

MPM 1D Handout
Rate of Change and First Differences

Date:

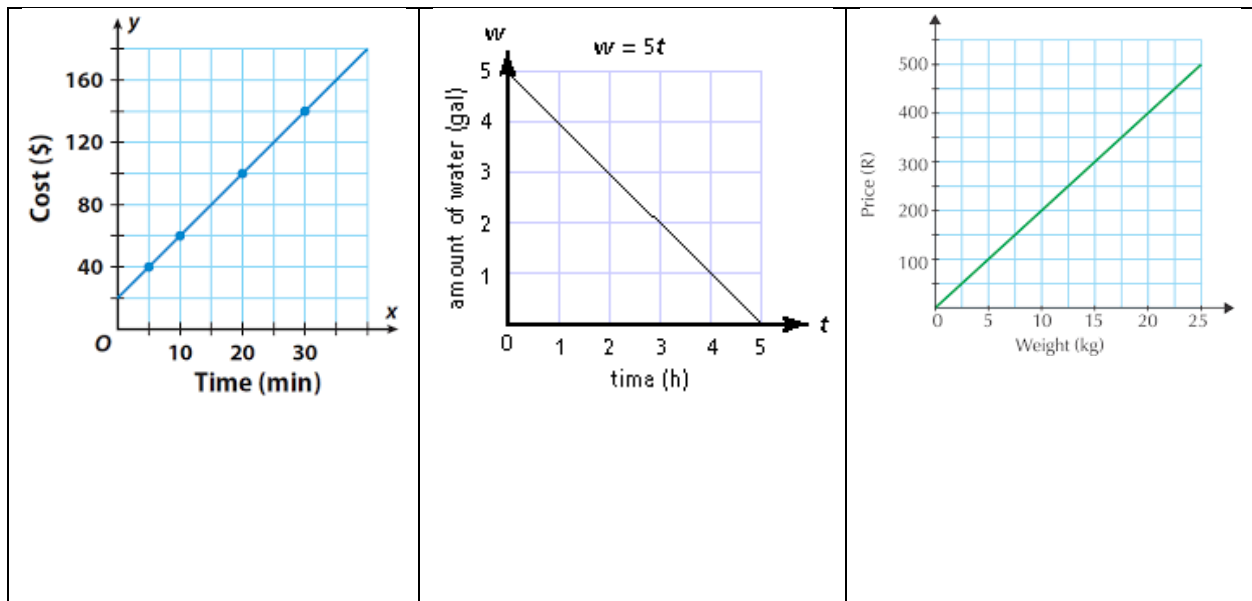
Name:

Important Stuff to Remember:

- There are FOUR ways to represent a relation:
 - Words (description)
 - Equation
 - Table
 - Graph
- We need to be able to identify direct and partial variation given any one of these forms and find the slope from any representation.

Part 1: Slope as a Rate of Change

1. Determine the rate of change (slope) for each graph shown below. Remember that the direction of the line matters (slope can be negative!!).



2. For each graph in question 1, state if it represents a direct or partial variation, and write an equation to model the relation.

3. At rest, Vicky takes 62 breaths every 5 min. What is Vicky's rate of change of number of breaths?

4. When he is sleeping, Jeffrey's heart beats 768 times in 12 min. What is his rate of change of number of heartbeats?

5. A racecar driver completed a 500-km closed course in 2.8 h. What is the rate of change, or speed?

6. The table below shows the minimum volume of water needed to fight a typical fire in rooms of various sizes.

Floor Area (m ²)	Minimum Volume of Water (L)
25	39
50	78
75	117

- a. Graph the data in the table.



- b. Calculate the rate of change.

- c. If a truck can pump water at a rate of 200 L/min, how long will it take to put out a fire in a room with a floor area of 140 m²? Did you interpolate or extrapolate to find this answer?

- d. Is this a direct or partial variation? How do you know?

Part 2: First Differences

1. Classify each of the following relationships as linear or non-linear by finding first differences.

x	y
0	5
1	6
2	8
3	12

x	y
3	-4
4	-1
5	2
6	5

x	y
-1	1
0	0
1	1
2	4

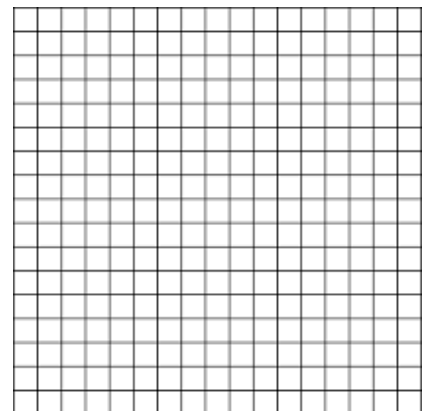
x	y
-5	8
-3	4
-1	0
1	-4

2. For each table in question 1 that represents a linear relationship, state the y-intercept (y – value when $x = 0$) and the rate of change, then write an equation to model it. Also, classify the relationships as direct or partial variation.

3. Consider the relation $y = 2x - 3$.

- a. Make a table of values for x-values from -3 to 3 (it is started for you below).

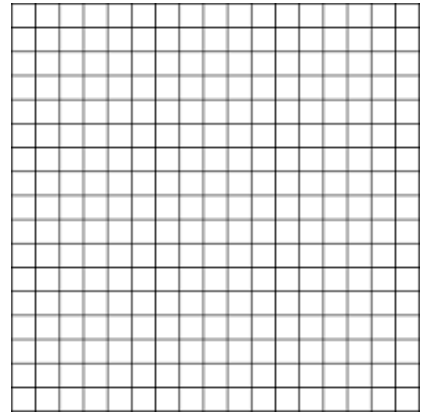
x	$y = 2x - 3$
-3	$2(-3) - 3 = -9$
-2	
-1	$2(-1) - 3 = -5$
0	
1	
2	$2(2) - 3 = 1$
3	



- b. Graph the relation.
 c. Classify the relation as linear or non-linear.
 d. Find the first differences for your table to verify your answer.

4. Consider the relation $y = x^2$.
- a. Make a table of values for x -values from -3 to 3.

x	$y = x^2$
-3	$(-3)^2 = 9$
-2	
-1	
0	
1	$(1)^2 = 1$
2	
3	



- b. Graph the relation.
- c. Classify the relation as linear or non-linear.
- d. Find the differences for your table to verify your answer.