

Greetings! We hope you enjoy your summer off, but we don't want you to come in rusty. Please take some time in the couple weeks before school starts to review with these problems. Before you start, you will need 2 things.

- 1) If you have not already done so, it is time to purchase your own personal graphing calculator. There is a very limited supply of calculators to check out in the library for those in financial need. But if you have the ability to purchase one, you will use it for this class, and all your other future math classes. We strongly suggest the TI-84. It is the most user-friendly and has all the functions that you will need for many math classes to come. If you have questions about a calculator purchase, please feel free to email one of us and we will try to answer them. Start looking early; sometimes you can find them for a great bargain at garage sales or on Craigslist.
- 2) You will find it easiest to do your work for this course in a spiral notebook that contains graph paper. This will save you the trouble of finding graph paper all of the time and help you keep your work all in one place. You will be making a lot of graphs this year. Please do this first assignment in your new spiral.

If you have any other questions, please stop by and see one of us before the school year ends or send us an email. Keep in mind that we are on summer break too, so we may not respond as quickly as we would during the school year.

Have a great summer!

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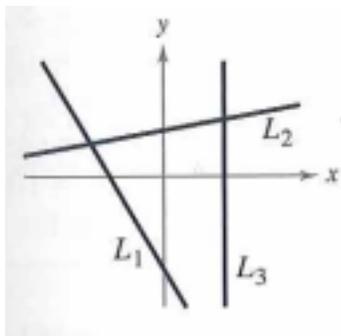
Linear Review questions:

- 1) For a line, the ratio of change in y to the change in x is called the _____ of the line.
- 2) Two lines are _____ if and only if their slopes are equal.
- 3) What is the relationship between two lines whose slopes are -3 and $\frac{1}{3}$?
- 4) What is the slope of a line that is perpendicular to the line represented by $x = 3$?
- 5) Identify the line that has the given slope.

a. $m = \frac{2}{3}$

b. m is undefined

c. $m = -2$



For problems 6-9, use the point on the line to find three additional points through which the line passes. (There are many correct answers.)

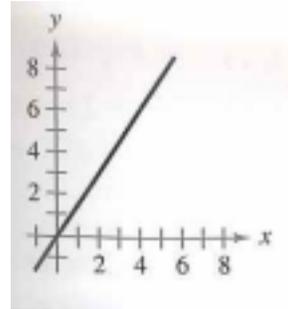
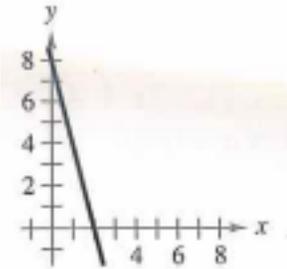
6) Point: $(2, 1)$ Slope: $m = 0$

7) Point: $(3, -2)$ Slope: $m = 0$

8) Point: (1, 5) Slope: m is undefined

9) Point: (-1, -6) Slope: $m = -\frac{1}{3}$

10) Estimate the slope of each line.



For problems 11 and 12,

- find the slope and y -intercept (if possible) of the equation of the line algebraically, and
- sketch the line by hand. Use a graphing calculator to verify your answers to parts (a) and (b).

11) $5x - y + 3 = 0$

12) $3y + 5 = 0$

For problems 13 - 16, find the equation of the line that passes through the two points in slope-intercept form.

13) (5, -1), (-5, 5)

14) (4, 3), (-4, -4)

15) (-8, 1), (-8, 7)

16) (-1, 6), (5, 6)

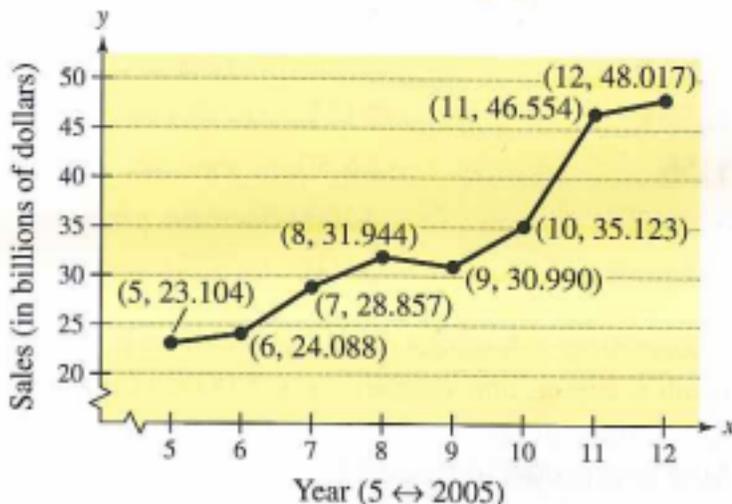
For problems 17 and 18, determine whether the lines L_1 and L_2 passing through the pairs of points are parallel, perpendicular, or neither.

17) $L_1 : (0, -1), (5, 9)$ and $L_2 : (0, 3), (4, 1)$

18) $L_1 : (-2, -1), (1, 5)$ and $L_2 : (1, 3), (5, -5)$

19) Write the slope-intercept forms of the equations of lines through the point (2, -1) that are a) parallel to the line $4x - 2y = 3$ and b) perpendicular to the line $4x - 2y = 3$.

20) The graph shows the sales y (in billions of dollars) of the Coca-Cola Company each year x from 2005 through 2012, where $x = 5$ represents 2005.



- Use the slopes to determine the years in which the sales showed the greatest increase and greatest decrease.
- Find the equation of the line between the years 2005 and 2012.
- Interpret the meaning of the slope of the line from part (b) in the context of the problem.
- Use the equation from part (b) to estimate the sales of the Coca-Cola Company in 2017. Do you think this is an accurate estimate.

Graphing Calculator Exploration

Things from the HOME SCREEN

Part I – EXPLORING THE HOME SCREEN

- Investigate some of the features of the calculator to learn how to do at least the following things.
 - Turn the calculator on and then back off (and then back on)
 - Find the answer to $3 \cdot 5 - 1 + (5 - 2) \cdot 2$ (try doing it by hand first to see if you get the same thing as the calculator)
 - CLEAR the Home Screen
 - What happens when you hit the ENTRY button (2nd ENTER)?
 - Do 3–4 more calculations of anything. Then see what happens if you hit the ENTRY button more than once.
 - What happens when you hit the ANS button then ENTER? What happens if you type “ANS + 8”?
 - Write your name with letters (what happens when you hit enter after typing your name)
 - Find the FRAC command and see what it does (look under the MATH button and try doing $8 \div 20$ FRAC)
 - What about the DEC command? What does it do?
 - Hit the GRAPH button (now you are in graphing mode). What happens when you hit the QUIT button?
 - Investigate the MODE button
 - Calculate $3 \div 7$. Then figure out how to “FIX” the number of decimal places so the calculator will only show 4 decimal places in the answer it gives
 - Figure out how the FLOAT command affects the number of decimal places the calculator shows
 - Store the number 7 into the letter a (type “7 STO A”)
 - What do you think will happen if you now type 5A and hit ENTER? Try it and see if you were right
 - What does RCL a do? How about RCL ANS
 - What is the difference between the back-space button (\leftarrow) and the DELETE button?
 - Figure out how to INSERT something without having to re-type everything. For example, how can you change $(14 + 5 - 83)$ to $(14 + 15 - 83)$ simply by inserting a “1” before the “5”?
 - What is the difference between the INS button, the DEL button, and the CLEAR button?
 - Figure out how to raise a number to any power – for example 3^5 .
 - Figure out how to find the square root of any number.
 - Figure out the difference between the “(-)” button and the subtraction button
 - Find the absolute value button

Part II – FUNCTION NOTATION

- Type the function $y = 3x - 2$ in Y_1 . Then from the HOME SCREEN, figure out how to type in $Y_1(4)$ and $Y_1(3)$, etc..
 - Hint: start with VARS \rightarrow Y-VARS \rightarrow FUNCTION
- Figure out what the calculator did to get the answer it shows
- Use this feature to make an x - y table on your paper for ten different x -values that you choose

Part III - SUMMARY

Fully describe the steps it takes to complete each item listed below AND **give an example** of when it might be useful to use. Do this in your spiral. Describe the steps like you are helping a student new to the class or a student who is absent for this activity.

- a) RECALL the last thing you typed so you can make changes to it
- b) Use ANS to help you use your last answer in a new calculation
- c) STORE a number into a variable to use in a calculation
- d) Use the FRACTION button
- e) INSERT something
- f) How to find $f(5)$ for the functions $y_1 = \frac{1}{2}x + 7$ AND function $y_2 = \frac{1}{2}(x - 8)^2 + 1$
- g) Describe 3-5 other features/commands you discovered and what they do

Part IV - EXPLORING GRAPHING FEATURES

Play around with the graphing features of the calculator to learn how to do at least the following things.

- To graph, you first have to put one or more equations in the calculator by hitting the "Y=" button. Put the function $y = -0.75(x - 3)^2 + 4$ in Y_1 . Then hit GRAPH.
- Hit the TRACE button, then hit "2 ENTER". What happens? Now hit "6 ENTER". What happens?
- What happens when you use the right and left arrow keys after hitting the TRACE button?
- What does the TABLE button do?
- What does the TBLSET button do? (Hint: investigate by changing the numbers and then hitting TABLE)
- How does the ASK feature in TBLSET change the way the calculator presents the TABLE when "Indepnt" is changed to "ASK"? How about when "Depend" is changed to "ASK"?
- Hit WINDOW and investigate the menu options there
 - Practice changing the viewing WINDOW and see how it changes the way the graph looks on the screen
- Hit ZOOM and investigate what ZSTANDARD does
- Delete the previous function, then graph the function $y = \frac{1}{2}(x - 8)^2 + 12$. Change the window so you can see that the graph makes a parabola. Then change the window back to the "Standard" window by selecting the ZSTANDARD command
- Put the function $y = -0.75(x - 3)^2 + 4$ back into Y_1 and then put the function $y = 3x - 12$ in Y_2
- Hit GRAPH. Then change the WINDOW so you can see ALL the intersections of the two graphs.
- Figure out how to trace the Y_1 function. Then figure out how to trace the Y_2 function
- Figure out how to graph the Y_1 function with a **bold** line, then re-graph it with a normal line

- ❑ Find the INTERSECT command under the CALC button and figure out how to find the intersection of the graphs of Y_1 & Y_2
- ❑ Without deleting it, figure out how to turn the Y_1 function off so that only the Y_2 will show up on the graph, then turn Y_1 back on so they both graph again
- ❑ Put the function $y = -0.5x^2 + 4$ in Y_1 . Then figure out how to find the MAXIMUM point on the graph (look under the CALC button)
- ❑ Find the ZERO command (under the CALC button) and figure out how to use it to find the x -intercepts of your graph (“zero” is another word for “ x -intercept”)
- ❑ Investigate the other commands under the CALC button and try figure out how what they do (dy/dx) and $f f(x)$ will likely not make much sense – but see what you can do with the others)

Part V – SUMMARY

Describe the steps it takes to complete each item listed below. Describe the steps like you are helping a student new to the class or a student who is absent for this activity.

- h) GRAPH a single function
- i) Set the WINDOW to the STANDARD viewing screen
- j) Change the WINDOW viewing screen to something else
- k) TRACE a function
- l) Graph two functions at the same time
- m) Find the INTERSECTION of the two functions using an “**Intersection**” feature (NOT the TRACE feature)
- n) Find the TABLE of a function
- o) CLEAR a function
- p) Describe 3-5 other graphing features you learned about the calculator

Graphing Calculator Exploration- Self-Quiz

Part I – GRAPHING & INTERSECTION

- Hit the MODE button and make sure RADIAN is highlighted.
- Put the function $y = 2x - 24$ in Y_1 and the function $y = 8 \sin(x)$ in Y_2 . Then hit GRAPH.
- Adjust your window so that you can see all of the intersections. How many intersections are there? Explain how do you know there aren't any more intersections off-screen?
- Use the INTERSECT command to find all the points of intersection.
- Delete the function in Y_1 and replace it with $y = 0.5x^2 - 2x - 5$. Use the appropriate command under the CALC button to find the vertex of this function. Write out what you find.
- Explain how to use the INTERSECT command to graphically solve to the equation $0.5x^2 - 2x - 5 = 0.1(x - 4)^3 - 2$. List all the solutions.

Part II – HOME SCREEN (Keep $y = 0.5x^2 - 2x - 5$ in Y_1)

- Explain how the ENTRY button can help you do repeated calculations easier and more quickly.
- Explain how the ANS button might be useful.
- Explain how the STO button might be useful.
- Find $Y_1(0)$, $Y_1(2)$, $Y_1(5)$, $Y_1(-2)$, and $Y_1(20.5)$,

According to the U.S. census, the population of California in 1850 was about 92,600. During the 1850's, with the great westward migration, the population grew substantially. In 1860, the census population was about 380,000.

1. What was the average yearly population increase during the 1850's (that is, from 1850 to 1860)?

2. If California's population had continued to increase after 1860 by the same annual amount as it averaged during the 1850's, what would the population have been in these years:
 - a) 1900
 - b) 1950
 - c) 1990

3. Generalize your results from Question 2. That is, develop a formula for the population of California in the year X (based on the assumption that the population continued to increase by the same annual amount as it averaged during the 1850's)

If you were ABLE to come up with a generalization in #3, then you may STOP here. Otherwise, if you were NOT able to come up with a generalization, then continue by completing the following questions on the back of this paper:

4. Describe/write out the steps you used to find the population in 1900.

5. Describe/write out the steps you used to find the population in 1950.

6. Describe/write out the steps you used to find the population in 1990.

7. What steps/calculations would you need to do to find the population in the year 2000?

8. What steps/calculations would you need to do to find the population in the year 2010?

9. What steps/calculations would you need to do to find the population in the year 2012?

10. What steps/calculations would you need to do to find the population in the year x ?