

1. Lesson Context

<p>BIG PICTURE of this UNIT:</p>	<ul style="list-style-type: none"> • What is meant by the term FUNCTIONS and how do we work with them? • What are the most important components of “Problem Solving”? • From last year’s course, what are the major topics from linear relations that we have worked with, remember, and are fluent with? • How do we apply the concept of linear relations to (i) geometry & (ii) data analysis?
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2. Lesson Objectives

- a. Apply linear relations to model contextual problems
- b. Work with multiple forms of linear equations

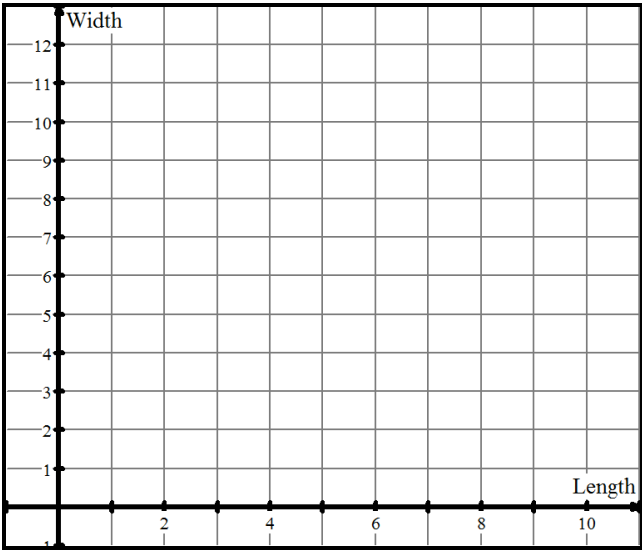
PART 1 – Skills REVIEW

1. Mr. Santowski was mowing lawns to make money for a video game! Mr. Santowski has 5 dollars in the bank. And for every lawn that he mows, he earns 3 dollars! A linear model will be used to model the relationship between the number of lawns mowed and amount of money he has.
 - a. What is the slope of this relationship? What would be the slope represent?
 - b. What is the y -intercept of this relationship? What would be the y -intercept represent?
 - c. What is the x -intercept of this relationship? What would be the x -intercept represent?
 - d. What will “ x ” represent?
 - e. Sketch this linear relation.
 - f. If Mr. S wants to buy a game that costs \$62, how many lawns must he mow?
 - g. Does the point (4,17) lie on the graph of this relation? What does this point mean in context?
 - h. Is there are a part of the graph we should not include? Why/why not? Hence, state the domain and range of this relation.

2. Mr. Smith is going BALD!!! Today, he has 7,000 hairs left on his head. If he loses 100 hairs every 4 days, then create a linear equation to model this situation!
 - a. What is the slope of this relationship? What would be the slope represent?
 - b. What is the y -intercept of this relationship? What would be the y -intercept represent?
 - c. What will “ x ” represent? What will “ y ” represent?
 - d. Sketch this linear relation.
 - e. On what day can Mr. Smith expect to go bald?
 - f. Does the point (150, 3250) lie on the graph of this relation? What does this point mean in context?
 - g. State the domain and range of this relation.
 - h. Graph this linear relation on your TI-84. What “changes” do you need to make on calculator when graphing this relation?

3. Your turn. Given the equation $y - 1500 = 25(x - 20)$.
 - a. Put the equation $y - 1500 = 25(x - 20)$ into $y = mx + b$ form.
 - b. Then write a story problem that goes with the numbers of the equation.
 - c. What is the significance of the numbers 20 and 1500 in the equation $y - 1500 = 25(x - 20)$?

4. Linear Models and Geometry

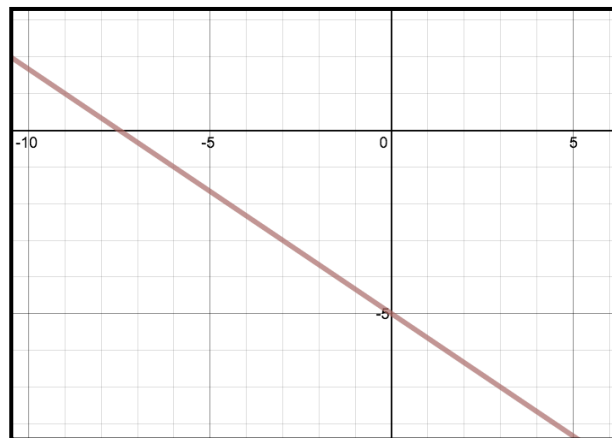
<p>Verbal Description:</p> <p>Mr Santowski is constructing 2 adjacent, rectangular pens to contain puppies, as illustrated below. I have 24 meters of fencing material available.</p>	<p>Data Table: List some possible values for the length and width of the pens.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">length</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;"></td> <td style="padding: 5px;">4</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;">7</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Width</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;">6</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">0</td> </tr> </table>	length	0		4			7				Width			6					1	0
length	0		4			7															
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<p>Graph:</p> 	<p>Equation:</p> <p>x-intercept:</p> <p>Meaning of x-intercept:</p> <p>y-intercept:</p> <p>Meaning of y-intercept :</p>																				
<p>Questions:</p> <ol style="list-style-type: none"> a. Write the equation in standard form. b. Write the equation in slope-intercept form. c. What does the slope mean in this question? d. Which form do you find easiest for this problem? Why? e. State the domain and range of this function and explain your thinking. 																					

PART 2 – Skills PRACTICE

1. Determine the equation of the line that passes through the point B(4,-2) and has a slope of $\frac{2}{3}$. Write the equation in slope-intercept as well as slope-point form. Verify using technology – first your TI-84 then on DESMOS

2. In order to graph the relation $4x - 2y - 12 = 0$ on the TI-84, you need to change the equation. Change the equation into:
 - a. slope-intercept form and
 - b. slope-point form.
 - c. Then, provide a sketch of the line and label the x- and y-intercepts.

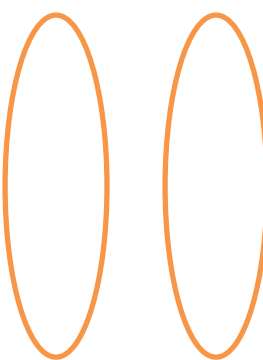
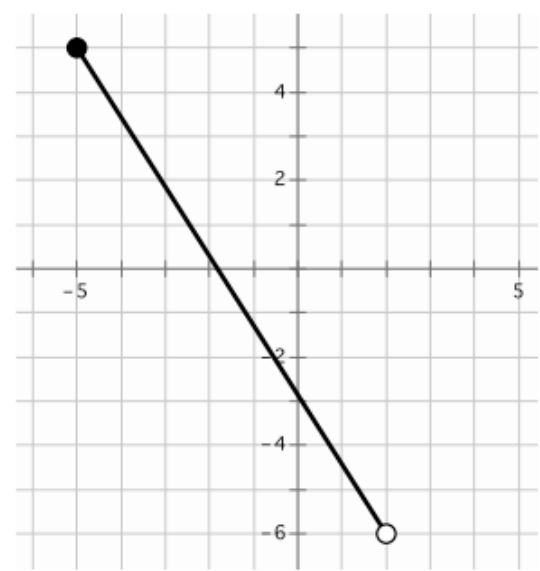
3. Determine the equation of the line that is shown in the diagram. Write the equation in slope-intercept as well as slope-point form and in standard form. Verify using technology – first your TI-84 then on DESMOS



4. Use DESMOS to graph the following lines on the specified domains or ranges as given. Sketch a copy into your notes, clearly labelling the “end points” of the line segments
 - a. $2x + 4y - 16 = 0$ on the domain of $\{x \in R \mid -2 \leq x \leq 6\}$
 - b. $\frac{2}{3}x - y - 4 = 0$ on the range of $\{y \in R \mid -4 \leq y \leq 2\}$

1		$2x + 4y - 16 = 0 \{ -2 \leq x \leq 6 \}$
2		$\frac{2}{3}x - y - 4 = 0 \{ -4 \leq y \leq 2 \}$

5. Complete the following

<u>VERBAL (V)</u>	<u>NUMERIC (N)</u>																						
<p>Our relation will be defined by the following GRAPHIC description:</p> <p>So, to write a verbal description: To “create/generate” a new value, ??????</p>	Table of Values	Mapping Diagram	Ordered Pairs																				
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<u>ALGEBRAIC (A)</u>	<u>GRAPHIC (G)</u>																						
																							

REVIEW: Domain, Range, Solve, Evaluate

Describe the domain in words →

Describe the range in words →

Evaluate for y when $x = -3$ and when $x = 4$

Solve for x if $y = -1$

6. Here is a “cost of apples” question. In each case, provide a REASON (or state your assumptions) for your answer!!
- If it is known that 6 apples cost 9LE, how much do 12 apples cost? How about 15 apples?
 - If it is known that 6 apples cost 9LE and that 10 apples cost 25LE, how much would 12 apples cost? How about 15 apples?
 - If 6 apples cost 9LE, 8 apples cost 16LE, 10 apples cost 25LE and 4 apples cost 4LE, how much would 12 apples cost? 15 apples?

Higher Level Extension Work

- A long distance calling plan charges \$1.29 for any call up to 20 minutes in length and 7 cents for each additional minute (or each part of a minute)
 - What is the independent variable (input)? What would the domain be?
 - What is the dependent variable (output)? What would the range be?
 - Would you expect this relation to be a function? Why/why not?
 - Determine the cost of a 52 minute phone call.
 - How long would a call be if you had to pay \$2.41.
 - To help draw a graph, complete the following table of values. Then graph this relation.

Time (min)	0	5	10	15	20	25	30	35	40
Cost (\$)									

Now, how would you write an equation for this relation?

