A. Lesson Context

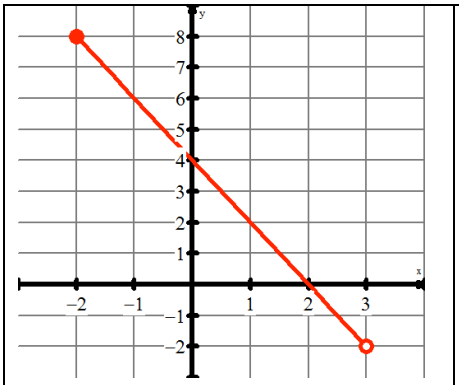
BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • What are the most important components of "Problem Solving"? • From last year's course, what are the major topics from linear relations that we have worked with, remember, and are fluent with? • How do we apply the concept of linear relations to (i) geometry & (ii) data analysis & (iii) functions

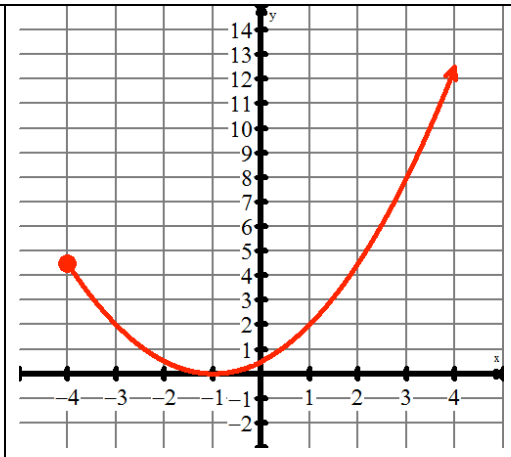
B. Lesson Objectives

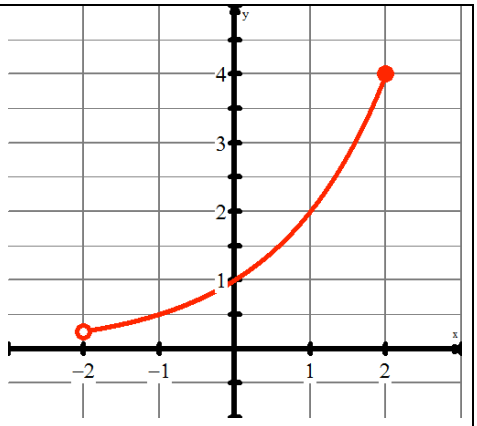
a. Review fundamental concepts of domain and range as related to Relations and to Functions
b. Change the context of the "given information" regarding relations and their domains and ranges

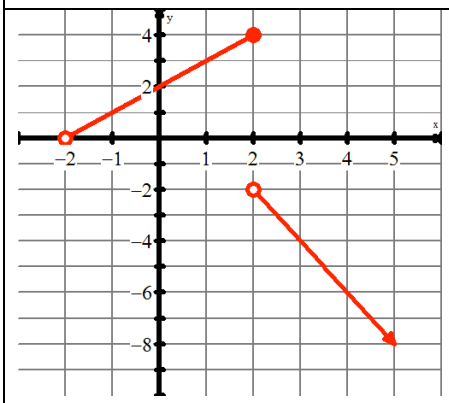
PART 1 – Skills REVIEW

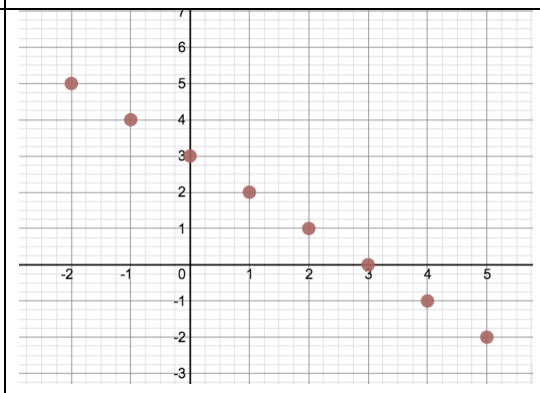
1. From the following graphic representations of relations, state the domain and range in words. Then, use appropriate math symbols to re-express the domain mathematically.

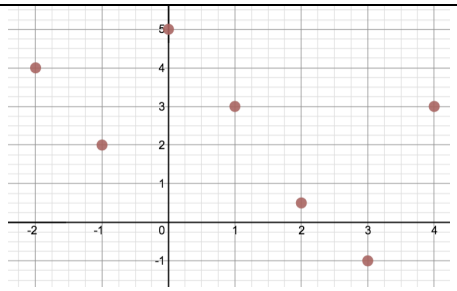












2. From the following DESCRIPTION of a scenario, determine the domain and range and state what each represent in the context of the problem.

The Singapore Flyer was the world's largest Ferris Wheel when it was built in 2008. The wheel has a diameter of 150 m and reaches a maximum height of 165 m (relative to the ground). One complete "ride" (which is one revolution of the wheel) takes 28 minutes.

The "independent variable" in a data collection experiment will be Mr. R's time on the ride and the dependent variable will be his height above the ground. Mr. R. will complete two consecutive rides on the Ferris Wheel.

a. Sketch a graph of what the height-time relation MIGHT look like. Explain the reasoning of your sketch.
b. State the domain and range of this relation in words.
c. State the domain and range of this relation mathematically.
d. HL EXTENSION: How would the domain change if Mr. R's two rides were NOT consecutive?

3. Domain and Range from equations.

   A type of corn plant grows at an average rate of 4.5 cm per day from the start of the 3rd week of growth to the end of the 6th week of growth. The plant's growth can be modeled using the equation h = 4.5a + 25, where h is the plant's height in cm and a is the plant's age, measured in days.

   a. What do the numbers 4.5 and 25 represent?
   b. State the domain and range for this relation, on the given domain and range.
   c. Graph the relation.
   d. HL EXTENSION: Draw a graph showing the relationship between height and age for the first 10 weeks of the plant.

PART 2 – Skills PRACTICE

1. Graph the function $y = 4 - \frac{1}{2}x$. From your graph (or from your calculator or from algebra), determine:
   a. The domain and range;
   b. The x-intercept and the y-intercept;
   c. Solve for y when x = -2
   d. What value of x makes y = -8?
   e. Sketch the relation and label the x- and y-intercepts.
   f. Write the equation in standard form.

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

3. Change the equation $5x - 2y - 12 = 0$ into slope-intercept form and slope-point form. Provide a sketch of the line.

4. Graph the points A(1,2) and B(6,1) and C(4,5) and D(8,4) on graph paper. Connect the points to make a quadrialteral.
   a. TRUE or FALSE: The quadrilateral is a parallelogram. Show/explain your reasoning.
   b. TRUE or FALSE: All four sides have different lengths. Show/explain your reasoning.

5. At higher altitudes, water boils at a lower temperature. Suppose water boils at 96.5 °C at an altitude of 1000 m and then at 93.0°C at an altitude of 2000 m.

    a. Mr. S propses a linear relation to model the relationship between altitude and the boiling point of water. What would be the slope of this linear model?
    b. Write the equation of this relation in all three forms (slope-intercept, standard, and point-slope).
    c. What would be the boiling point of water at the South Base Camp on Mount Everest (elevation 17,600 ft)
    d. What window settings on your TI-84 will allow you to get a "good view" of this relation?

Higher Level Extension Work

1. If apples cost 3 LE per apple and oranges cost 4 LE per orange, how many apples and oranges can I buy for 70LE?

2. Graph the points A(1,2) and B(6,1) and C(4,5) and D(8,4) on graph paper. Connect the points to make a quadrialteral. Use algebraic methods to find the point at which the diagonals intersect.