The integer power is always a multiple of 3.

2. \(2^{nd}\) [EE] lets you enter and calculate the exponent.

Notes

- The examples on the transparency masters assume all default settings.
- You can enter a value in scientific notation regardless of the numeric notation mode setting. For a negative exponent, press \([-]\) before entering it.
- Results requiring more than 10 digits are automatically displayed in scientific notation.
- For the decimal notation mode, refer to \(2^{nd}\) [FIX] in Chapter 6, Decimals and Decimal Places.
- These modes (FLO, SCI, and ENG) affect only the display of results.
# Engineering, Scientific, Floating Decimal

Enter 12543, which will be in floating decimal notation (default), and alternate between scientific and engineering notations.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>12543</td>
<td>FLO SCI ENG&lt;br&gt;1.2543x10^4&lt;br&gt;SCI DEG</td>
</tr>
<tr>
<td>2nd DRG ➔</td>
<td>12543&lt;br&gt;12.543x10^3&lt;br&gt;ENG DEG</td>
</tr>
<tr>
<td>ENTER</td>
<td>12543&lt;br&gt;12543.0&lt;br&gt;DEG</td>
</tr>
</tbody>
</table>

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Exponent

The Earth is $1.496 \times 10^8$ kilometers from the Sun. Jupiter is $7.783 \times 10^8$ kilometers from the Sun. Enter the numbers in scientific notation and determine how far away the Earth is from Jupiter.

Press | Display
--- | ---
7 $\cdot$ 783 EE 2nd $\times^{-1}$ 8 | $7.783 \times 10^8$ $628700000.$ DEG
$\pi$ - 1 $\cdot$ 496 EE 2nd $\times^{-1}$ 8 ENTER |
Logarithms and Antilogarithms

Keys

1. **LOG** calculates the common logarithm (base 10).

2. **LN** calculates the natural logarithm (base e, where \( e = 2.718281828459 \)).

3. **2nd** \([10^x]\) calculates the common antilogarithm (10 raised to the power of the value).

4. **2nd** \([e^x]\) calculates the natural antilogarithm (\( e \) raised to the power of the value).

Notes

- The examples on the transparency masters assume all default settings.
- \( \boxed{\text{[]} \) ends a logarithmic function.
Common Logarithm, Natural Logarithm

Find $\log_{10} 23$ rounded to 4 decimal places. Then find $\ln 23$ rounded to 4 decimal places and return to floating decimal notation.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOG</strong> <strong>23</strong></td>
<td>$\log (23)$</td>
</tr>
<tr>
<td><strong>ENTER</strong></td>
<td>1.361727836 DEG</td>
</tr>
<tr>
<td><strong>FIX</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>DOT</strong></td>
<td>0.00000000</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LOG</strong> <strong>23</strong></td>
<td>$\log (23)$</td>
</tr>
<tr>
<td><strong>ENTER</strong></td>
<td>1.3617 DEG</td>
</tr>
<tr>
<td><strong>FIX</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>DOT</strong></td>
<td>0.00000000</td>
</tr>
<tr>
<td><strong>LN</strong> <strong>23</strong></td>
<td>$\ln (23)$</td>
</tr>
<tr>
<td><strong>ENTER</strong></td>
<td>3.1355 DEG</td>
</tr>
<tr>
<td><strong>FIX</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>DOT</strong></td>
<td>0.00000000</td>
</tr>
</tbody>
</table>

Common Logarithm, Natural Logarithm
Common Antilogarithm, Natural Antilogarithm

Find antilog 3.9824 rounded to 4 decimal places. Then find antiln 3.9824 rounded to 4 decimal places. When finished, return to floating decimal notation.

Press | Display
--- | ---
2nd $10^x$ 3 | $10^x (3.9824)$
9824 ) ENTER | $9602.846792$\text{DEG}
2nd FIX | $F0123456789$\text{DEG}
4 | $10^x (3.9824)$
2nd e$^x$ 3 | $e^x (3.9824)$
9824 ) ENTER | $53.6456$\text{FIX DEG}
2nd FIX | $e^x (3.9824)$
2nd $10^x$ 3 | $10^x (3.9824)$
9824 ) ENTER | $9602.8468$\text{DEG}
2nd e$^x$ 3 | $e^x (3.9824)$
9824 ) ENTER | $53.64562936$\text{DEG}
Angle Settings and Conversions

Keys
1. DRG displays the following menu that lets you change the angle mode setting to DEG, RAD, and GRD without affecting the value in the display.
   - **DEG** sets degree mode.
   - **RAD** sets radian mode.
   - **GRD** sets gradient mode.
   The default setting is DEG.

2. displays a menu that lets you specify the unit of an angle.
   - † specifies degrees.
   - ′ specifies minutes.
   - ″ specifies seconds.
   - r specifies radians.
   - g specifies gradients.
   - DMS lets you convert an angle from decimal degrees to DMS notation.

Notes
- The examples on the transparency masters assume all default settings.
- Angles with a trig function ignore the angle mode setting and display results in the original unit. Otherwise, angles (without a trig function) are converted and displayed according to the angle mode setting.
- You enter decimal-degree angles the same as you would any other number.
- For decimal/DMS conversions, the calculator interprets all values as degrees, regardless of the angle-unit setting.
- DMS angles are entered as † (degrees), ′ (minutes), and ″ (seconds).
Degrees, Minutes, and Seconds to Decimal

You watched 2 videos that were 2:05 (2 hours and 5 minutes) and 1:46 (1 hour and 46 minutes) in length. How long did you watch videos?

Press Display

2

2°

ENTER

2° 5'

ENTER + 1°

2° 5' + 1°

ENTER

46

2° 5' + 1° 46'

ENTER ENTER

Ans DMS

3° 51' 0"

DEG
Fraction to Degrees, Minutes, and Seconds

How much is $\frac{2}{3}$ of an hour in hours, minutes, and seconds?

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 [Ab/c] 3</td>
<td>$\frac{2}{3}$</td>
</tr>
<tr>
<td></td>
<td>$\frac{2}{3} \text{ DMS}$</td>
</tr>
<tr>
<td></td>
<td>$0^\circ 40' 0''$ DEG</td>
</tr>
</tbody>
</table>
# Degrees, Radians, Gradients

Calculate the sine of 30 in degrees, radians, and gradients.

<table>
<thead>
<tr>
<th>Press</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong><code>SIN 30</code></strong></td>
<td><code>sin(30)</code> <code>\text{^t} 0.5</code> <em>DEG</em></td>
</tr>
<tr>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td><strong>DRG</strong></td>
<td><code>DEG RAD GRD</code></td>
</tr>
<tr>
<td>ENTER ENTER</td>
<td><code>sin(30)</code> <code>\text{^t} -0.988031624</code> <em>RAD</em></td>
</tr>
<tr>
<td><strong>DRG</strong></td>
<td><code>DEG RAD GRD</code></td>
</tr>
<tr>
<td>ENTER ENTER</td>
<td><code>sin(30)</code> <code>\text{^t} 0.4539905</code> <em>GRAD</em></td>
</tr>
</tbody>
</table>
Polar and Rectangular Conversions

Keys

1. \( \text{2nd} \ [\text{R►P}] \) displays the following menu that lets you convert rectangular coordinates \((x, y)\) to polar coordinates \((r, \theta)\) or vice versa.

\( \text{R►Pr} \) Converts rectangular coordinate to polar coordinate \(r\).

\( \text{R►P} \) Converts rectangular coordinate to polar coordinate \(\theta\).

\( \text{P►Rx} \) Converts polar coordinate to rectangular coordinate \(x\).

\( \text{P►Ry} \) Converts polar coordinate to rectangular coordinate \(y\).

2. \( \text{2nd} \ [,] \) enters a comma.

Notes

- The example on the transparency master assumes all default settings.
- Before starting calculations, set angle mode as necessary.
Polar to Rectangular

Convert the polar ordered pair \((7, 30)\) to rectangular using the DEG \((^\circ)\) angle unit.

The rectangular ordered pair is \(6.062177826, 3.5\).
1. [2nd] [HYP] accesses the hyperbolic ($\sinh$, $\cosh$, $\tanh$) function of the next trig key that you press.

**Notes**

- The example on the transparency master assumes all default settings.
- Hyperbolic calculations are not affected by the angle mode setting—whether or not the calculator is in **RAD** (radian), **GRD** (gradient), or **DEG** (degree) modes.
Find the hyperbolic sine (sinh), cosine (cosh), and tangent (tanh) of 5.

Press | Display
--- | ---
\[2\text{nd} \ \pi \ \text{SIN} \ 5 \ \text{ENTER}\] | \(\sinh(5) \quad 74.20321058\) DEG
\[2\text{nd} \ \pi \ \text{COS} \ 5 \ \text{ENTER}\] | \(\cosh(5) \quad 74.20994852\) DEG
\[2\text{nd} \ \pi \ \text{TAN} \ 5 \ \text{ENTER}\] | \(\tanh(5) \quad 0.999909204\) DEG
## Quick Reference to Keys

<table>
<thead>
<tr>
<th>KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="cursor_keys.png" alt="Cursor Keys" /></td>
<td>Moves the cursor left and right so you can scroll the entry line. Press <strong>2nd</strong> ![Cursor Keys](cursor Keys)(left) or <strong>2nd</strong> ![Cursor Keys](cursor Keys)(right) to scroll to the beginning or end of the entry line. Moves the cursor up and down so you can see previous entries. Press <strong>2nd</strong> ![Cursor Keys](cursor Keys)(up) or <strong>2nd</strong> ![Cursor Keys](cursor Keys)(down) to scroll to the beginning or end of the history.</td>
</tr>
<tr>
<td>+ - × ÷</td>
<td>Adds, subtracts, multiplies, and divides.</td>
</tr>
<tr>
<td>0 - 9</td>
<td>Enters the digits 0 through 9.</td>
</tr>
<tr>
<td><img src="open_parentheses.png" alt="Open Parentheses" /></td>
<td>Opens a parenthetical expression.</td>
</tr>
<tr>
<td><img src="close_parentheses.png" alt="Close Parentheses" /></td>
<td>Closes a parenthetical expression.</td>
</tr>
<tr>
<td><img src="reciprocal.png" alt="Reciprocal" /></td>
<td>Calculates the reciprocal.</td>
</tr>
<tr>
<td><img src="squares.png" alt="Squares" /></td>
<td>Squares the value.</td>
</tr>
<tr>
<td><img src="pi.png" alt="Pi" /></td>
<td>Enters the value of pi rounded to 10 digits (3.141592654).</td>
</tr>
<tr>
<td><img src="decimal_point.png" alt="Decimal Point" /></td>
<td>Enters a decimal point.</td>
</tr>
<tr>
<td><img src="negative.png" alt="Negative" /></td>
<td>Indicates the value is negative.</td>
</tr>
<tr>
<td><img src="power.png" alt="Power" /></td>
<td>Raises a value to a specified power.</td>
</tr>
<tr>
<td><img src="angle_units_menu.png" alt="Angle Units Menu" /></td>
<td>Displays the following menu that lets you specify the unit of an angle.</td>
</tr>
<tr>
<td>°</td>
<td>Specifies degrees.</td>
</tr>
<tr>
<td>′</td>
<td>Specifies minutes.</td>
</tr>
<tr>
<td>″</td>
<td>Specifies seconds.</td>
</tr>
<tr>
<td>r</td>
<td>Specifies radians.</td>
</tr>
<tr>
<td>g</td>
<td>Specifies gradients.</td>
</tr>
<tr>
<td><img src="dms.png" alt="DMS" /></td>
<td>Lets you convert an angle from decimal degrees to DMS notation.</td>
</tr>
<tr>
<td><strong>2nd</strong></td>
<td>Turns on the <strong>2nd</strong> indicator and accesses the function shown above the next key that you press.</td>
</tr>
<tr>
<td><strong>2nd</strong> [10^x]</td>
<td>Calculates the common antilogarithm (10 raised to the power of the value).</td>
</tr>
<tr>
<td><strong>2nd</strong> [√]</td>
<td>Calculates the square root.</td>
</tr>
</tbody>
</table>
## Quick Reference to Keys (Continued)

<table>
<thead>
<tr>
<th>KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd (%)</td>
<td>Changes a real number to percent. Results display according to the decimal notation mode setting.</td>
</tr>
<tr>
<td>2nd [,]</td>
<td>Enters a comma.</td>
</tr>
<tr>
<td>2nd [√⁻]</td>
<td>Calculates the specified root (x) of the value.</td>
</tr>
<tr>
<td>Ab/c</td>
<td>Lets you enter mixed numbers and fractions.</td>
</tr>
<tr>
<td>2nd [Ab/c+d/÷]</td>
<td>Converts a simple fraction to a mixed number or a mixed number to a simple fraction.</td>
</tr>
<tr>
<td>2nd [ANS]</td>
<td>Recalls the most recently calculated result, displaying it as Ans.</td>
</tr>
<tr>
<td>CLEAR</td>
<td>Clears characters and error messages on the entry line. Once the display is clear, it moves the cursor to the last entry in history.</td>
</tr>
<tr>
<td>2nd [CLRVAR]</td>
<td>Clears all memory variables.</td>
</tr>
<tr>
<td>COS</td>
<td>Calculates the cosine.</td>
</tr>
<tr>
<td>2nd [COS⁻¹]</td>
<td>Calculates the inverse cosine.</td>
</tr>
<tr>
<td>DATA</td>
<td>Lets you enter the statistical data points (x for 1-VAR stats; x and y for 2-VAR stats).</td>
</tr>
<tr>
<td>DEL</td>
<td>Deletes the character at the cursor. If you hold DEL down, it deletes all characters to the right. Then each time you press DEL, it deletes 1 character to the left of the cursor.</td>
</tr>
<tr>
<td>DRG</td>
<td>Displays the following menu that lets you change the Angle mode to degrees (°), radians (r), or gradients (g), and then back to degrees without affecting the value in the display.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DEG     Sets degree mode.</td>
</tr>
<tr>
<td></td>
<td>RAD     Sets radian mode.</td>
</tr>
<tr>
<td></td>
<td>GRD     Sets gradient mode.</td>
</tr>
<tr>
<td></td>
<td>When you turn on the TI30X IIS, it is always in the DEG mode.</td>
</tr>
<tr>
<td>2nd [eˣ]</td>
<td>Calculates the natural antilogarithm (e raised to the power of the value).</td>
</tr>
<tr>
<td>2nd [EE]</td>
<td>Lets you enter and calculate the exponent.</td>
</tr>
<tr>
<td>ENTER</td>
<td>Completes the operation or executes the command.</td>
</tr>
</tbody>
</table>
### Quick Reference to Keys (Continued)

<table>
<thead>
<tr>
<th>KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
</table>
| **2nd** [EXIT STAT] | Displays the following menu that lets you clear data values and exit \textbf{STAT} mode.  

\textbf{EXIT ST: Y N}  

Press \textbf{ENTER} when \textbf{Y} (yes) is underlined to clear data values and exit \textbf{STAT} mode.  

Press \textbf{ENTER} when \textbf{N} (no) is underlined to return to the previous screen without exiting \textbf{STAT} mode. |
| **2nd** [F\*+D] | Converts a fraction to its decimal equivalent or converts a decimal to its fractional equivalent, if possible. |
| **2nd** [FIX] | Displays the following menu that lets you set the number of decimal places.  

\begin{align*}  
F & 0 1 2 3 4 5 6 7 8 9  
\end{align*}  

\begin{align*}  
F & \quad \text{Sets floating decimal (standard) notation.}  
O-9 & \quad \text{Sets number of decimal places.}  
\end{align*} |
| **2nd** [HYP] | Accesses the hyperbolic (\textbf{sinh}, \textbf{cosh}, \textbf{tanh}) function of the next trig key that you press. |
| **2nd** [INS] | Lets you insert a character at the cursor. |
| **2nd** [K] | Turns on the constant mode and lets you define a constant. |
| **LN** | Calculates the natural logarithm (base \( e \), where \( e = 2.718281828459 \)). |
| **LOG** | Calculates the common logarithm (base 10). |
| **MEMVAR** | Displays the following menu of variables.  

\begin{align*}  
A & B C D E  
\end{align*}  

\begin{align*}  
A & \quad \text{Lets you view the stored value before pasting it to the display.}  
\end{align*} |
<p>| <strong>2nd</strong> [OFF] | Turns off the calculator and clears the display. |
| <strong>ON</strong> | Turns on the calculator. |</p>
<table>
<thead>
<tr>
<th>KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRB</td>
<td>Displays the following menu of functions.</td>
</tr>
<tr>
<td></td>
<td>nPr     Calculates the number of possible permutations.</td>
</tr>
<tr>
<td></td>
<td>nCr     Calculates the number of possible combinations.</td>
</tr>
<tr>
<td></td>
<td>!       Calculates the factorial.</td>
</tr>
<tr>
<td></td>
<td>RAND    Generates a random 10-digit real number between 0 and 1.</td>
</tr>
<tr>
<td></td>
<td>RANDI   Generates a random integer between 2 numbers that you specify. Separate the 2 numbers with a comma.</td>
</tr>
<tr>
<td>2nd [RCL]</td>
<td>Recalls the stored values to the display.</td>
</tr>
<tr>
<td>2nd [RESET]</td>
<td>Displays the RESET menu.</td>
</tr>
<tr>
<td></td>
<td>RESET: N Y</td>
</tr>
<tr>
<td></td>
<td>Press ENTER when N (no) is underlined to return to the previous screen without resetting the calculator.</td>
</tr>
<tr>
<td></td>
<td>Press ENTER when Y (yes) is underlined to reset the calculator. The message MEM CLEARED is displayed.</td>
</tr>
<tr>
<td></td>
<td>Also, press [ON] and [CLEAR] simultaneously to reset the calculator immediately. No menu or message is displayed.</td>
</tr>
<tr>
<td>2nd [R►P]</td>
<td>Displays the following menu that lets you convert rectangular coordinates ((x, y)) to polar coordinates ((r, \theta)) or vice versa.</td>
</tr>
<tr>
<td></td>
<td>R►Pr Converst rectangular coordinate to polar coordinate (r).</td>
</tr>
<tr>
<td></td>
<td>R►P(\theta) Converts rectangular coordinate to polar coordinate (\theta).</td>
</tr>
<tr>
<td></td>
<td>P►R(x) Converts polar coordinate to rectangular coordinate (x).</td>
</tr>
<tr>
<td></td>
<td>P►R(y) Converts polar coordinate to rectangular coordinate (y).</td>
</tr>
<tr>
<td>2nd [SCI/ENG]</td>
<td>Displays the following numeric notation mode menu.</td>
</tr>
<tr>
<td></td>
<td>FLO Restores standard mode (floating decimal).</td>
</tr>
<tr>
<td></td>
<td>SCI Turns on scientific mode and displays results as a number from 1 to 10 ((1 \leq n &lt; 10)) times 10 to an integer power.</td>
</tr>
<tr>
<td></td>
<td>ENG Turns on engineering mode and displays results as a number from 1 to 1000 ((1 \leq n &lt; 1000)) times 10 to an integer power. The integer power is always a multiple of 3.</td>
</tr>
</tbody>
</table>
### Quick Reference to Keys (Continued)

<table>
<thead>
<tr>
<th>KEY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIN</strong></td>
<td>Calculates the sine.</td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>SIN</strong>⁻¹</td>
<td>Calculates the inverse sine.</td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>STAT</strong></td>
<td>Displays the following menu from which you can select 1-VAR, 2-VAR, or CLRDATA.</td>
</tr>
<tr>
<td></td>
<td>1-VAR Analyzes data from 1 set of data with 1 measured variable—x.</td>
</tr>
<tr>
<td></td>
<td>2-VAR Analyzes paired data from 2 sets of data with 2 measured variables—x, the independent variable, and y, the dependent variable.</td>
</tr>
<tr>
<td></td>
<td>CLRDATA Clears data values without exiting STAT mode.</td>
</tr>
<tr>
<td><strong>STATVAR</strong></td>
<td>Displays the following menu of stat variables with their current values.</td>
</tr>
<tr>
<td></td>
<td>n Number of x (or x,y) data points.</td>
</tr>
<tr>
<td></td>
<td>( \bar{x} ) or ( \bar{y} ) Mean of all x or y values.</td>
</tr>
<tr>
<td></td>
<td>( S_x ) or ( S_y ) Sample standard deviation of x or y.</td>
</tr>
<tr>
<td></td>
<td>( \sigma_x ) or ( \sigma_y ) Population standard deviation of x or y.</td>
</tr>
<tr>
<td></td>
<td>( \Sigma x ) or ( \Sigma y ) Sum of all x values or y values.</td>
</tr>
<tr>
<td></td>
<td>( \Sigma x^2 ) or ( \Sigma y^2 ) Sum of all x 2 values or y 2 values.</td>
</tr>
<tr>
<td></td>
<td>( \Sigma xy ) Sum of (x x y) for all xy pairs in 2 lists.</td>
</tr>
<tr>
<td></td>
<td>a Linear regression slope.</td>
</tr>
<tr>
<td></td>
<td>b Linear regression y-intercept.</td>
</tr>
<tr>
<td></td>
<td>r Correlation coefficient.</td>
</tr>
<tr>
<td><strong>STO</strong></td>
<td>Displays the following menu of variables.</td>
</tr>
<tr>
<td>A B C D E</td>
<td>Lets you select a variable in which to store the displayed value. The new variable replaces any previously stored value.</td>
</tr>
<tr>
<td><strong>rand</strong></td>
<td>Lets you set a seed value for random integers.</td>
</tr>
<tr>
<td><strong>TAN</strong></td>
<td>Calculates the tangent.</td>
</tr>
<tr>
<td><strong>2nd</strong> <strong>TAN</strong>⁻¹</td>
<td>Calculates the inverse tangent.</td>
</tr>
</tbody>
</table>
# Display Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>2nd function.</td>
</tr>
<tr>
<td>HYP</td>
<td>Hyperbolic function.</td>
</tr>
<tr>
<td>FIX</td>
<td>Fixed-decimal setting.</td>
</tr>
<tr>
<td>SCI, ENG</td>
<td>Scientific or engineering notation.</td>
</tr>
<tr>
<td>STAT</td>
<td>Statistical mode.</td>
</tr>
<tr>
<td>DEG, RAD, GRAD</td>
<td>Angle mode (degrees, radians, or gradients).</td>
</tr>
<tr>
<td>K</td>
<td>Constant mode.</td>
</tr>
<tr>
<td>x¹⁰</td>
<td>Precedes the exponent in scientific or engineering notation.</td>
</tr>
<tr>
<td>↑ ↓</td>
<td>An entry is stored in history before and/or after the active screen. Press ( \uparrow ) and ( \downarrow ) to scroll.</td>
</tr>
<tr>
<td>← →</td>
<td>An entry or menu displays beyond 11 digits. Press ( \leftarrow ) or ( \rightarrow ) to scroll.</td>
</tr>
</tbody>
</table>
## Error Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARGUMENT</strong></td>
<td>A function does not have the correct number of arguments.</td>
</tr>
<tr>
<td><strong>DIVIDE BY 0</strong></td>
<td>You attempted to divide by 0.</td>
</tr>
</tbody>
</table>
| **DOMAIN** | You specified an argument to a function outside the valid range. For example:  
  For \( x^\sqrt{ } \) — \( x = 0 \) or \( y < 0 \) and \( x \) is not an odd integer.  
  For \( y^x \) — \( y \) and \( x = 0; y < 0 \) and \( x \) is not an integer.  
  For \( \sqrt{x} \) — \( x < 0 \).  
  For \( \text{LOG} \) or \( \text{LN} \) — \( x \leq 0 \).  
  For \( \text{TAN} \) — \( x = 90^\circ, -90^\circ, 270^\circ, -270^\circ, 450^\circ, \) etc.  
  For \( \sin^{-1} \) or \( \cos^{-1} \) — \( |x| > 1 \)  
  For \( \text{nCr} \) or \( \text{nPr} \) — \( n \) or \( r \) are not integers \( \geq 0 \).  
  For \( x! \) — \( x \) is not an integer between 0 and 69. |
| **EQUATION LENGTH ERROR** | An entry exceeds the digit limits (88 for entry line and 47 for statistics or constant entry lines); for example, combining an entry with a constant that exceeds the limit. |
| **FRQ DOMAIN** | \( \text{FRQ} \) value (in 1-variable statistics) \( < 0 \) or \( > 99 \), or not an integer. |
| **OVERFLOW** | \(|\theta| \geq 10^10\), where \( \theta \) is an angle in a trig, hyperbolic, or \( R \leftrightarrow \text{Pr} \) function. |
| **STAT**   | • You pressed \( \text{STATVAR} \) with no defined data points.  
  • You pressed \( \text{DATA}, \text{STATVAR}, \) or \( \text{2nd} [\text{EXIT STAT}] \) when not in \( \text{STAT} \) mode.  
  • Statistical analyses do not have at least 2 data points \( (n > 1) \). |
| **SYNTAX** | The command contains a syntax error—entering more than 23 pending operations, 8 pending values, or having misplaced functions, arguments, parentheses, or commas. |
# Support and Service Information

<table>
<thead>
<tr>
<th><strong>Product Support</strong></th>
<th><strong>Customers in the U.S., Canada, Puerto Rico, and the Virgin Islands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For general questions, contact Texas Instruments Customer Support:</td>
</tr>
<tr>
<td></td>
<td>phone: 1-800-T-CARES (1-800-842-2737)</td>
</tr>
<tr>
<td></td>
<td>e-mail: <a href="mailto:ti-cares@ti.com">ti-cares@ti.com</a></td>
</tr>
<tr>
<td></td>
<td>For technical questions, call the Programming Assistance Group of Customer Support:</td>
</tr>
<tr>
<td></td>
<td>phone: 1-972-917-8324</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Customers outside the U.S., Canada, Puerto Rico, and the Virgin Islands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact TI by e-mail or visit the TI calculator home page on the World Wide Web.</td>
</tr>
<tr>
<td>e-mail: <a href="mailto:ti-cares@ti.com">ti-cares@ti.com</a></td>
</tr>
<tr>
<td>internet: <a href="http://www.ti.com/calc">www.ti.com/calc</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Product Service</strong></th>
<th><strong>Customers in the U.S. and Canada Only</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Always contact Texas Instruments Customer Support before returning a product for service.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Customers outside the U.S. and Canada</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to the leaflet enclosed with this product or contact your local Texas Instruments retailer/distributor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other TI Products and Services</strong></th>
<th><strong>Visit the TI calculator home page on the World Wide Web.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://www.ti.com/calc">www.ti.com/calc</a></td>
</tr>
</tbody>
</table>
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