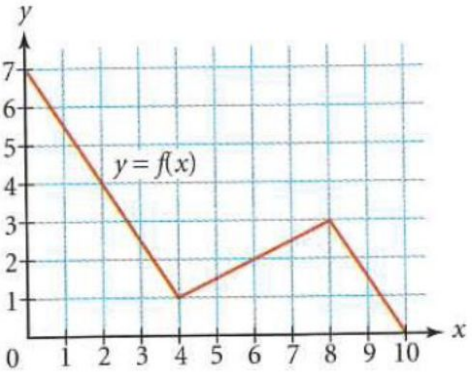
IM2 Problem Set 4.9 - Linear Relations

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. **(CI)** Use the graph below to answer the following questions about the function, $y = f(x)$. In the graph $f(4) = 1$.
   a. Evaluate: $f(6)$, $f(2)$, $f(0)$, $f(5)$.
   b. For which values of x is $f(x) = 1$?
   c. State the domain and range of f.
   d. There are three linear segments in this function. Determine the equation of each segment and express in slope-intercept form



2. **(CI)** Solve the following linear systems using the substitution method
   a. Line 1: $3x - 2y = 10$ Line 2: $x + 3y = 7$
   b. Line 1: $x + 3y = 5$ Line 2: $2x - 3y = -17$
   c. Line 1: $y = -2x + 5$ Line 2: $4x + 2y = 10$

3. **(CA)** Given ΔABC, where $\angle ABC = 90°$ and AB = 5 cm and BC = 12 cm, determine:
   a. The length of side AC;
   b. The measure of $\angle BAC$ and $\angle BCA$
   c. If point B is located at (0,0) and point A is located at (5,0), determine the equation of the line through points A and C.

4. **(CI)** Solve the following linear systems using the elimination method:
   a. Line 1: $2x + y = 29$ Line 2: $4x - 3y = 18$
   b. Line 1: $5x + 2y = 18$ Line 2: $2x + 3y = 16$
   c. Line 1: $3x + 21 = 5y$ Line 2: $4y + 6 = -9x$

5. **(CA)** The linear system $6x + 5y = 10$ and $ax + 2y = b$ has an infinite number of solutions. Determine the value(s) of a and b.

6. **(CI)** Hana paid a one-time registration fee to join a health club but she also pays a monthly fee. After 3 months, she had paid $315 and after 7 months, she had paid $535. Determine the registration fee and the monthly fee.

Part 2 - Skills/Concepts Application Problems

7. **(CA)** ReadyCars charges $59/day plus $0.14/km to rent a car whereas BestCARS charges $69/day plus. $0.11/km. Use may use DESMOS to help prepare your graphs.

    a. Mr. D wants to drive 200 km and rent the car for only one day. Which company should he use?
    b. Mr. S wants to rent a car for 2 days and drive from the airport to his home, which is a trip of 500 km. How much does each each company charge for this trip.
    c. Prepare a graph showing the cost of the following trip: a three day trip wherein you travel 200 km on day 1, 400 km on day 2 and 600 km on day 3.

8. **(CI)** A rectangle has a perimeter of 40 meters.

    a. State three possible dimensions that this rectangle may have. Determine the area of each of your possible fields.
    b. One possible dimension of the rectangle has its length being 2 units longer than its width. Create a **linear system** for this situation.
    c. Solve your linear system and explain what your solution means.
    d. Maya says that we did not need a **linear system**, we could have simply used **one linear equation** to solve the problem. What equation did Maya use?

9. **(CI)** Solve the linear system defined by $x - \frac{1}{3}y = -1$ and $\frac{2}{3}x - \frac{1}{4}y = -1$. Verify your solution.

10. **(CA)** Use DESMOS to help you with this question. Given the function $g(x) = -2x + 7$;

    a. Show that the point (3,1) is on the line.
    b. Is the point (5,10) above or below the line? Explain your reasoning.
    c. Explain how you would graph the inequality $g(x) < -2x + 7$?
    d. Use DESMOS to graph $g(x) < -2x + 7$.

11. **(CA)** Given the following functions, evaluate or solve as required:

    a. If $f(x) = 4x - 3$, evaluate $f(-9)$ and solve for x if $f(x) = 53$.
    b. If $g(x) = x^2 - 2$, evaluate $g(-2)$ and solve for x if $g(x) = 7$.
    c. If $h(x) = -x^2 - 4$, evaluate $h(5)$ and solve for x if $h(x) = -40$.
    d. If $m(x) = 4^{2x-1} - 1$, evaluate $m(0)$ and $m(-0.5)$ and solve for x if $m(x) = 15$.
    e. If $g(x) = x^2 - x - 2$, evaluate $g(2)$ and is there another value for x if $g(x) = 0$?

12. **(CA)** Juan is a cashier at a store. He has a total of $580 in bills. He has 76 bills, consisting of $5 bills and $10 bills. How many of each type of bill does he have?

Part 3 - Extension Problems

13. Complete the table of value for the function $f(x) = \begin{cases} -x & x \leq 0 \\ x & x > 0 \end{cases}$ and then prepare a graph from your table of values.

14. Absolute Value means the _____ from zero. So what do you think the graph of this equation looks like? Make your best sketch of the graph of y= x looks like. (this is just your best guess)

15. Use your calculator and DESMOS to prepare graphs of the absolute value function. How do these graphs compare to the graph and table of values from Q13?

HOMEWORK PROBLEMS:

(1) Nelson 10, Chap 1.4, p40, Q12,13,14
(2) Nelson 10, Chap 1.6, p55, Q11ade, 13