

Section 5.6 – Connecting Everything

MPM1D

Part 1: Do It Now

a) Calculate the first differences

Type of relation:

x	y	First Differences	
0	-3		
3	1		
6	5		
9	9		
12	13		

b) Using the table of values, what is the constant of variation (slope)?

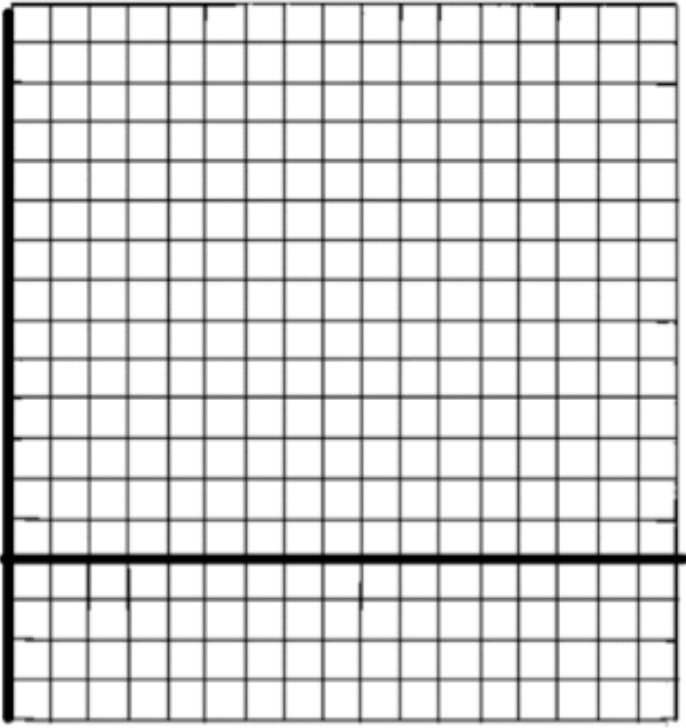
$$\text{Remember: } m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

c) What is the initial value (y-intercept)?

d) Is this a direct variation or partial variation?

e) Write an equation for the relation in the form $y = mx + b$ using the constant of variation (m) and the initial value (b)

f) Graph the relation



g) Find the slope of the line from the graph. How does this relate to the constant of variation?

h) What is the y-intercept? How does this relate to the initial value?

i) Write the equation of the line in the form $y = mx + b$ using the slope and y-intercept

Part 2: The Rule of Four

A relation can be represented in a variety of ways so that it can be looked at from different points of view. A mathematical relation can be described in four ways:

1. Using words
2. Using a graph
3. Using a table of values
4. Using an equations

Part 3: Write an equation when the relation is represented in words

Remember that the equation of a line is $y = mx + b$

Considering that a line is really just a set of ordered pairs, (x, y) , it makes sense that the equation of a line needs to contain the variables x and y . These variables will define the coordinates that make up the line.

This means that the only 2 values that need to be determined in order to write the equation of a linear relation are m and b .

When a linear relation is represented in words m is the rate of change and b is the initial value.

**Linear relation represented in words: m = rate of change (slope)
 b = initial value (y-intercept)**

Example 1: Write an equation for the following relationship by first identifying the value of m and b .

The Copy Centre charges \$75 to design a poster plus 25 cents **for each copy**.

$m =$

$b =$

And the equation of this linear relation is:

If The Copy Centre changed their cost per flyer to 35 cents for each copy the equation would become:

If The Copy Centre changed their design cost to \$125 the equation will become:

Example 2: y varies directly with x . When $x=2$, $y=8$.

a) What is the initial value?

b) What is the slope of the line?

c) Write an Equation for this relationship

Example 3: y varies partially with x . When $x=0$, $y=3$, and when $x=2$, $y=8$.

a) What is the initial value?

b) What is the slope of the line?

c) Write an Equation for this relationship

Part 4: Write an equation when the relation is represented in a table of values

Remember:

$$\text{slope} = \text{rate of change} = m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$b = \text{initial value} = y - \text{intercept} = \text{value of } y \text{ when } x \text{ is } 0$$

Example 4: Determine the equation of the following linear relations using the tables provided:

a)

x	y
0	6
1	9
2	12
3	15
4	18

$$m =$$

$$b =$$

Equation:

b)

x	y
-2	3
0	5
2	7
4	9
6	11

$$m =$$

$$b =$$

Equation:

What should we do if the initial value isn't in the table?

c)

x	y
2	-11
3	-8
4	-5

$m =$

$b =$

Equation:

d)

x	y
-8	-5
-6	-10
-4	-15

$m =$

$b =$

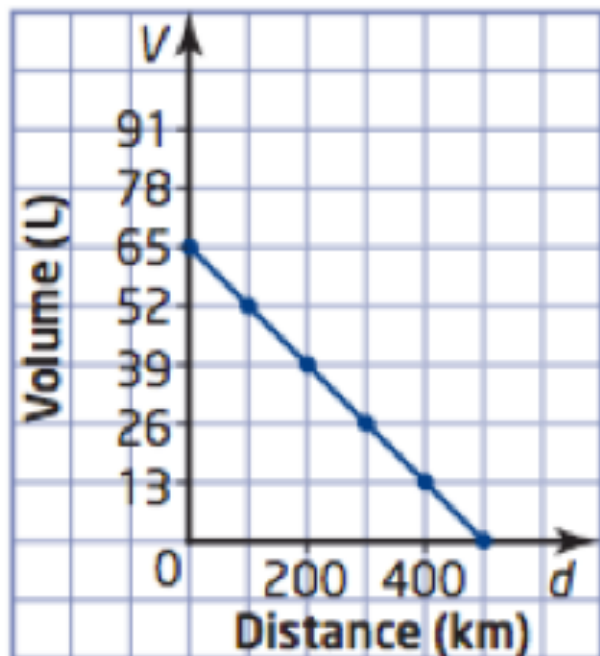
Equation:

Part 5: Write an equation when the relation is represented as a graph

Example 5: The graph shows the relationship between the volume of gasoline remaining in a car's fuel tank and the distance driven.

Remember: $m = \text{slope} = \frac{\text{rise}}{\text{run}}$

$b = \text{initial value} = y - \text{intercept}$



Slope:

y -intercept:

Equation: