

(A) Lesson Objectives:

- a. Review Linear Equations in the form of $Ax + By = C$
- b. Apply Linear Equations to Real World Applications
- c. Graph Linear Equations

(B) Classwork – Review of Skills:

1) Write an equation *in point-slope form* for each line. Then convert to all other forms of linear functions.

- a) through $(3, -2)$ with gradient 3
- b) through $(2, -3)$ with gradient $-\frac{3}{4}$
- c) through $(0, 4)$ with gradient -3 .

2) 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 $(-2, 3)$.

(C) Applications - Environmental Issues

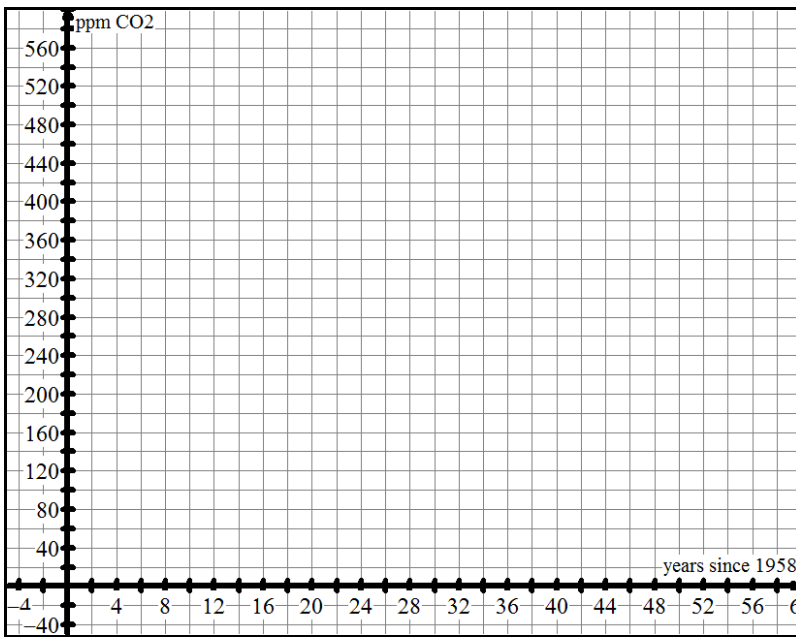
Verbal Description:

The amount of CO₂ (in ppm) in the air at the Mauna Loa Astronomical Observatory has been measured regularly since 1959. In 1972, the amount of CO₂ recorded was 327.45 ppm while in 2012, the amount was 389.78 ppm.

Data Table:

Years since 1959		
ppm of CO ₂		

Graph:



Equation:

Slope:

Meaning of Slope:

Y-intercept:

Meaning of y-intercept :

Questions:

- When will the CO₂ levels be at 600 ppm?
- What was the amount of CO₂ in the air in June of this year?
- If I give you an additional data point, (in the year 2005, the measured amount was 379.78), will your equation change? Why? How?
- Interpret the statement $C(46) = 413$
- What would be the domain and range of this linear function? Explain.

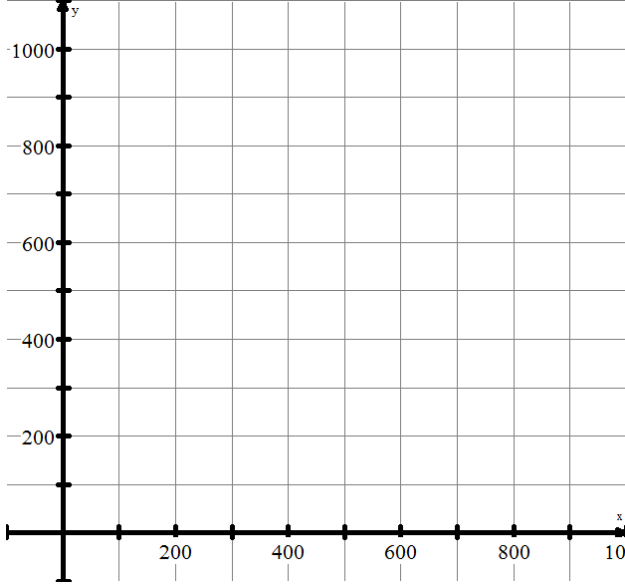
(C) Explorations → Health Issues

<p>Verbal Description:</p> <p>The graph below shows the relationship between a person’s maximum heart rate and their age.</p>	<p>Data Table:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">age</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">80</td> </tr> <tr> <td style="padding: 5px;">Max heart rate</td> <td style="padding: 5px;">220</td> <td style="padding: 5px;">120</td> </tr> </table>	age	0	80	Max heart rate	220	120
age	0	80					
Max heart rate	220	120					
<p>Graph:</p>	<p>Equation:</p> <p>Slope:</p> <p>Meaning of Slope:</p> <p>Y-intercept:</p> <p>Meaning of y-intercept :</p>						
<p>Questions:</p> <p>(a) For what age will maximum heart rate be 170 beats per minute?</p> <p>(b) What is the maximum heart rate for a 50 year old athlete?</p> <p>(c) At what rate is the max heart rate decreasing from year to year?</p> <p>(d) Evaluate $R(49)$ and interpret.</p> <p>(e) Solve $R(y) = 0$ and interpret. Is this value reasonable or not?</p> <p>(f) State the domain and range of this function. Explain.</p>							

(D) Explorations - Salary and Earnings

Mr Santowski has a summer job working on an assembly line making motherboards for computers. He gets paid \$1 for each for each laptop board he makes and \$1.50 for each desktop board he makes. Last week, he earned \$1015 for making 795 motherboards.

Graph:



DEFINE YOUR VARIABLES, then complete the tables

Data Table (motherboards):

x						
y						

Data Table (Earnings):

x						
y						

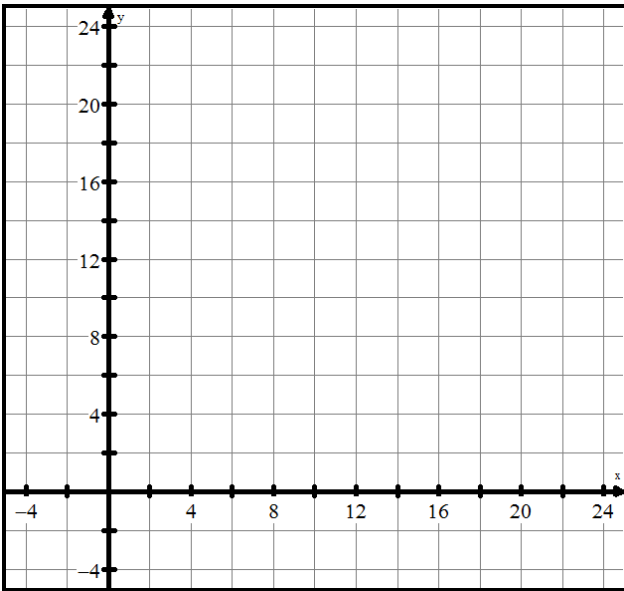
- (a) Write an equation for the number of motherboards he makes.
- (b) What do the x- and y-intercepts represent?
- (c) What is the slope and what does the slope of this function represent?
- (d) What would the domain and range of this function be? Explain.

- (e) Write an equation for his earnings.
- (f) What do the x- and y-intercepts represent?
- (g) What is the slope and what does the slope of this function represent?
- (h) What would the domain and range of this function be? Explain.

(C) Explorations → Mixtures

A candy store is preparing a mixture of chocolate raisins and chocolate peanuts. The raisins are sold for \$2.25/kg and the peanuts are sold for \$1.75/kg. They will produce a 20 kg mix that sells for \$41.

Graph:



DEFINE YOUR VARIABLES, then complete the tables

Data Table (amount):

x						
y						

Data Table (Cost):

x						
y						

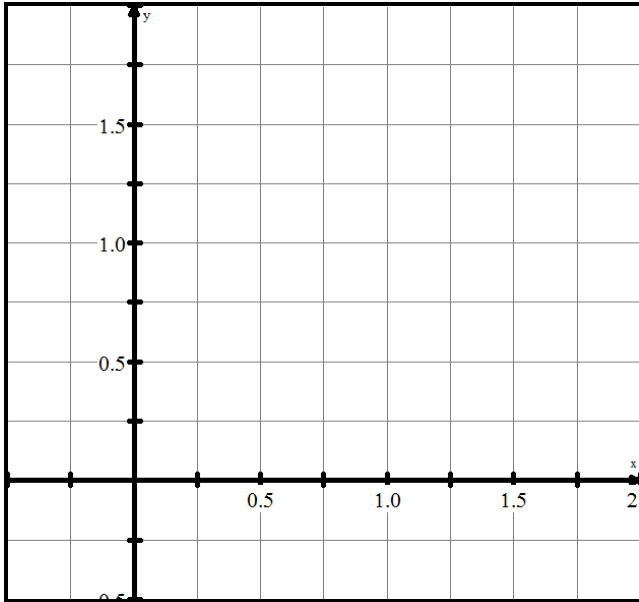
Questions:

- Write an equation for the amount of the mixture made.
- What do the x- and y-intercepts represent?
- Write an equation for the total cost of the mix.
- What do the x- and y-intercepts represent?
- Use algebra to write and solve a single equation that can be used to determine how much of each mixture should be used to make 20 kg of a mix that sells for \$41.

(C) Explorations: Equations in Standard Form - Rates

Jose travelled 95 km from Oakville to Oshawa by car and by train. The car averaged a speed of 60 km/hr and the train averaged 90 km/hr. The whole trip took 1.5 hours of travel time.

Graph:



DEFINE YOUR VARIABLES, then complete the tables

Data Table (time):

x						
y						

Data Table (distance):

x						
y						

Questions:

- (a) Write an equation for the time travelled.
- (b) What do the x- and y-intercepts represent?
- (c) Write an equation for the distance travelled.
- (d) What do the x- and y-intercepts represent?
- (e) Use algebra to write and solve a single equation that can be used to determine how much time was spent travelling by car.

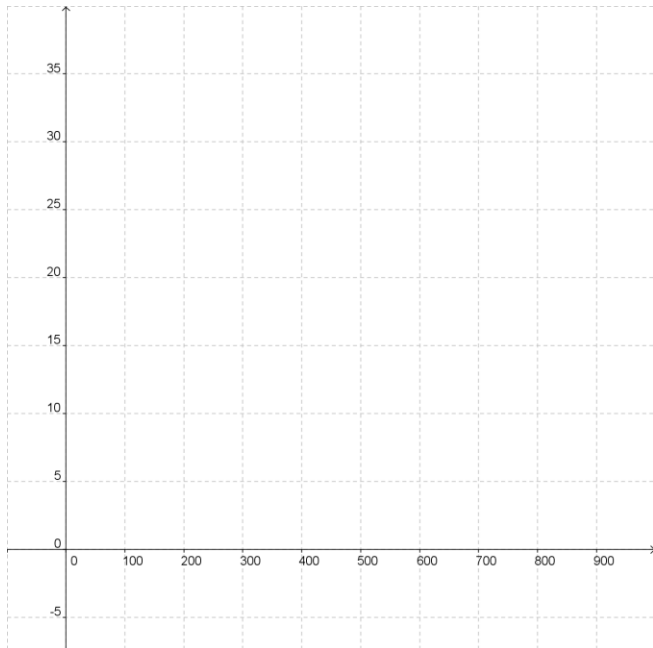
Verbal Description:

Mr Robertson is climbing a mountain. At an altitude of 200m it is 20 degrees Celsius, but after climbing to 500 metres the temperature has dropped to 15 degrees Celsius.

Data Table: List the points that the question gives you.

x						
y						

Graph: Label the axes and the function.



Dependent variable:

Independent variable:

Equation:

Slope:

Meaning of Slope:

Y-intercept:

Meaning of y-intercept :

Questions:

- (a) What is the temperature at sea-level?
- (b) What will be the temperature at 1000m?
- (c) Mr Robertson climbed this mountain in summer. What might be the effect on the graph of climbing the mountain in winter? Explain.
- (d) After a while Mr Robertson stops for lunch but finds the water in his water bottle has frozen. What can you say about the height Mr Robertson has reached?
- (e) What do you think the domain of the function might be?
- (f) What do you think the range of the function might be?

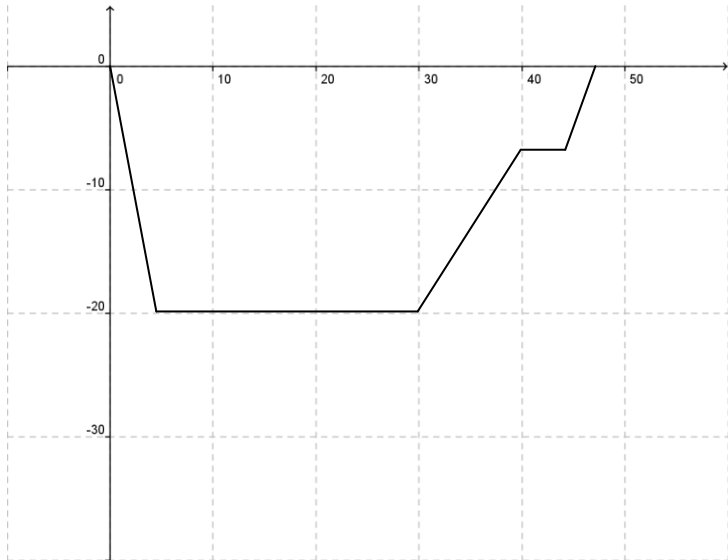
Verbal Description:

Mr Robertson is going ... ? (Look at the all the information you have and make a guess as to what Mr Robertson is doing...)

Data Table: List the points that the question gives you.

t						
d						

Graph: Label the axes and the function.



Dependent variable: time in minutes

Independent variable: metres

Equation:

Slope:

Meaning of Slope:

Y-intercept:

Meaning of y-intercept :

Questions:

- (a) What is happening for the first five minutes?
- (b) What is happening from 5 minutes to 30 minutes?
- (c) Explain what Mr Robertson is doing between 40 and 45 minutes. If you don't know, ask a colleague (someone in the class will know).
- (d) What do you think the domain of the function might be?
- (e) What do you think the range of the function might be?