BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • 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. A relation is defined by the following description: ***To "create/generate" a new value, a number is doubled and then increased by four.*** The CONDITION on the "starting" number is that it must be a real number between and including 0 and 10.

   a. Use the starting numbers of x = 0, 1, 2, 3, ……8, 9, 10 to create a table of values for this relation.
   b. List 3 ordered pairs for this relation.
   c. Create an equation for this relation.
   d. Graph this relation. What are the domain and range for this relation?

2. For the linear function defined by $2x$ - $8y$ - 32, determine

   a. the range of this function if the domain is $\{-2 < x \leq 4\}$.
   b. the domain of this function if the range is $\{-12 \leq y < 4\}$
   c. where this function intersects the function $f(x) = \frac{1}{4}x + 6$

3. A corn plant grows at an average rate of 4.5 mm/day from the start of the third week to the end of the sixth week. During this time period, the plant's growth can be modeled by $h(d) = 4.5d + 25$, where h is the plant's height in mm and d is the number of days since the beginning of the third week.

   a. What do the numbers 4.5 and 25 represent?
   b. What domain has been given in this question?
   c. What is the range of this function?

4. Determine the equation of a line that is:

   a. parallel to $3x + 2y$ - 9 = 0 and passes through (-2,5). Sketch this line.
   b. parallel to the x-axis and goes through the point (-2,5). Sketch this line.
   c. parallel to the y-axis and goes through the point (-2,5) Sketch this line.

Part 2 - Skills/Concepts Application Problems

5. Given the lines defined by $-6x + 2y = -4$ and $y = -3x + 1$:

   a. Use your calculator to determine the intersection point.
   b. Now, use the substitution method to algebraically find the point where the lines $-6x + 2y = -4$ and $y = -3x + 1$ intersect.

6. Mr. S has $18,000 savings in 2 investment accounts. Last year, he earned a total of $930 of interest from these 2 accounts. One of the accounts earns 6% annual interest and the other account earns 3% annual interest.

   a. Why would Mr S invest his money in 2 different accounts in the first place?
   b. One equation that Mr S writes to model this problem is $0.06x + 0.03y = 930$. Explain
      i. what the variables x and y represent
      ii. what $0.06x$ represents
   c. The second equation Mr S writes is $x + y = 18000$. Explain why.
   d. How much does Mr S have invested in each account?

7. Solve the linear system $y = 2x - 4$ and $3x + 2y = 15$ using the substitution method.

8. Next week, your math teacher will give you a test worth 100 points. The test will consist of 35 problems, some of which are worth 2 points and some problems are worth 4 points. How many 2 mark and how many 4 mark questions are on the test?

   a. Since there are 2 unknowns in this problem, we need to write 2 equations that model the relationships involving our unknowns. One equation that Mr R proposes is $x + y = 35$. Explain why this equation is correct.
   b. What might the variables x and y represent?
   c. Write a second equation that shows how the two unknowns are related.
   d. Solve this system of equations.
   e. How many 2 mark and how many 4 mark questions are on the test?

9. Determine the value of the unknown in the following problems:

   a. Find A if the graph of the equation $Ax + 3y = 5$ is parallel to the graph of $5x - 2y = 4$
   b. Find B if the graph of the equation $3x = By + 2$ is perpendicular to the graph of $3y = -2x + 4$
   c. Find A and B if the graph of $Ax + 3y = B$ produces the same line as the graph of $2x + 6y = 7$

10. Let $f(x) = 2x - 6$ and let $g(x) = 3x - 9$.

    a. Evaluate (i) $f(-3)$ (ii) $f(4) - f(3)$ (iii) $f(5) - f(4)$ (iv) $f(A + 1) - f(A)$

    b. Evaluate (i) $f(g(2))$ (ii) $g(f(2))$

11. The Yearbook club is considering two different companies to print this year's yearbook. The Descartes Publishing Co. charges a flat fee of \$475 plus \$4.50 per book. The Euclidean Publishing Co. charges a one time fee of \$550 plus \$4.25 per book.

    a. Each of the company's costs to publish the yearbooks can be modeled using linear equations. Write two equations to model the publishing costs.

    b. Which company should our Yearbook club use? Why.

12. Given the equation $5x - 2y - 29 = 0$;

    a. change the equation $5x - 2y - 29 = 0$ into slope-intercept form as well as slope-point form.

    b. determine the point on the line $5x - 2y - 29 = 0$ that is closest to the origin.

Part 3 - Extension Problems

13. A line with a slope of 3 intersects a line with a slope of 5 at the point (10,15). What is the distance between the x-intercepts of these 2 lines?

14. Let $f(x) = 2x - 6$ and let $g(x) = 3x - 9$.

    a. Find $f(g(2))$ as well as $g(f(2))$ as well as $f(g(x))$.

    b. Let $h(x) = 3x + 10$. For what value of x does $h(h(x)) = x$?