BIG PICTURE	 What is meant by the term FUNCTIONS and how do we work with them? mastery with working with basics & applications of linear functions
of this UNIT:	 mastery with working with basics & applications of linear systems understanding basics of function concepts and apply them to lines & linear systems

Part 1 - Skills/Concepts Review

- 1. Determine the equation of the following lines and express each equation in standard form.
 - a. The line through the point A(5,-2) and perpendicular to 3x 2y 6 = 0.
 - b. The line through the point A(-3,-4) and parallel to the line 4x + 2y = -8.
- 2. Factor each of the following linear equation and hence, determine where the line crosses the *x*-axis. Confirm your answer using DESMOS.

a. y = -4x + 16b. y = 5x + 12c. $y = \frac{1}{2}x + 2$

- 3. For the linear relation 3x + 2y = 9,
 - a. Determine the *x* and *y*-intercepts.
 - b. Determine the slope.
 - c. Graph this relation.
 - d. Evaluate for y if x = 5.
 - e. Evaluate for x if y = -2.
 - f. Write the equation in function form (f(x) = ????)
- 4. Use your graphing calculator to determine where the linear functions y = 2x 7 and y = -4x + 5 intersect. Explain how you can use an algebraic method to come up with the same intersection point.

Part 2 - Skills/Concepts Application Problems

- 5. Given the linear function $g(x) = -\frac{2}{3}x + 1$,
 - a. Determine the slope, the *y*-intercept and the *x*-intercept of this function.
 - b. Sketch a graph of this function.
 - c. Evaluate g(-9).
 - d. Solve -5 = g(x).
 - e. Rewrite the equation in standard form.
 - f. Mr. S restricts the domain to be $\{x \in \mathbb{R} \mid -6 \le x \le 12\}$. Determine the range of this function.

6. A function, f(x), is defined by f(x) = 5x + 12. Evaluate

(i) f(2) (ii) f(-3) (iii) $f(-\frac{1}{5})$ (iv) f(a)

- 7. Ben has a total of \$225.00 in 5 dollar bills and 20 dollar bills.
 - a. Determine the MAXIMUM amount of \$5 bills that Ben could have.
 - b. Determine the MAXIMUM amount of \$20 that Ben could have.
 - c. Determine 2 other possible combinations of \$5 bills and \$20 bills that Ben could have (you do NOT need an equation for this)
 - d. You now have 4 data points. Use any 2 of the points to write a linear equation. Express your final answer in standard form. What do you notice?
 - e. What might the *x* and *y* variables represent?
- 8. Mr. R wishes to investigate the intersection of the linear functions y = x 2 and x + 5y = -4.
 - a. How can he decide whether or not they intersect *BEFORE* he does any graphing or algebra?
 - b. Use DESMOS to determine where the two lines intersect.
 - c. How could you use algebra to find the same intersection point?
- 9. State the domain and range of the following graphs. Use set notation as well as interval notation.



10. Barb is withdrawing \$100 from her bank account. She asks for the money in \$5 bills and \$10 bills.

- a. If the teller gives her four \$10 bills, how many \$5 bills does she get?
- b. If the teller gives her eight \$5 bills, how many \$10 bills does she get?
- c. List 3 other combinations of \$5 and \$10 bills that Barb could get.
- d. State the domain and range of this relation.
- e. Determine an equation that can be used to model this situation.

11. Determine the equation of the line presented in this graph. Express your answer in standard form, slope-intercept form and point-slope form.



12. The graph included shows Kyle's distance from home as he cycles home from school.

- a. How far is the school from Kyle's home?
- b. What does the ordered pair (10,1.5) mean in this context?
- c. What are the domain and range for this relation?
- d. At what speed does Kyle cycle?
- e. What is the slope of this graph?
- f. What does slope really mean, in the context of this problem?



Part 3 - Extension Problems

- 13. A function has the following properties: (i) the domain of f is the set of natural numbers, (ii) f(1) = 1, and (iii) f(x+1) = f(x) + 3x(x+1) + 1.
 - a. Determine f(2), f(3), f(4), f(5) and f(6)
 - b. Describe this function.
- 14. A function is defined as follows: f(n + 1) = f(n) + 3 where *n* is an integer greater than 0 and you are given that f(1) = -2. Evaluate f(2) and f(3) and f(4) and f(5).
- 15. Let f(x) = 3x + 1 and let g(x) = 2 x. Determine the values for *a* such that:
 - a. f(a) = g(a)b. $f(a^2) = g(2a)$