

## Graphing Calculator Laboratory Reading

Directions: Use your graphing calculator to complete the following reading. After you have completed the reading go to the lab assistant to obtain the worksheet to see how well you have mastered the contents of this reading.

1. Turn your graphing calculator on by pressing the ON button in the lower left corner of the keypad.

2. Now turn your graphing calculator OFF by pressing the yellow-orange button followed by the ON button.

Q: Why do you think the first button that you pressed was colored yellow-orange?

A: This key is called the '2<sup>nd</sup>' key. In order to access the yellow-orange words and symbols located above the buttons on your keypad you first need to press the '2<sup>nd</sup>' key. The 'OFF' command is in yellow-orange letters just above the 'ON' button.

3. Try entering  $\sqrt{9}$  in your calculator. Notice that the  $\sqrt{\quad}$  symbol is yellow-orange.

Q: What button do you have to press in order for the calculator to give you back the correct answer of three?

A: You need to press the blue ENTER button. This button is just like the one on a regular computer. When you type  $\sqrt{9}$  on your calculator the flashing cursor at the end indicates that the calculator is waiting for you to press ENTER so it can execute the command.

Q: What is the purpose of the parenthesis on the display screen? i.e.  $\sqrt{\quad}(9)$ ?

A: It is used as necessary in order for the calculator to distinguish between expressions like  $\sqrt{9-5}$  and  $\sqrt{9}-5$ . Respectively, this translates to  $\sqrt{\quad}(9-5)$  and  $\sqrt{\quad}(9)-5$  on the calculator display screen.

4. Next, find the number 'pi' or ' $\pi$ ' on your calculator and give the number in decimal form accurate to as many decimal places the calculator will give. The symbol for 'pi' is yellow-orange as well.

5. Find the button that has the symbol '^' on it. This is the power key.

Q: How do you think you would calculate  $3^2$  on the calculator?

A: Press 3 followed by the '^' key and then press 2 and ENTER.

6. Find the 'negative' button on your calculator; this is a gray button labeled as '(-)'.

Q: What is the difference between the gray 'negative' (-) button and the blue 'subtraction' button?

A: The calculator makes a fuss between the usages of these two buttons. If you use them in the wrong context the calculator will give you a syntax error message. To write a negative number you MUST use the (-) button and NOT the blue 'subtraction' button. The same goes if you are subtracting, in which case, you MUST NOT use the (-) button.

Q: What is the difference between  $(-2)^6$  and  $-2^6$ ?

A: In the former case you multiply  $-2$  by itself six times in a row to get an answer of 64. In the latter case you multiply 2 by itself six times and then put a negative sign next to the result to get an answer of  $-64$ . Remember the order of operations. In the former case parenthesis took precedence while in the latter case the exponent took precedence.

7. Find the key labeled 'CLEAR'. Use this key to clear out everything on the display screen.

Q: What if I had information on my display screen that I accidentally erased, is it lost for good?

A: No, it is not lost for good. You can retrieve whatever you had on your display screen line by line by simply pressing 2<sup>nd</sup> ENTER repeatedly.

8. If you are ever in a screen such as the graphing screen of the calculator you can always come back to the display screen by pressing 2<sup>nd</sup> MODE. This quits whatever screen you happen to be in and brings you back to the regular display screen. To see how this is used press the blue 'Y =' key. This is the first key on the very tippy top of the keypad. If you press the CLEAR button nothing happens. To get back to the regular display screen you need to press 2<sup>nd</sup> MODE.

9. Find the key labeled 'X,T,θ,n'. This is called the variable key button. In algebra, we use variables to represent unknown quantities.

Q: When you press this button which letter appears on your display screen?

A: The letter 'X'. This is the primary letter we use in algebra to represent unknown quantities. If you press ENTER, the calculator will give you a number. This number is the value that is currently assigned to the variable 'X'.

Q: What if I don't want this number assigned to the variable 'X'?

A: You can always assign a new number over the old one by using the 'STO⇒' key. This is explained next.

10. Now find the button labeled 'STO⇒'. This is called the store key button. You use this button to assign numerical values to different variables. For example, in order to store the number 5.68 in the variable X, you simply press 5.68 followed by the key labeled 'STO⇒' followed by the variable key button and finally ENTER. You can check to make sure that 5.68 is indeed assigned to the variable X by pressing CLEAR and then pressing the variable key button followed by ENTER. The calculator should give back the number 5.68 on the next line.

11. Try to figure out how to assign the numerical value of 74 to the variable 'X'.

12. Clear the display screen and now press the variable key button followed by ENTER. You see that the calculator gives you the value you assigned to the variable 'X'. Now store the number  $-2.25$  in the variable 'X'.

Q: How do I clear out the old numerical value of 74 before I assign the number  $-2.25$  ?

A: You don't need to. Just type in  $-2.25$  and press the store key button followed by the variable key button and press ENTER and the new value of  $-2.25$  will automatically overwrite the old value of 74.

Q: Do I need to clear out the assigned numerical values when I am done using the calculator?

A: No, you do not need to. In fact, there is no way to 'clear' out the assigned values to a given variable; you simply overwrite the old value every time you need to.

Q: When I need to use the graphing features of the calculator, will the numerical values I have assigned to the variable 'X' have any effect on the graphing capabilities of the calculator?

A: Absolutely NOT. The commands you perform on the display screen are totally independent of the commands and expressions you enter while in the graphing mode of the calculator. We will introduce the graphing mode of the calculator at a later date.

13. Locate the green 'ALPHA' key. Notice the green letters and symbols above the buttons on your keypad.

Q: Do you think that the 'ALPHA' key is colored green by coincidence?

A: No, it is not a coincidence. If you need to assign a numerical value to the letter 'P' for example, you simply use the store key button in conjunction with the 'ALPHA' button and the '8' button. All the letters of the Alphabet are colored green above the regular buttons on the keypad. To access these letters you need to first press the ALPHA key.

14. Don't be afraid to explore with your graphing calculator. No matter what you do to it (with the exception of throwing it onto the cement ground as hard as you can) you can always reset your calculator to its original factory settings. To reset your calculator, press 2<sup>nd</sup> '+' on the display screen and highlight option 7 using the blue directional keys in the upper right hand corner of the calculator. Press ENTER and highlight option 2 labeled "Defaults" and press ENTER again. Highlight option 2 again, this time labeled "Reset" and press ENTER. You should get a screen that says 'Defaults set'. Now Press CLEAR to return to the display screen. Your calculator is now reset to original factory settings.
15. Sometimes the four 'AAA' batteries are too low and it is difficult to see what is displayed on your calculator screen even in lighted rooms. You can fix this problem by adjusting the contrast of your calculator's display screen. Pressing the 2<sup>nd</sup> button followed by the blue 'up' or 'down' directional keys on the calculator adjusts the contrast.
16. We will now explore how to enter fractions in the graphing calculator. Enter in the display screen the number 0.54545454545454 and then press the 'MATH' key. Highlight option 1 labeled '> Frac' and press ENTER twice. You should get a result that says  $\frac{6}{11}$ . Many times when you are performing calculations your calculator will give a decimal answer. You use this feature to convert it into a fraction. Beware that not all decimals have a fractional equivalent. Try converting the number  $\sqrt{2}$  into a fraction. The calculator will just give you a decimal and not a fraction. This is because  $\sqrt{2}$  is an irrational number.
17. The last feature we will explore today is the ANS feature (short for answer) used on the display screen. This feature can be accessed by pressing 2<sup>nd</sup> '(-)'. Anytime you see ANS on your calculator display screen, your calculator is making reference to the numerical value found in the line directly above ANS on the display screen. To see how to use this feature, clear your display screen and press the number 8 followed by ENTER. The calculator gives you back the number 8 on the next line. If you want to add 5 to this number simply press 2<sup>nd</sup> '(-)' and press the addition key followed by the number 5 and ENTER. The calculator adds five to ANS, which has a numerical value of 8; associated with it. The number 8 is associated with ANS because the number 8 was entered in the line directly above ANS. Your calculator gives you back the correct answer of 13. If you want to add 7 to 13, simply enter ANS followed by the addition key followed by 7 and ENTER. You may wonder why such a feature is even on your graphing calculator when you can simply retype the number each time. This feature is useful when you have long drawn out expressions on the display screen that you want to access easily time after time. Instead of retyping in a whole long expression you simply use the ANS feature.