# Math TEACHER Link

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## A Look at the TI-82 Keyboard Sections

- Lower center (gray keys): Arithmetic Keys
- Lower Right (blue keys): Basic Operations
- Lower Left (black keys): Basic Functions
- **Top Row:** Display Keys
- Next Three Rows: Special Program Keys
- Middle Row: Trig. and Inverse Trig. Functions







BACK

		TI-82		
	TblSet	<u>200M</u>	CALC TRACE	TABLE <u>GRAPH</u>
<mark>2nd</mark> A-LOCK ALPHA	QUIT MODE LINK X,T,0	INS DEL LIST STAT	•	
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LOG	Un-1 0 7	Un−1 P 8	<mark>א Q</mark> 9	I R
ex s LN	LN T	Ls U 5	6 V	] ⊌ 
RCL X STO►	L1 Y	2 Z	<b>3</b> β	MEM "
	0	i.	ANS ?	ENTRY

## **Most Keys Have Three Different Functions**

#### • Face Function

For the function printed in white on the key, simply press the key!

• Upper Left Function For the function printed in blue above and to the left of the key,

press the 2nd key (circled in red), and then press the desired key.

### • Upper Right Function

For the function printed in gray above and to the right of the key, press the Alpha key (circled in green), and then press the desired key.

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e× S L4 T L5 U L6 V 1 LN 4 5 6 -	
KCL X Li     Y L₂     2 L₃     Ø MEM       STO►     1     2     3     +	
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# **On-Off and Possible Trouble Already!**

### • On Button

Located in the lower left corner (circled in red).

### • Turning the Calculator Off

Press the 2nd key (circled in green), then press the On button (circled in red).

#### **o** Possible Trouble

You turn on the calculator, and the screen is totally blank!

- **o** Possible Fixes
  - 1. Change the screen contrast (next page), or
  - 2. Change the batteries!







# **Changing the Screen Contrast**

#### • Screen Too Light

Press the 2nd key (circled in white), then press and HOLD DOWN the UP arrow (circled in green) until you are satisfied with the screen contrast.

#### • Screen Too Dark

Press the 2nd key (circled in white), then press and HOLD DOWN the DOWN arrow (circled in red) until you are satisfied with the screen contrast.

		TI-82		
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# The Home Screen:

## What it's for

• The Home Screen is where you enter in and carry out most calculations. The Home Screen to the right shows two such calculations.

## How to get there

• If you are in any other screen, press the 2nd key (circled in red) and then the Mode key (circled in green) to get to the Home Screen.

(4.5/6.1^2+35.1) /2.56 13.75817783 4.2*sin (π/3) 3.637306696

1	FI-82	
Y= WINDW	CA ZOOM TR	lc table :Ace <u>graph</u>
R-LOCK LINK ALPHR X,T,0	INS DEL LIST STAT	•





### An Exercise in Changing Screens to Set Degree Measure for Angles

- Press the Mode key to get a screen like the one shown to the right.
- Use the ARROW keys to move the blinking cursor so that it covers **Degree**. Then press the ENTER key.
- Return to the Home Screen (by pressing the 2nd key, then the Mode key).
- Compute sin(60) and cos(60). The results are shown to the right.









### Numerical Calculations: An example that may illustrate a common mistake

• Key in the following formula and press the ENTER key:

(28.5 - 13.2^3)/(-7.3)

- You should get the output displayed at the upper right.
  - If you made the common mistake, your screen will look like that shown to the lower right.
  - Press 2 to return to the formula, and go to the next screen for an explanation of the mistake.







# A Common Mistake: Incorrect use of the subtraction key and negative number key

- The subtraction key (circled in red) and the negative number key (circled in green) have different meanings!
- In this case, the **negative** symbol should have been used in front of the 7.3 rather than the **subtraction** symbol.
  - The screen to the right shows the correct entry on top and the entry containing the mistake below it.
  - The next screen shows you how to correct formulas.









# Correcting a Formula using 2nd-ENTER and the ARROW keys

- After you have executed an incorrect formula, you can no longer move the cursor up to that formula with the ARROW keys to edit it.
- However, you don't need to re-enter the entire formula to make your corrections:
  - Just press the 2nd key then the ENTER key to redisplay the previous formula.
  - Use the ARROW keys to position the blinking cursor over the 6, and type 5.
  - Press ENTER. The result is shown to the lower right.

(2.1 <sup>2</sup> +π*6.1) <sup>2</sup> .1
762.2525178
00081
I wanted 5.1, not 6.1!







TI-82 Tutorial: Key in Functions

### Key in functions from left to right, except for the reciprocal and square functions

- Use your calculator to evaluate the following formulas:
  - o log 37.5
  - o e^2.5
  - o tan(2pi/3) (in radians)
  - o 3.45^2
  - o arctan(3.5pi)
  - 0 10^4.5

37. 109 031268 2. 249396 tan ( 2050808

3.45² 11.9025 tan¹ (3.5π̂) 1.480100149 io^4.5 31622.7766





# The Y= key and the Function Screen

- Press the Y= key (circled in red) to see the Function Screen shown to the right.
  - NOTE: There may be some functions already entered on your screen - that doesn't matter now.
- You can enter functions of one variable in the form y=f(x) by using the Variable Key (circled in green).
  - NOTE: The variable must be entered as x, even if some other letter is used for it.

V + = <b>E</b>	
χz=	
IY3=	
lùi=	
Y5=	
IV e =	
lù≣	
X7-	
Y8=	
L	







### Graphing the functions $y = 2 \sin(x/2)$ and y = x + 1/x

- If a formula is already entered for Y1, clear it by pressing the CLEAR key (circled in green).
- Use the Variable key to enter the formula  $2\sin(x/2)$  for Y1. Press the ENTER key.
- Clear the formula from Y2 if necessary. Enter x + 1/x for Y2, and press the ENTER key.
- Clear any of the other functions (Y3 Y8) using the ARROW and CLEAR keys.
- Press the ZOOM key (circled in red), then press 4 to see the graphs of the two functions you entered.









# Using the Graph Window Screen and the Window Key

- Press the WINDOW key (top row) to see the Window Screen shown to the right.
  - This shows that the dimensions of the graphing window are:

$$\begin{array}{l} -4.7 < x < 4.7 \\ -3.1 < y < 3.1 \end{array}$$

- Also, the tick marks are spaced by 1 unit on each axis.
- Using the ARROW keys to move the blinking cursor, change the screen dimensions to:

$$-1 < x < 5$$
  
 $-2 < y < 10$ 







# A Graphing Exercise

#### Graph the function $y = 3 \exp(-x)$ for -1 < x < 5 and -2 < y < 10

- Press the WINDOW key (top row) to make sure that the current screen limits are correct. Edit the values if necessary, using the ARROW keys to move the cursor.
- Press the Y= key to display the Function Screen. Clear all the functions (using the ARROW keys and the CLEAR key), and enter the function e^(-x) for Y1.
- Press the GRAPH key (top row). Check your graph with that shown to the right.









# Using the ZOOM key to graph in certain windows easily.

- Press ZOOM (top row), then 6
  - The function is graphed in the **standard window**:

$$-10 < x < 10$$
  
 $-10 < y < 10$ 

• **TRY IT OUT!** Enter y = 3x 2<sup>(-x)</sup> in the function window, and use ZOOM - 6 to graph it in the standard window.

Check the Answer!



- Press ZOOM (top row), then 4
  - The function is graphed in the **nice decimal window**:

$$\begin{array}{l} -4.7 < x < 4.7 \\ -3.1 < y < 3.1 \end{array}$$

#### • TRY IT OUT!

Use ZOOM - 4 to graph the same function in the nice decimal window. <u>Check the Answer!</u>





BACK



BACK

# Finding interesting points on a graph with the TRACE key.

- Graph y=3x 2^(-x) in the nice decimal window (ZOOM, then 4).
- Press the TRACE key (top row).
- Use the Left and Right ARROW keys to move the blinker to the approximate high point P of the graph.
- The coordinates of P are displayed at the bottom of the screen.









# Zeroing-in on interesting points using the ZOOM key

- Graph y=3x 2<sup>(-x)</sup> in the nice decimal window (ZOOM, then 4).
- Use TRACE (as explained on the last slide) to approximate the high point P.
- Press the ZOOM key, then the number 2 (Zoom In).
- Press ENTER. The resulting screen is displayed to the right.
- Continue to the next slide.









## ... Then use the TRACE key to get closer yet!

- Press the TRACE key, and use the Left and Right ARROW keys to get an even better approximation to the coordinates of the high point of the graph.
- Thus, x=1.45 and y=1.592 are the approximate coordinates of the high point.









### Selecting several functions for graphing.

- Press the Y= key (top left), then enter the functions shown on the screen to the right for y1 thru y6. (NOTE: You can enter up to 10 different functions.)
- Use the ARROW keys and the ENTER key to turn off y2, y4, and y6.
  - Position the blinking cursor over the equal sign of the function you want to turn off.
  - Press the ENTER key to toggle the function ON and OFF. A function is ON when the equal sign is highlighted. On this screen, Y1, Y3, and Y5 are ON.









# Graphing selected functions, and changing selections.

- Press the ZOOM key, then the number 4 to graph the functions y1, y3, and y5 (from the last screen) in the nice decimal window. The screen to the right shows the graphs of these three functions.
- Press Y= to return to the Function Screen. Then use the ARROW keys and the ENTER key to select only functions y2 and y3.
- Graph y2 and y3 in the standard window (ZOOM 6). Remember that the value for both x and y in the standard window are between -10 and 10. The screen to the right shows the two graphs.









## **Entering and Graphing Polar Functions**

- Press the MODE key (second row).
- Use the ARROW keys and the ENTER key to select Pol as shown to the right.
- Press the Y= key. Note that you can now enter polar equations of the form r=f(theta).
- Enter the function r1=1.5-2.5\*cos(theta). To get "theta" (the symbol, NOT the word), use the variable key (x,T,"theta") in the third row.
- Press ZOOM then 4 to get the graph shown to the right.
- The WINDOW key (top row) allows you to change screen parameters.









## **Entering and Graphing Parametric Functions**

- Press the MODE key (second row), and use the ARROW keys and the ENTER key to select Par as shown to the right.
- Press the Y= key. Note that you can now enter parametric equations of the form x=f(T) and y=f(T).



• Enter the function:

x1T=3\*cos(T) y1T=2\*sin(T)

• Press ZOOM then 4 to get the graph shown to the right.







### Making Tables of Values of Functions the same procedure for Func, Par, and Pol!

- Use the MODE key to select the "Func" mode of function entry.
- Use the Y= key to select (or enter fresh) the functions:

- Press the 2nd key, then the WINDOW key (= Tblset).
- Edit the Table Setup Window as shown to the right.









# Modifying Tables of Function Values - again the same for Func, Par, and Pol!

- Press the 2nd key then the GRAPH key (= TABLE key) to see the table of values to the right. These are the values of the functions y1=3x\*2^(-x) and y2=2x+1.
- Use the Up and Down ARROWS to scroll through the values.
- Press the 2nd key, then the WINDOW key (= Tblset). Note that the TblMin value is the the topmost x-value displayed on the table.
- Edit the Table Setup values to TblMin=-2 and (delta)Tbl=1. Press 2nd then GRAPH.
- Check the screen to the right.











## **TI-82 Calculator Tutorial**

## The End

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