(A) Lesson Context

BIG PICTURE of this UNIT:	• mastery with algebraic manipulations/calculations involving linear relations • proficiency in working with graphic and numeric representations of lines • proficiency in working with linear relations in real world scenarios		
CONTEXT of this LESSON:	Where we've been Lesson 3 reviewed types of equations of linear relations & their applications	Where we are Graphs & algebra of equations of linear relations & introduction to piecewise linear equations	Where we are heading Mastery of working with equations of linear relations

(B) Lesson Objectives:

a. Review working with equations of linear relations written in all three forms
b. Review writing equations given information about Parallel and Perpendicular Lines
c. Review working with equations of linear relations in real world applications
d. Introduce working with piecewise defined linear equations

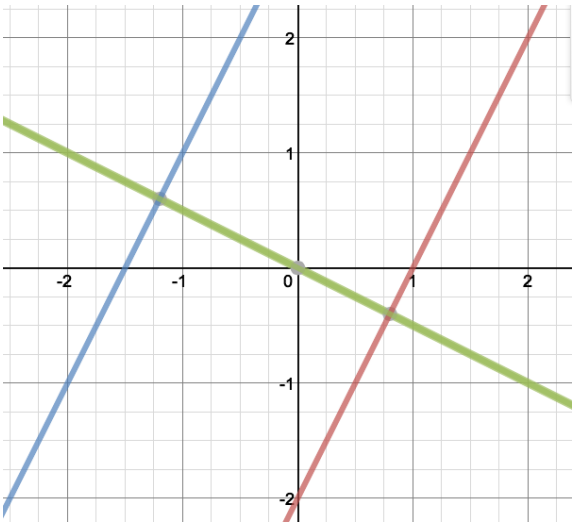
(C) Skill Review Exercise #1:

a. Determine the equation of the line through the point A(2,-3) with a slope of $-\frac{3}{4}$. Write the equation in all three forms:

(D) Concept Review: Parallel & Perpendicular Lines

a. Parallel Lines:

b. Perpendicular Lines



(E) Concept Practice: Working with Parallel & Perpendicular Lines

Write an equation *in all three forms* for the line and make a SKETCH for each question.

a) which has gradient $\frac{1}{2}$ and cuts the y-axis at 3

b) which is parallel to a line with slope 2, and passes through the point $(-1, 4)$

c) which cuts the x-axis at 5 and the y-axis at -2

d) which cuts the x axis at -1, and passes through $(-3, 4)$

e) which is perpendicular to a line with gradient $\frac{3}{4}$, and cuts the x-axis at 5

which is perpendicular to a line with gradient -2, and passes through $(-2, 3)$.

(F) Review Exercise #3: (BLUE LEVEL)

(a) Determine the equation of the line that is perpendicular to the line $y = -\frac{4}{3}x + 1$ and passes through A(a,-2). Write the equation in all three forms.

(b) Determine the equation of the line that is parallel to the line $3x - 2y - 9 = 0$ and passes through the point $A\left(5, \frac{1}{K}\right)$. Write the equation in all three forms.

(G)Applications - Environmental Issues

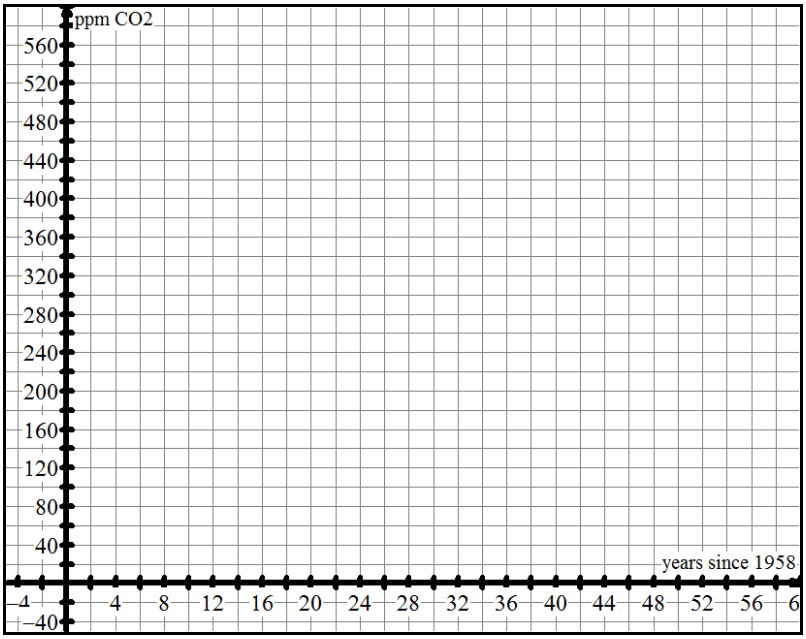
Verbal Description:

The amount of CO_2 (in ppm) in the air at the Mauna Loa Astronomical Observatory has been measured regularly since 1958. In 1972, the amount of CO_2 recorded was 327.45 ppm while in 2012, the amount was 389.78 ppm.

Data Table:

Years since 1958		
ppm of CO_2		

Graph:



Equation:

Slope:

Meaning of Slope:

Y-intercept:

Meaning of y-intercept :

Questions:

(a) When will the CO_2 levels be at 600 ppm?

(b) What was the amount of CO_2 in the air in June of this year?

(c) If I give you an additional data point, (in the year 2005, the measured amount was 379.78), will your equation change? Why? How?

(d) Interpret the meaning of the ordered pair (56,413)

(e) What would be the domain and range of this linear relation? Explain.

(H)Applications ➔ Health Issues

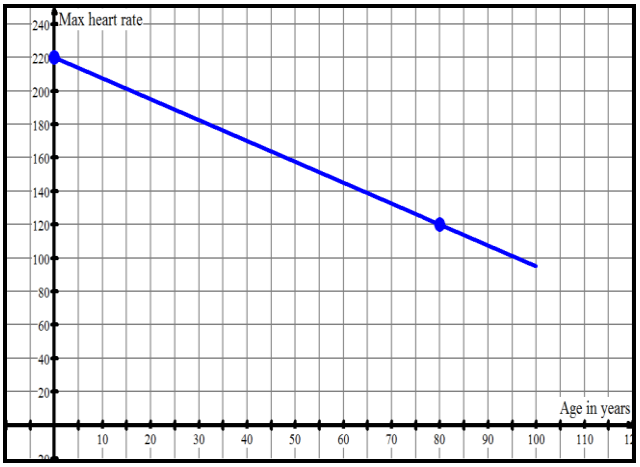
Verbal Description:

The graph below shows the relationship between a person's maximum heart rate and their age.

Data Table:

age	0	80
Max heart rate	220	120

Graph:



Equation:

Slope:

Meaning of Slope:

Y-intercept:

Meaning of y-intercept :

Questions:

(a) For what age will maximum heart rate be 170 beats per minute?

(b) What is the maximum heart rate for a 50 year old athlete?

(c) At what rate is the max heart rate decreasing from year to year?

(d) Determine the x-intercept(s) and interpret. Is this value reasonable or not?

(e) State the domain and range of this relation. Explain.

(I) Consolidating a Skill: Piecewise Linear Relations: Example #1

Do you see the two different parts?

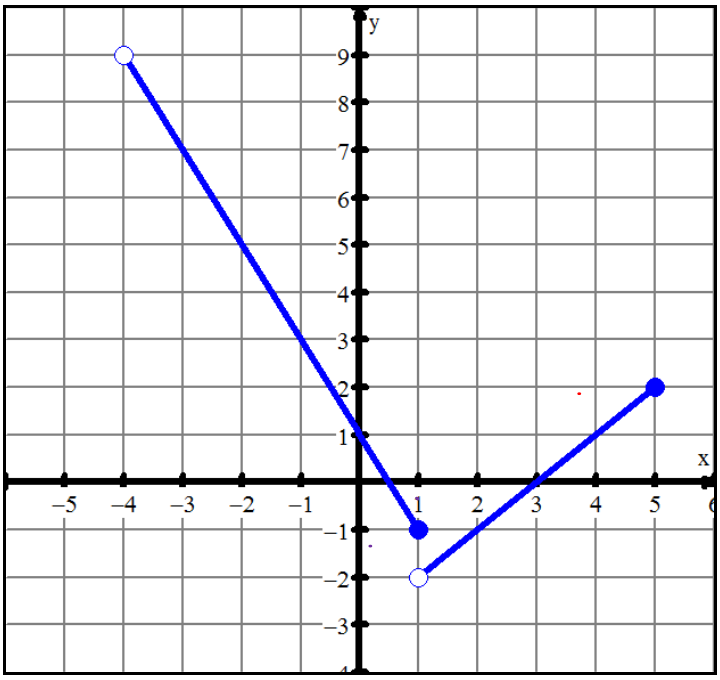
First part equation:

What x-values does the first part cover?

Second part equation:

What x-values does the second part cover

So, the equation defining what we see would be:



(J) Consolidating a Skill: Piecewise Linear Relations: Example #2

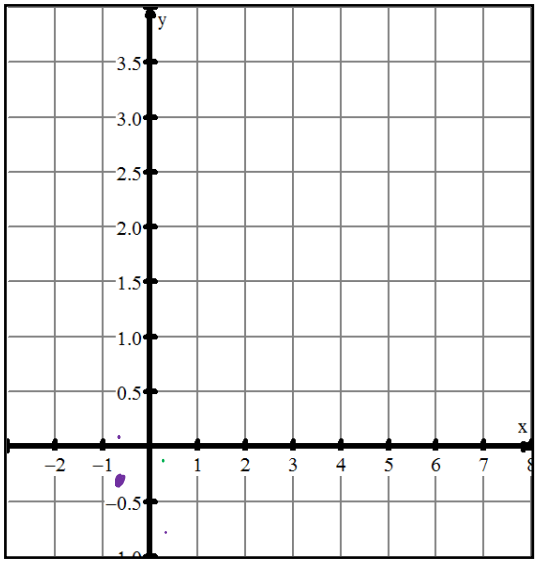
a. Consider the relation defined as $y = \begin{cases} -x+1 & \text{if } -2 \le x < 1 \\ 2 & \text{if } x = 1 \\ \frac{1}{2}x - 1 & \text{if } x > 1 \end{cases}$.

i. Determine the value of y when x = -2; x = 0; x = 1; x = 2

ii. Determine the domain of this relation

iii. Graph this piecewise linear relation.

iv. Determine the range of this relation



(K) Working with Applications of Piecewise Functions

a. A museum charges $40 for a group of 10 or fewer people. A group of more than 10 people will pay $2.00 per person for the number of people above 10 (in addition to the $40,00). For example, a group of 15 will pay $50. The maximum group size is 50 people.

   i. Draw a sketch that represents this situation. Show key points.
   ii. Write an equation in the form of y = …… ?
   iii. What are the domain and range of this cost relation

b. The charge for a taxi ride in New York City is $10.00 for the first half of a mile and then $1.50 for each additional quarter of a mile (rounded to the nearest quarter mile.)

   i. Make a data table showing the how the cost in dollars (***C***) of a trip is determined by the distance travelled, in miles (***m***). So the function will be called ***C***(***m***)
   ii. What is the cost for a 1.75 mile trip?
   iii. How far can you go for $25.00?
   iv. Sketch the graph, showing key points.

c. (BLACK LEVEL) Relations can be described by the terms CONTINUOUS and DISCONTINUOUS. Explain what that means given the two examples you have worked through today in class.

(L) Homework

From this link at http://faculty.piercecollege.edu/martinrm/Math261/Linear.pdf , complete Q 8,9,10,14-17,19,20. Answers are on the last page, but make sure your homework shows YOUR WORK in support of the answers!!!