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)** Two functions are given: $f(x) = 4 - \frac{1}{2}x$ on the domain of $-4 < x \le 8$ and then $g(x) = -2 + \frac{1}{4}x$ on the domain of $-8 \le x < 4$. State the range of each function. Do the two functions intersect? Explain how you know they do/don't intersect.

2. **(CA)** Hanna has scored the following grades in her quizzes in IM2: 85%, 93%, 96% and 71%.
   a. Determine the average grade in these quizzes.
   b. She has one more quiz to write and so she would like to raise her quiz average to A⁻ (89.5%). Is this possible?
   c. As it turns out, she scores 100% on Quiz 5. So now she must write the semester final exam, which contributes 20% to her final grade. Her 5 quiz scores contribute the other 80% of her final grade. What exam score must Hanna get in order to finish with an A⁻ in IM2?

3. **(CA)** You are given the following two linear functions: L_1 is $2x + 5y = -4$ and L_2 is $x - 2y = 7$.
   a. Solve this linear system by graphing.
   b. Now create a new system by doing the following: (i) add together L_1 and L_2 and (ii) subtract L_2 from L_1 (so $L_1 - L_2$). Write your new equations and solve this new system by graphing.
   c. Given your observations from Q3a and Q3b, explain what the term "equivalent linear systems" means.

4. **(CI)** For the following lines, graph them and determine (if possible) their (i) slopes, (ii) x- and y-intercepts: a. $y = 4$ b. $y = -2$ c. $x = -3$ d. $x = 5$ e. $\frac{x}{3} + \frac{y}{8} = -1$

5. **(CA)** You are given the linear functions: L_1 is $3x - 4y = 11$ and L_2 is $5x + 2y = 21$.
   a. Use your TI-84 to graph the 2 functions and find the intersection point.
   b. Use POLYSMLT2 to determine the intersection point.
   c. Since you now have the graph of each linear function, explain how would you graph the **inequality** $3x - 4y < 11$ and the **inequality** $5x + 2y > 21$.
   d. Since you know where the 2 functions intersect, explain how you would solve the system defined by: $3x - 4y < 11$ and L_2 is $5x + 2y > 21$. Finally, what is the solution to this system?

6. **(CI)** Solve the following linear systems. **(CA)** Verify your answers using POLYSMLT2
   a. $4x + y = 1$ and $x - 2y = -11$
   b. $3x - 3y = 6$ and $8x + 4y = 4$
   c. $3x + 2y = -2$ and $-9x - 6y = 3$

Part 2 - Skills/Concepts Application Problems

7. **(CI)** The Gr 9 student council is going to sell muffins as a fund raising activity. They spend $16 on advertising and the cost of ingredients to bake each muffin is $0.50. They decide to sell each muffin for 75 cents.
   a. Write two equations that can be used to model this situation.
   b. If they sell 200 muffins, how much money does the student council raise?
   c. How many muffins must the Gr 9 student council sell in order to break even (profit is zero)?

8. **(CA)** Kajsa and Erika make bead jewellery in their spare time. Their monthly income for 10 consecutive months is shown in the table. To help describe the trend in their income, answer the following questions.

Month	1	2	3	4	5	6	7	8	9	10
Income ($)	20	25	45	55	80	90	110	105	135	155

   a. Select 2 points and determine an equation for a linear model for their sales data.
   b. Do the slope and intercept(s) have any meaning in the context of this situation?
   c. What would the domain and range of this relation be?
   d. When will their sales income reach $200? What assumption are you making? How confident are you in this prediction?
   e. What will their sales income be 24 months after they start? How confident are you in this prediction?
   f. Now, use your calculator to graph the scatter plot and use your calculator to determine the equation for the line of best fit.

9. **(CA)** At CAC's HS Talent Show, the Sophomore council sold 130 tickets and raised LE 2,912.50. The admission fees were LE 25 for adults and LE 17.50 for students. Determine how many adult tickets and how many student tickets were sold.

10. **(CI)** Consider the following relations, given to you as sets of coordinates. Determine:
    a. are they functions or not?
    b. the domain and range for each function.
        i. $\{(-3, 2), (4, -2), (-3, -2), (4, 2)\}$
        ii. $\{(1, 1), (1, 3), (1, 5)\}$
        iii. $\{(2, -3), (3, -3), (4, -3)\}$
        iv. $\{(1, 1), (2, 2), (3, 3)\}$

11. **(CI)** Graph the following functions:

a. (i) $f(x) = \begin{cases} 5 - 2x & x < 2 \\ x - 1 & x \geq 2 \end{cases}$ (ii) $g(x) = \begin{cases} -3 + x & x < 3 \\ \frac{2}{3}x - 1 & x \geq 3 \end{cases}$

b. One of the two functions above is described as being continuous and one is described as being discontinuous. Which function is continuous and what does mean when we describe a function as being continuous or discontinuous?

Part 3 - Extension Problems

12. The highest and lowest marks awarded on an examination were 285 and 75. All the marks must be reduced so that the highest and lowest marks become 200 and 60.

a. Determine a linear function that will convert 285 to 200 and 75 to 60.
b. Use the function to determine the new marks that correspond to original marks of 95, 175, 215, and 255.

13. As a mental arithmetic exercise, a teacher asked her students to think of a number, triple it, and subtract the resulting number from 24. Finally, they were asked to multiply the resulting difference by the first number they had selected.

a. Use function notation to express the final answer in terms of the original number.
b. Determine the result of choosing numbers 3, 25, and 10.
c. Determine the maximum result possible.

HOMEWORK PROBLEMS: