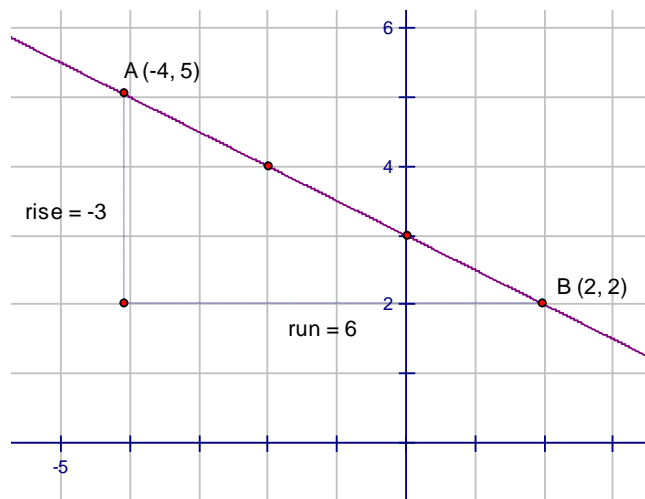


Course: MFM2P Gr. 10 AppliedLesson: 3 - 2Unit: Linear RelationsTopic: Slope as a Rate of Change

✚ *homework check:* Lesson 3 - 1✚ *note:* Slope as a Rate of Change

To calculate the rate of change from a graph, we can use a rate triangle to find the rise and run between two clearly labeled points. Slope can then be calculated by $slope = \frac{rise}{run}$. For example, calculate the slope of the following line.



$$slope = \frac{rise}{run}$$

$$m = \frac{-3}{6}$$

$$m = \frac{-1}{2}$$

To calculate the rate of change from a table of values, we subtract to find the difference between consecutive y - values. This calculation can be called the “first differences”. For example, calculate the slope given the following table of values.

x	y	Rate of change
-2	-4	$-2 - (-4) = 2$
-1	-2	$0 - (-2) = 2$
0	0	$2 - 0 = 2$
1	2	$4 - 2 = 2$
2	4	$6 - 4 = 2$
3	6	

Therefore, the rate of change in the y – value is 2 each time the x – value increases by 1.

We can gather the slope or rate of change information from an equation if the relationship is linear. Linear relations have the form $y = mx + b$ where ‘m’ is the slope or rate of change of the line. Using this information, write the value of the slope for each of the following.

a) $y = -2x + 3$ from $y = mx + b$, $m = -2$

b) $y = \frac{1}{5}x - 5$ from $y = mx + b$, $m = \frac{1}{5}$

c) $y = x + 9$ from $y = mx + b$, $m = 1$

Sometimes, we can find a rate of change in word problems. For example,

- a) Mike works at a tire store. He gets paid \$12 an hour plus a base rate of pay of \$40. What is his rate of change?

Rate of change is something that changes regularly. In this case, Mike’s hourly wage constantly changes every hour. For this reason, Mike’s rate of change is \$12/hour.

- b) Emily delivers papers every day. She gets paid \$0.12 per paper plus a base pay of \$25. What is her rate of change?

Emily’s pay depends on how many papers she delivers, for this reason, Emily’s rate of change is \$0.12/paper.

These same word problems can be used to make tables of values to graph relationships. For example,

- a) Mike works at a tire store. He gets paid \$12 an hour plus a base rate of pay of \$40. Make a table of values using 0 to 4 hours and calculate the rate of change.

hours	pay(\$)	Rate of Change
0	40	$52 - 40 = 12$
1	52	$64 - 52 = 12$
2	64	$76 - 64 = 12$
3	76	$88 - 76 = 12$
4	88	

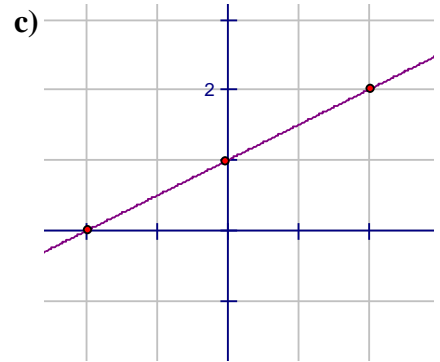
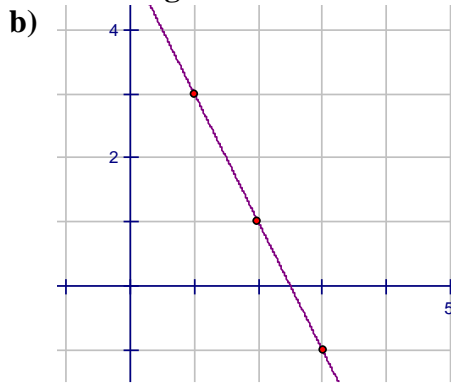
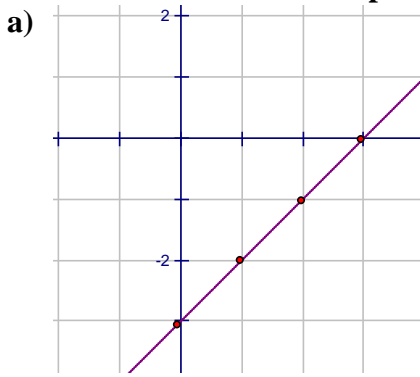
- b) Emily delivers papers every day. She gets paid \$0.12 per paper plus a base pay of \$25. Make a table of values showing her pay after selling 10 to 14 papers and calculate the rate of change.

papers	pay (\$)	Rate of Change
10	26.20	$26.32 - 26.20 = 0.12$
11	26.32	$26.44 - 26.32 = 0.12$
12	26.44	$26.56 - 26.32 = .012$
13	26.56	$26.68 - 26.56 = 0.12$
14	26.68	

✎ *homework assignment:* Lesson 3 - 2

Lesson 3 – 2: Slope as a Rate of Change

1. Calculate the slope for each line using the rise and run.



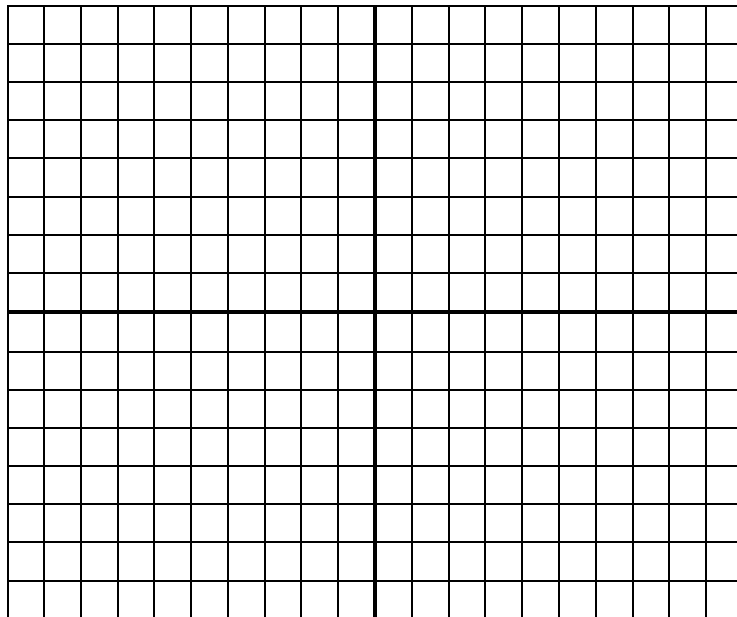
2. Complete the table for each.

x	$y = 2x + 5$
0	
1	
2	
3	
4	

x	$y = x - 3$
0	
1	
2	
3	
4	

x	$y = -0.5x + 2$
0	
2	
4	
6	
8	

3. Graph each of the above on the grid provided. Label each line using the equation.



4. Calculate the rate of change given the following tables of values.

a)

x	y	first differences
-2	-9	
-1	-6	
0	-3	
1	0	
2	3	

b)

x	y	first differences
-2	4	
-1	2	
0	0	
1	-2	
2	-4	

c)

x	y	first differences
-3	5	
-1	3	
1	1	
3	-1	
5	-3	

5. A parking garage posts the sign to the right:

Parking Rates:

30 minutes or less	\$3.75
1 hour or less	\$7.50
1.5 hours or less	\$11.25
2 hours or less	\$15.00
Over 2 hours	\$4.50 per hour

Night Rate:

After 6 p. m. to 7 a. m. \$2.50 per hour

Weekends and Holidays:

From 6 a. m. to 10 p. m. \$7.00 per day

a) Create a table of values that shows the total charge for 0 to 2 hours of parking by half hour intervals.

b) Calculate the total charge if someone parked for 24 hours on a work day.

c) Calculate the total charges if someone parked for the weekend (Friday night to Sunday night).

6. Barry picks fruit each summer. His potential earnings are displayed in the table.

Baskets Picked	1	2	3	4	5	6
Earnings (\$)	12.50	23.00	35.50	48.00	60.5	73.00

a) What is the rate of change for this relation?

b) How much should Barry earn for picking 15 baskets of fruit?

c) How many baskets of fruit did Barry pick if he earns \$375?