A. Lesson Context

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		
CONTEXT of this LESSON:	Where we've been In Lessons 1-3, you practiced with basic concepts related to linear relations	Where we are Connecting to Linear Relations, we now consolidate working with different forms of equations that describe linear relations.	Where we are heading How do we apply the concept of "functions" to linear & exponential relations.

B. Lesson Objectives

    a. This is a DIFFERENTIATED LESSON, that will offer you the opportunity to work at the level best suited to your current level of (i) mastery & (ii) confidence.

    b. Choose your level on the ASSUMPTION that I AM GOING TO GIVE A POP QUIZ on Writing Linear Equations and you either (i) would need more guided practice; (ii) would like more practice, but don't necessarily need a lot of guidance or (iii) you ROCK, so bring on DIFFERENT, more challenging stuff!

C. Fast Five (Skills Review Focus)

- Consolidation of Linear Modeling concepts related to the Balloon Problem

- Discussion about independent & dependent variables

https://www.youtube.com/watch?v=e8np2IaTv_s

- weight of bungee jumper - amount of stretch in the bungee chord	-income from a bake sale - number of cakes sold	- length of a downhill race - time it takes to complete the race	- area of a circle - the radius of a circle

D. Forms of Equations: Skill Mastery

1. A line that passes through the points C(2,3) and D(5,8).
Write the equation of this line in all three forms.

2. Given the equation $y = 4 - \dfrac{1}{2}x$:

      (a) Determine the value of y if x = -12

      (b) Determine the value of x if y = -2

      (c) State the slope and x- and y-intercepts

      (d) Write the equation in standard form.

      (e) Write the equation in point-slope form.

3. Given the equation $2x - 3y = -8$:

      (a) Determine the value of y if x = -12

      (b) Determine the value of x if y = -2

      (c) State the slope and x- and y-intercepts

      (d) Write the equation in slope intercept form.

      (e) Write the equation in point-slope form.

4. Given the equation $y - 5 = \dfrac{2}{3}(x - 2)$:

       (a) Determine the value of y if x = -12

       (b) Determine the value of x if y = -2

       (c) State the slope and x- and y-intercepts

       (d) Write the equation in standard form.

       (e) Write the equation in slope intercept form.

5. The equation $\dfrac{x}{7} - \dfrac{y}{2} = -1$ can also be written as $\dfrac{1}{7}x - \dfrac{1}{2}y = -1$.

(a) Why are they the same?

All three of your Math teachers tried to convert the equation into standard form.

(b) Mr Rawlings multiplied the equation by 2 and got $\dfrac{2x}{7} - y = -2$. Is he correct? Why/why not?

(c) Mr Santowski multiplied the equation by 7 and got $x - \dfrac{7}{2}y = -7$. Is he correct? Why/why not?

(d) Mr Smith multiplied the equation by 14 and got $2x - 7y = -14$. Is he correct? Why/why not?

(b) Determine the value of x if y = -14

(c) State the slope and x- and y-intercepts

6. A line passes through the point E(5,-2) and is parallel to $3x - 4y = -9$. Answer the following guiding questions as work toward determine the equation of this line & express the equations in all three forms.

(a) Use DESMOS to graph the line $3x - 4y = -9$ as well as the point E(5,-2)

(b) Using algebra or DESMOS or any other method, EXPLAIN why the slope of the line $3x - 4y = -9$ is ¾.

(c) Using DESMOS, type in the new equation y = ¾x + B and add a slider for B
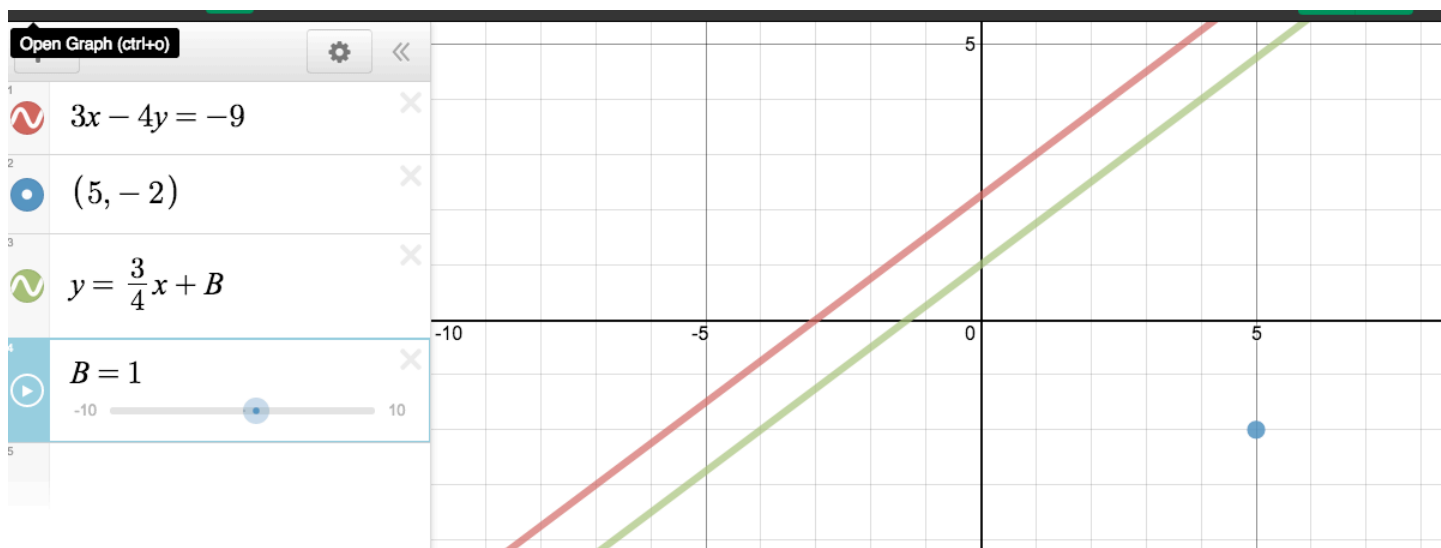
(d) Play the slider and thus determine an appropriate value for B such that the line passes the point E(5,-2) and is parallel to $3x - 4y = -9$.
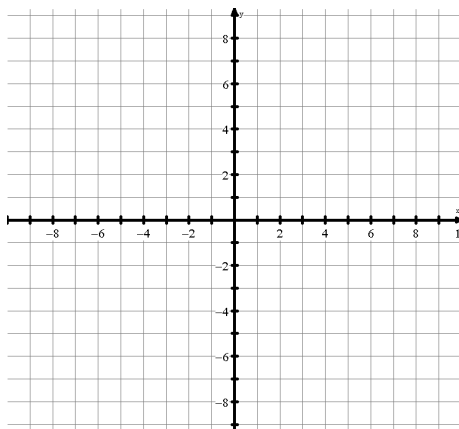
(e) Use algebraic processes to verify that your value of B from this graphic investigation is correct.

E. **Level MF** ➔ **Have achieved Skill Mastery & can** ==move my learning forward==

Feel free to use the INTERNET to help you with RESEARCH as you explore these EXTENSION topics .....

1. **PART A – Piecewise Linear Functions**

$$g(x) = \begin{cases} x+3 & \text{if } x < -2 \\ -2x-3 & \text{if } x \geq -2 \end{cases}$$

Determine

$g(-4), \ g(-2), \ \text{and} \ g(2).$

Determine the domain of $g(x)$
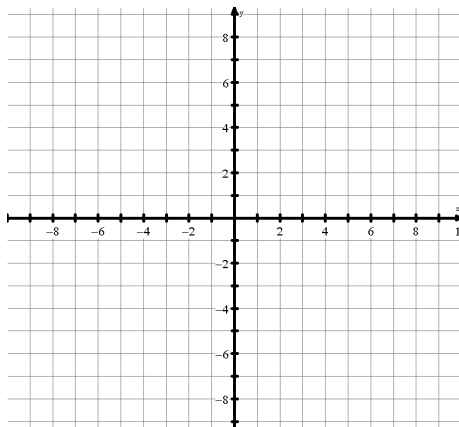
Graph $g(x)$.

Determine the range of $g(x)$

$$g(x) = \begin{cases} 1+x & \text{if } x < 0 \\ 5-2x & \text{if } x \geq 0 \end{cases}$$

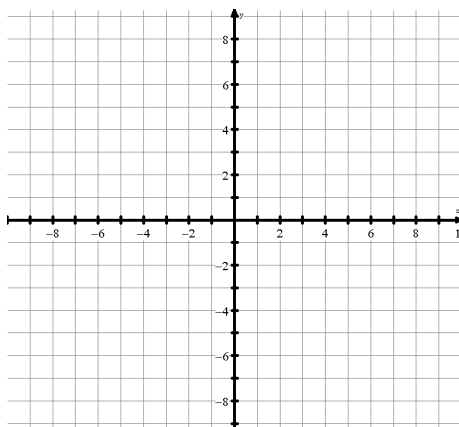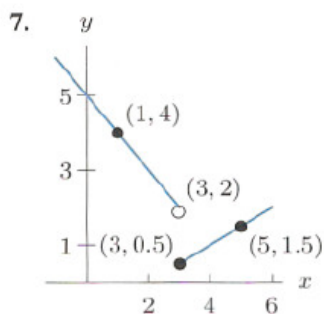Determine $g(-1), \ g(0), \ \text{and} \ g(2).$

Determine the domain of $g(x)$

Graph $g(x)$.

Determine the range of $g(x)$

$$a(x) = \begin{cases} 1-x & \text{if } -6 \leq x < -2 \\ 3 & \text{if } x = -2 \\ x-2 & \text{if } -2 < x < 4 \end{cases}$$

Determine :

$a(-1), \ a(2), \ \text{and} \ a(3).$

Determine the domain of $a(x)$
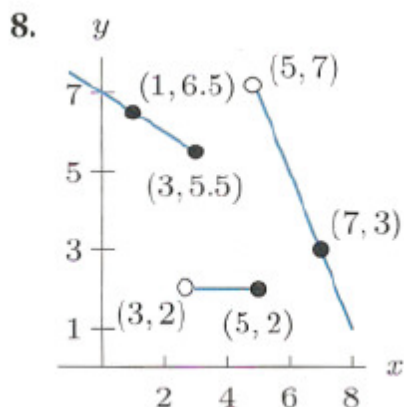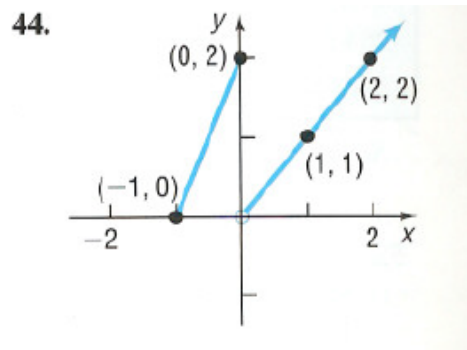
Graph $a(x)$.

Determine the range of $a(x)$

Write an equation for the function

7.

Write an equation for the function

8.

Write an equation for the function

44.

2. **PART B – Graphing & Solving Linear Inequalities**

(a) Solve the linear inequality 3x + 5 < -2x +3(x-4)

(b) Use DESMOS to graph the linear inequality y ≤ 2x + 4. Explain what is happening and offer an explanation as to WHY the solution appears as it does. Explain how you could ALGEBRAICALLY verify that your solution was correct

(c) Graph the linear inequality y < 2x – 16. DO NOT USE TECHNOLOGY!! Verify your solution.

(d) Graph the linear inequality y ≥ -x+5. DO NOT USE TECHNOLOGY!! Verify your solution.

(e) Graph the linear inequality 2x – 4y < 16. DO NOT USE TECHNOLOGY!! Verify your solution.

(f) Graph the linear inequality y – 6 < -2(x + 3). DO NOT USE TECHNOLOGY!! Verify your solution.

3. PART C – Solving Linear Equations Involving Absolute Value.

    a. Explain what the Absolute Value "function" does to an input, for example the numbers -3 and +5

    b. Evaluate $\left| -2 + 5 + 7 - 13 \times 2 \right|$ and evaluate $\left(-2 + 5 + 7 - 13 \times 2 \right)$ and explain WHY the answers are different.

    c. Solve $\left| 2x + 5 \right| = 4$ GRAPHICALLY on DESMOS and explain WHY there are two solutions.

    d. Explain HOW to solve the equation $\left| 2x + 5 \right| = 4$ ALGEBRAICALLY.

    e. Solve $\left| 2x + 5 \right| = x + 4$ GRAPHICALLY and explain WHY there are two solutions.

    f. Explain HOW to solve the equation $\left| 2x + 5 \right| = x + 4$ ALGEBRAICALLY.

    g. Solve the following equations involving absolute value ALGEBRAICALLY.

        (i) $\left| -2x + 5 \right| = x + 4$

        (ii) $\left| -\dfrac{2}{3}x - 1 \right| = x + 4$

        (iii) $\left| 2x + 5 \right| = x - 4$

        (iv) $4 - \left| 3x - 6 \right| = 4 - x$