Unit 4, Activity 1, Vocabulary Self-Awareness

Name _____ Date _____ Hour _____

Put a (+) in the blank for each word that you are comfortable with the definition.
Put a (✓) in the blank for each word that you are not quite certain of the definition.
Put a (-) in the blank for each word that is brand new to you and you have no understanding of the vocabulary word.

Write a definition and give an example of each of the words. If you are not sure of the word's definition, make a guess and during the unit you will have time to update your definitions as the terms are developed.

Word	**+**	**✓**	**-**	**Example**	**Definition**
input					
output					
coefficient					
slope					
linear equations					
proportional relationship					
unit rate					
equivalent ratio					
equivalent fraction					

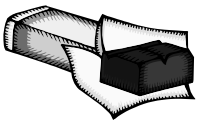
One potato chip costs $0.15

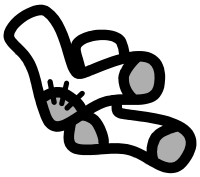
Name _____ Date _____ Hour _____

Choose the better buy

1. Soda at Store A sells for $3.59 for six, and at Store B the soda sells 12 for $7.15. Which is the better buy? Show your thinking.

2. Candy bars are selling at Store A 10 for $5.50. At Store B the same candy bars are 5 for $2.30. Which is the better buy? Show your thinking.





3. Store A decides to sell socks in a package of 12 for $17.25. Store B puts the same socks on sale for $1.40/pair. Which is the better buy? Show your thinking.

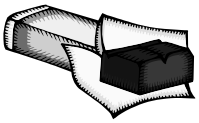
4. Justin found a CD player at Store A for $79.98 and he gets a 30% discount off the price. At Store B, the CD player is marked $55.00. Which is the better buy? Why?

Choose the better buy

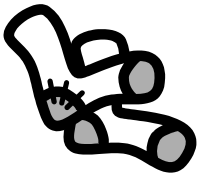
1. Soda at Store A sells for $3.59 for six, and at Store B the soda sells 12 for $7.15. Which is the better buy? Show your thinking.

   At store A the unit price for one soda is $.60 (.595833) and store B the price would also be $.60 (.5983333). Because the money is always rounded to the hundredths, there would be no better buy.

2. Candy bars are selling at Store A 10 for $5.50. At Store B the same candy bars are 5 for $2.30. Which is the better buy? Show your thinking.



   Store B has a unit price of $.46 per candy bars and Store A has a unit price of $.55. Store B has the better buy.



3. Store A decides to sell socks in a package of 12 for $17.25. Store B puts the same socks on sale for $1.40/pair. Which is the better buy? Show your thinking.

   Store B has the better buy because the unit price for socks at store A is $1.44/pair.

4. Justin found a CD player at Store A for $79.98, and he gets a 30% discount off the price. At Store B, the CD player is marked $55.00. Which is the better buy? Why?

   With the 30% discount off $79.98, the sale price would be $55.99, so Store B is the better buy at $55.00.

Unit 4, Activity 2, Refreshing Dance

Name_____ Date _____ Hour _____

Use the data in the chart below to determine the total cost of getting the concession stand ready for the Friday night dance if there are 200 students predicted to attend.

Item	Cost per unit	Amount needed per student	Price per student	Amount needed	Total cost of item (200 students)
Soda	$1.19/2-liter soda	50 mL			
Candy bars	$8.99/box of 36 bars	1 bar			
Popcorn	$1.19/bag which pops about 5 gallons of popcorn	1 quart			
Pizza	$5.00/pizza divided into 8 equal slices	1 slice			

1. If 250 students attend the dance and every student in attendance orders a slice of pizza, how many extra pizzas must be ordered?

2. If there are only 150 students who want to purchase a box of popcorn, how much profit would be made if every box sells for $0.75?

Use the data in the chart below to determine the total cost of getting the concession stand ready for the Friday night dance if there are 200 students predicted to attend.

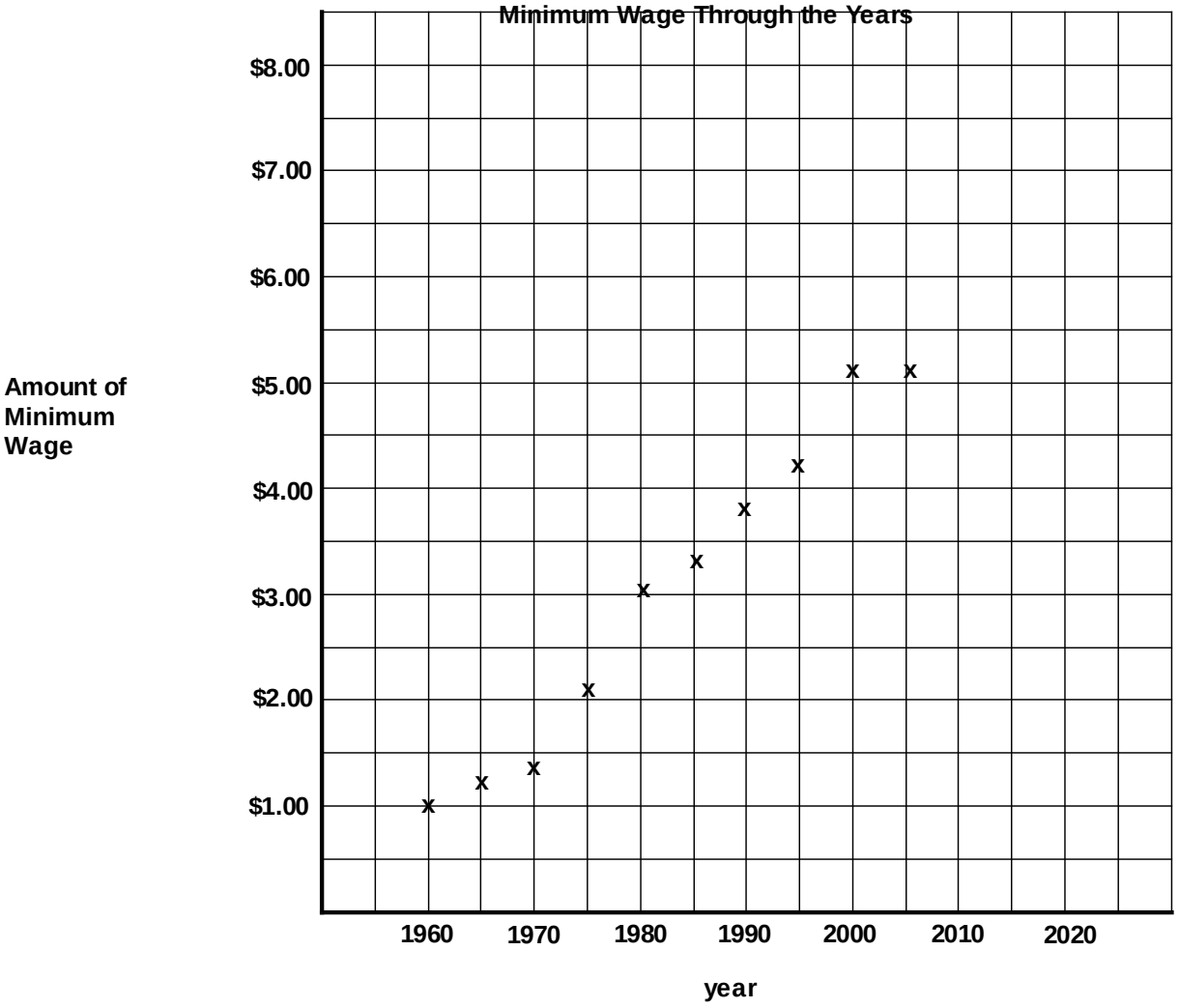
Item	Cost per unit	Amount needed per student	Price per student	Amount needed	Total cost of item (200 students)
Soda	*$1.19/2 liter soda*	*50 mL*	*$.03/student*	*10 2L bottles*	*$5.95*
Candy bars	*$8.99/box of 36 bars*	*1 bar*	*$.25/student*	*must buy the 6th box to get 200 bars*	*$53.94*
Popcorn	*$1.19/bag which pops about 5 gallons of popcorn*	*1 quart*	*$.06/student*	*Need 10 bags*	*$11.90*
Pizza	*$5.00/pizza divided into 8 equal slices*	*1 slice*	*$.63/student*	*Need 25 pizzas*	*$125*

1. If 250 students attend the dance and every student in attendance orders a slice of pizza, how many extra pizzas must be ordered?
   Must order 7 more pizzas because 8 is not a factor of 50.

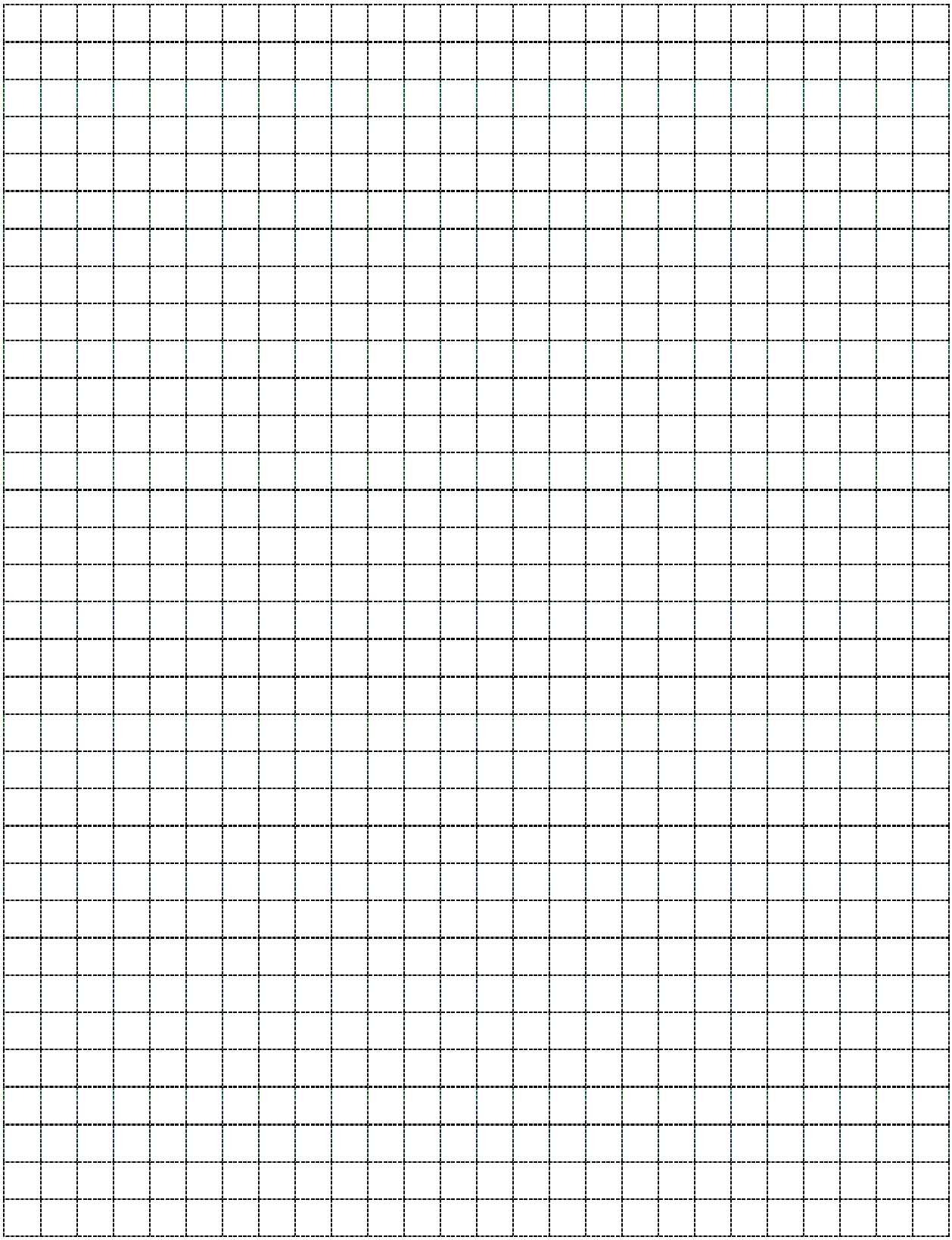
2. If there are only 150 students who want to purchase a box of popcorn, how much profit would be made if every box sells for $0.75?
   150 x $.06 = $9.00 to purchase the popcorn and if this sells for $.75/box, 150 x .75 = $112.50; therefore, 112.50 – 9.00 = $103.50 profit

Wages and Benefits: Value of the Minimum Wage (1960-Current)

Effective Date	*1938 Act* [1]	*1961 Amendments* [2]	*1966 and Subsequent Amendments* [3]	
			Nonfarm	*Farm*
Oct 24, 1938	$0.25			
Oct 24, 1939	$0.30			
Oct 24, 1945	$0.40			
Jan 25, 1950	$0.75			
Mar 1, 1956	$1.00			
Sep 3, 1961	$1.15	$1.00		
Sep 3, 1963	$1.25			
Sep 3, 1964		$1.15		
Sep 3, 1965		$1.25		
Feb 1, 1967	$1.40	$1.40	$1.00	$1.00
Feb 1, 1968	$1.60	$1.60	$1.15	$1.15
Feb 1, 1969			$1.30	$1.30
Feb 1, 1970			$1.45	
Feb 1, 1971			$1.60	
May 1, 1974	$2.00	$2.00	$1.90	$1.60
Jan. 1, 1975	$2.10	$2.10	$2.00	$1.80
Jan 1, 1976	$2.30	$2.30	$2.20	$2.00
Jan 1, 1977			$2.30	$2.20
Jan 1, 1978	$2.65 for all covered, nonexempt workers			
Jan 1, 1979	$2.90 for all covered, nonexempt workers			
Jan 1, 1980	$3.10 for all covered, nonexempt workers			
Jan 1, 1981	$3.35 for all covered, nonexempt workers			
Apr 1, 1990[4]	$3.80 for all covered, nonexempt workers			
Apr 1, 1991	$4.25 for all covered, nonexempt workers			
Oct 1, 1996	$4.75 for all covered, nonexempt workers			
Sep 1, 1997[5]	$5.15 for all covered, nonexempt workers			
Jul 24, 2007	$5.85 for all covered, nonexempt workers			
Jul 24, 2008	$6.55 for all covered, nonexempt workers			
Jul 24, 2009	$7.25 for all covered, nonexempt workers			


Minimum Wage Through the Years
Amount of Minimum Wage
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
1960
1970
1980
1990
2000
2010
2020
year

Unit 4, Activity 3, Grid

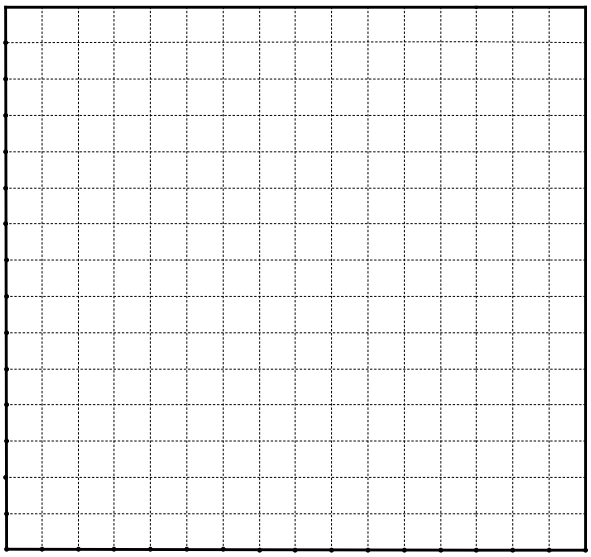


Name _____ Date _____ Hour _____

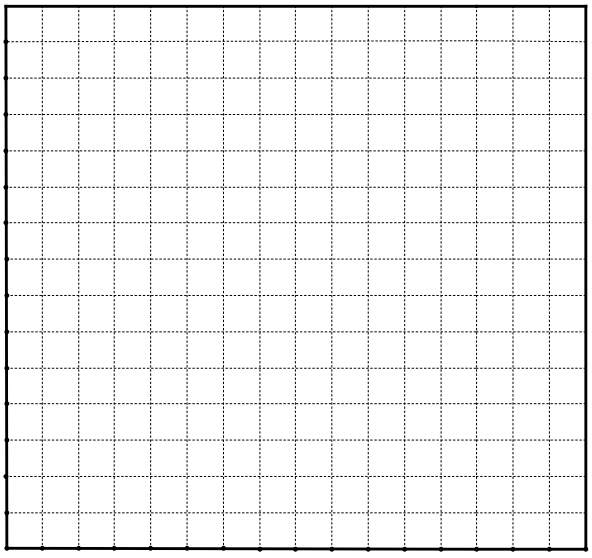
Rates and Proportions

For each of the following problems, draw a graph of the relationship between the quantities and describe how the unit rate is illustrated by the slope of the graph in the relationship. Write at least 2 proportions from each situation using ordered pairs from the graph.

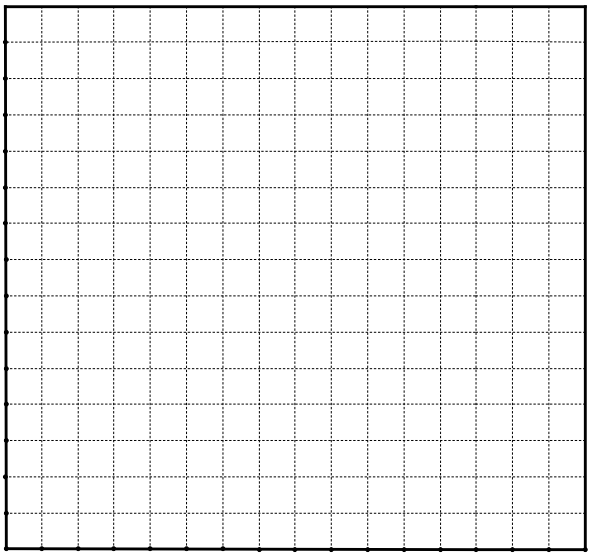
1. Lunches in the cafeteria are $1.75 each.



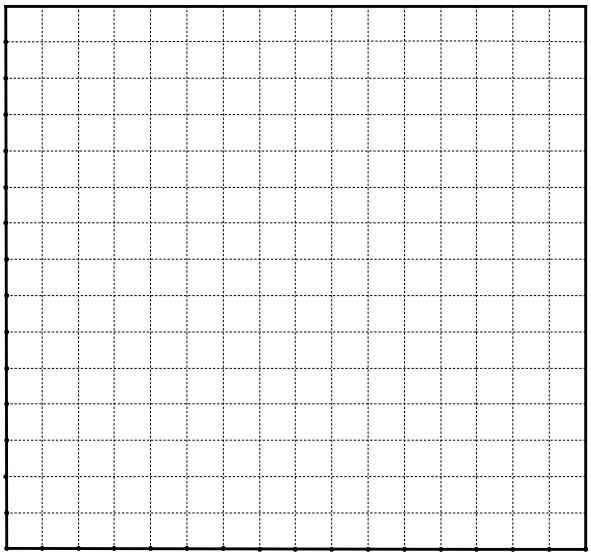
2. Ms Williams gives three quizzes every two weeks.



3. Every week, grandmother receives 3 letters.



4. Baily adds $25 to his savings account each month.



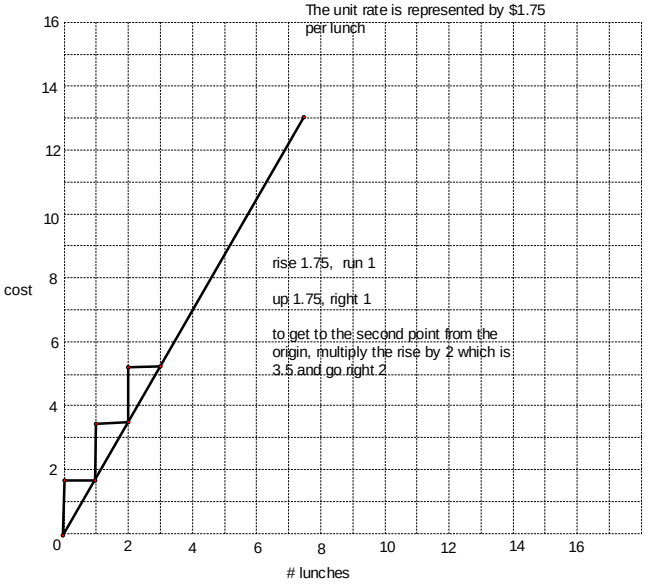
Rates and Proportions

For each of the following problems, draw a graph of the relationship between the quantities and describe how the unit rate is illustrated by the slope of the graph in the relationship. Write at least 2 proportions from each situation using ordered pairs from the graph

1. Lunches in the cafeteria are $1.75 each.

$$\frac{y}{x} = \frac{1.75}{1} = \frac{3.5}{2} = \frac{5.25}{3}$$

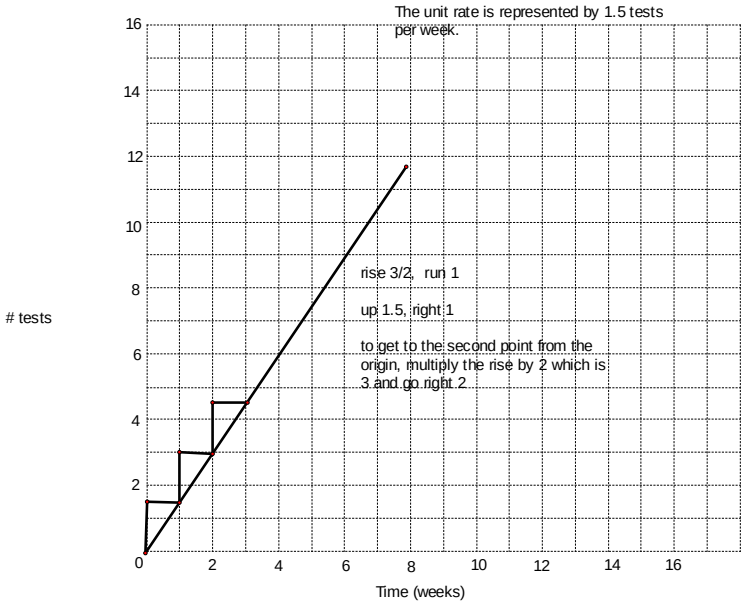
The value of y will always be the number of lunches times 1.75, so the rise over the run will be the unit rate and the proportional values.



2. Ms. Williams gives three quizzes every two weeks.

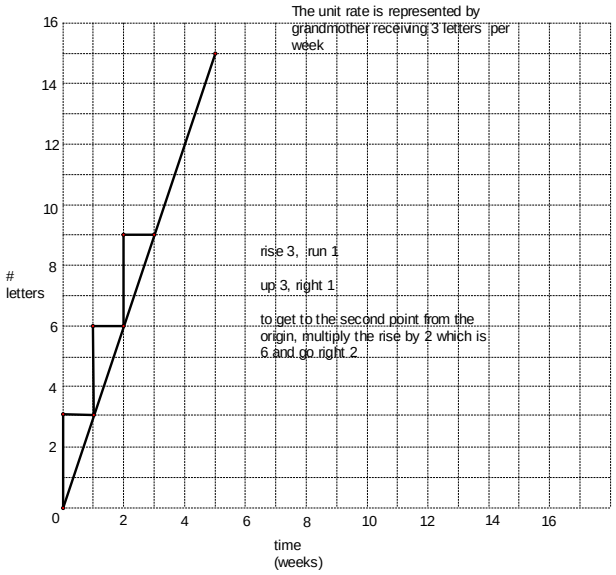
$$\frac{y}{x} = \frac{3}{2} = \frac{6}{4} = \frac{9}{6}$$

The number of quizzes will always be 1.5 times the number of weeks, so the rise over the run will be the unit rate and the proportional values.



3. Every week, grandmother receives 3 letters. $\frac{3}{1}=\frac{6}{2}=\frac{9}{3}$

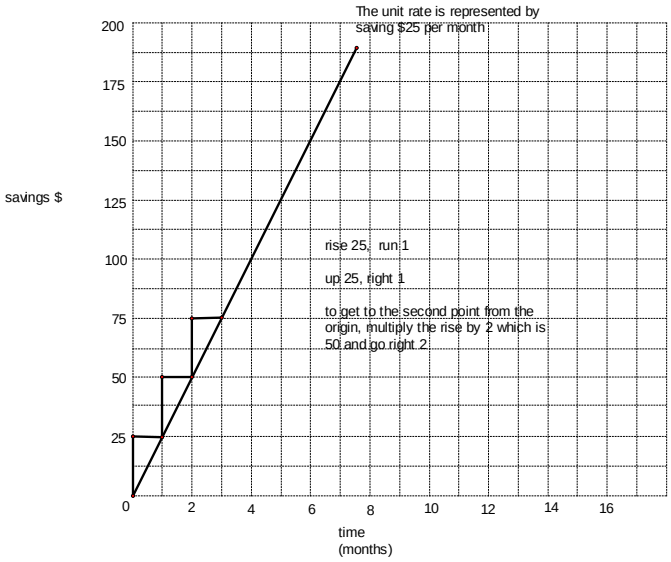
The total number of letters that grandmother receives is 3 times the number of weeks, so the rise over the run will be the unit rate and the proportional values.



4. Baily adds $25 to his savings account each month.

$$\frac{25}{1}=\frac{50}{2}=\frac{75}{3}$$

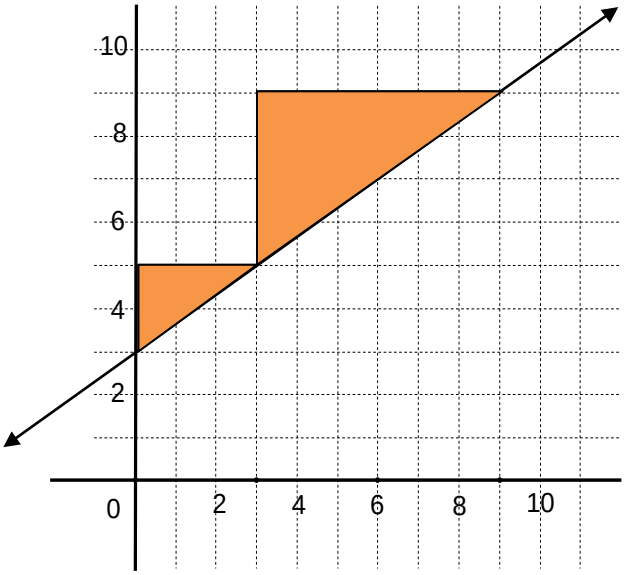
The amount of money in Bailey's savings account is $25 times the number of months, so the rise over the run will be the unit rate and the proportional values.



Name _____ Date _____ Hour _____

1) The diagonal line at the right is not vertical. Label the vertices of the two triangles that are drawn along the diagonal with the ordered pair that represents each vertex.

2) The diagonal line on the coordinate grid provides the third side of two similar triangles. Prove that these two triangles are similar using ratios of the lengths of their corresponding sides. Compare the vertical side length to the horizontal side length.



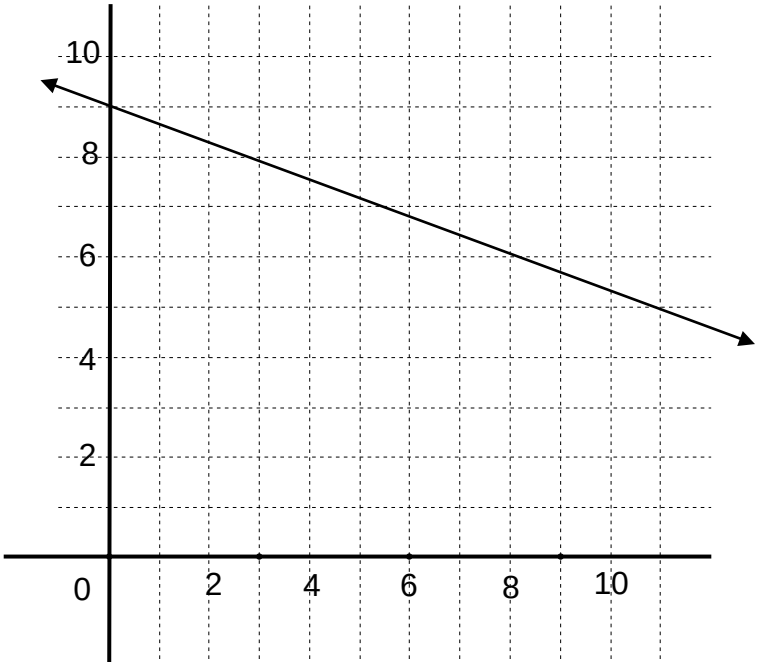
3) Find the slope of each of the triangles using the ratio of $\frac{rise}{run}$ or the slope formula $m = \frac{y_1 - y_2}{x_1 - x_2}$.

4) Compare the ratio in #2 to the slope in #3. What is true of the ratios?

5) Work with your shoulder partner and form a conjecture from the information you have gathered. Extend your proof to include one more triangle along the line.

6) What is the *y*-intercept of this line? Write the equation for the line.

On the grid at the right, prove whether the conjecture from #5 holds true for the line that is not vertical.



7) Show the ratios of two similar triangles along the line.

8) What is the slope of the line.

   How do the ratio and slope compare?

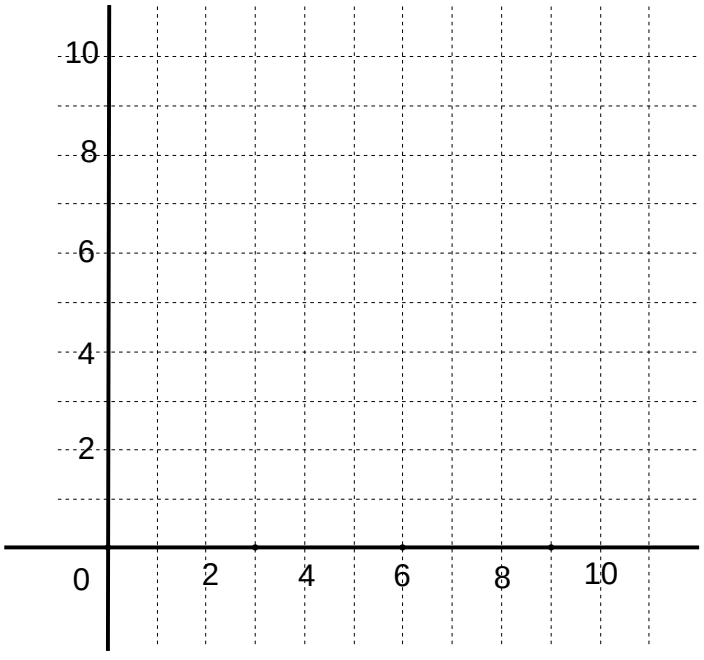
9) Write the equation for the line.

10) Draw a line on the grid below that intersects the origin and point (2, 2).

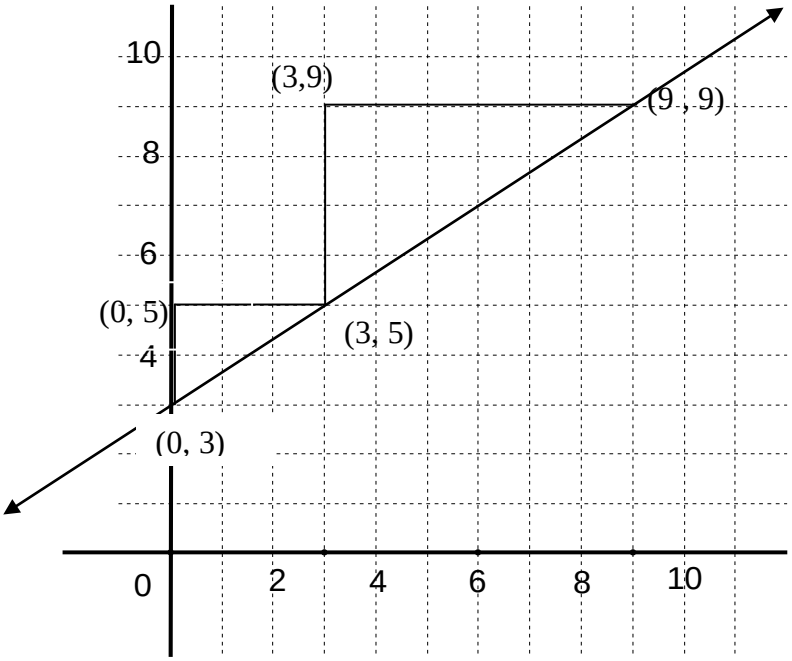
11) Write the ratios for two triangles along the line. Show your triangles.

12) Explain how the equation for this line is different from the equation for the lines in #6 and #9.

13) Does your conjecture still prove to be true?



1) The diagonal line at the right is not vertical. Label the vertices of the two triangles that are drawn along the diagonal with the ordered pair that represents each vertex.



2) The diagonal line on the coordinate grid provides the third side of two similar triangles. Prove that these two triangles are similar using ratios of the lengths of their corresponding sides. Compare the vertical side length to the horizontal side length.

Small triangle $\frac{vertical_1}{horizontal_1} = \frac{2}{3}$

Large triangle $\frac{vertical_2}{horizontal_2} = \frac{4}{6}$

$\frac{2}{3} = \frac{4}{6}$ *yes, they are similar*

3) Find the slope of each of the triangles using the ratio of $\frac{rise}{run}$ or the slope formula $m = \frac{y_1 - y_2}{x_1 - x_2}$.

Small Triangle slope: $\frac{rise}{run} = \frac{2}{3}$ $\quad \frac{5-3}{3-0} = \frac{2}{3}$

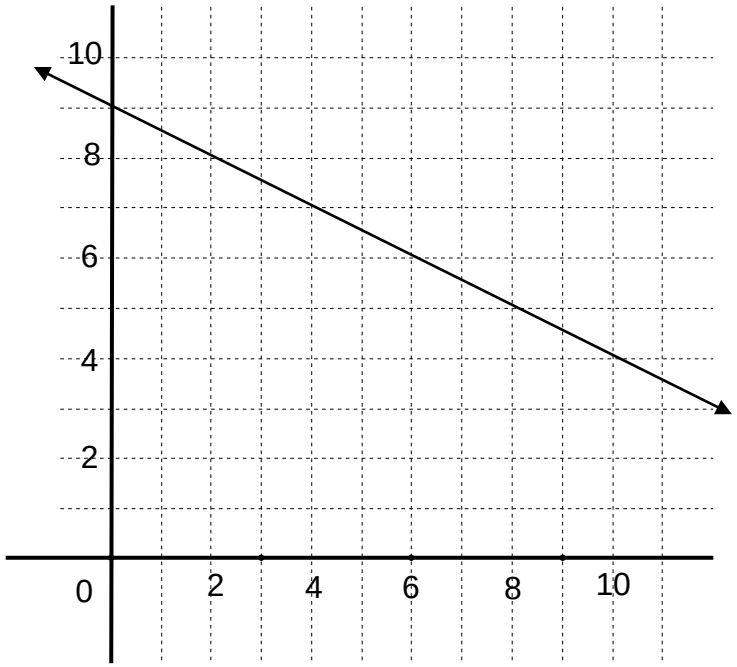
Large Triangle Slope: $\frac{rise}{run} = \frac{4}{6}$ $\quad \frac{9-5}{9-3} = \frac{4}{6}$

4) Compare the ratio in #2 to the slope in #3. What is true of the ratios?
The ratios and the slopes are equivalent.

5) Work with your shoulder partner and form a conjecture from the information you have gathered. Extend your proof to include one more triangle along the line.

6) What is the *y*-intercept of this line? Write the equation for the line.
3 is the y intercept and the equation is $y = \frac{2}{3}x + 3$

On the grid at the right, prove whether the conjecture from #5 holds true for the line that is not vertical.



7) Show the ratios of two similar triangles along the line, comparing corresponding sides.
These will vary but possible are: $\frac{3}{6}, \frac{5}{10}$

8) What is the slope of the line.
$\frac{1}{2}$

How do the ratio and slope compare?

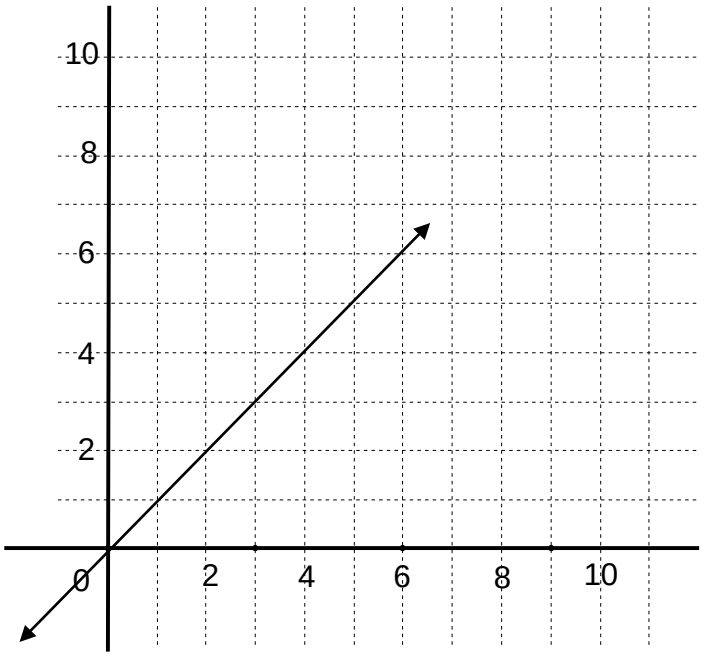
9) Write the equation for the line.
$y = -\frac{1}{2}x + 9$

10) Draw a line on the grid below that intersects the origin and point (2, 2).

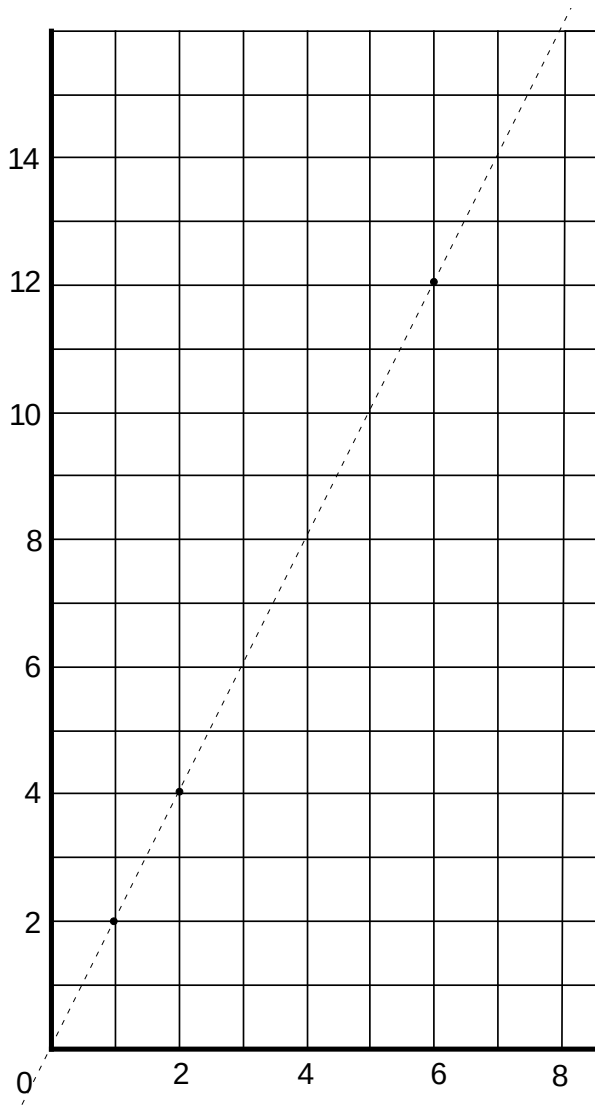
11) Write the ratios for two triangles along the line. Show your triangles.
Many different possible answers, possible vertical side/horizontal side is $\frac{1}{1}, \frac{4}{4}$

12) Write the equation for this line and explain how the equation for this line is the different from the equation for the lines in #6 and #9.
y = x; the slope of this line is one and the y intercept is 0. In #6 there was a y intercept of 3 and #9 a y intercept of 9

13) Does your conjecture still prove to be true? *Yes, the slope of the similar triangles is equal.*

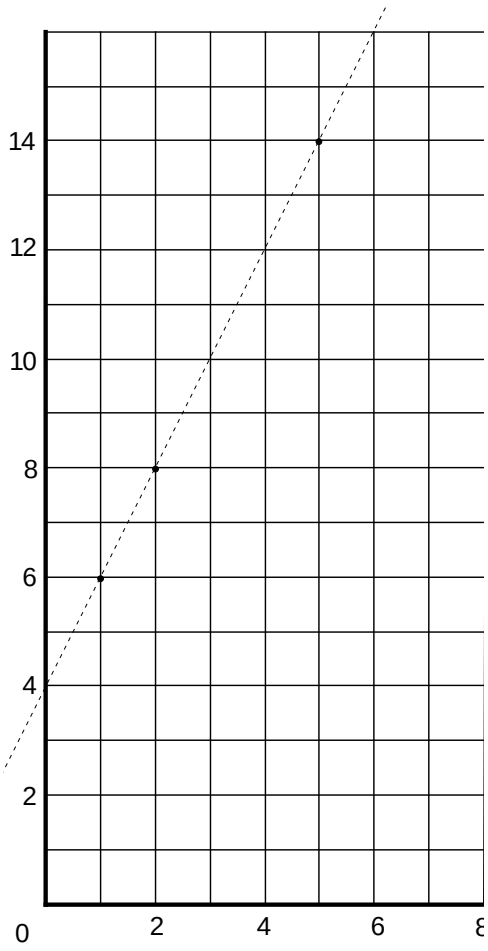


Name _____ Date _____ Hour _____

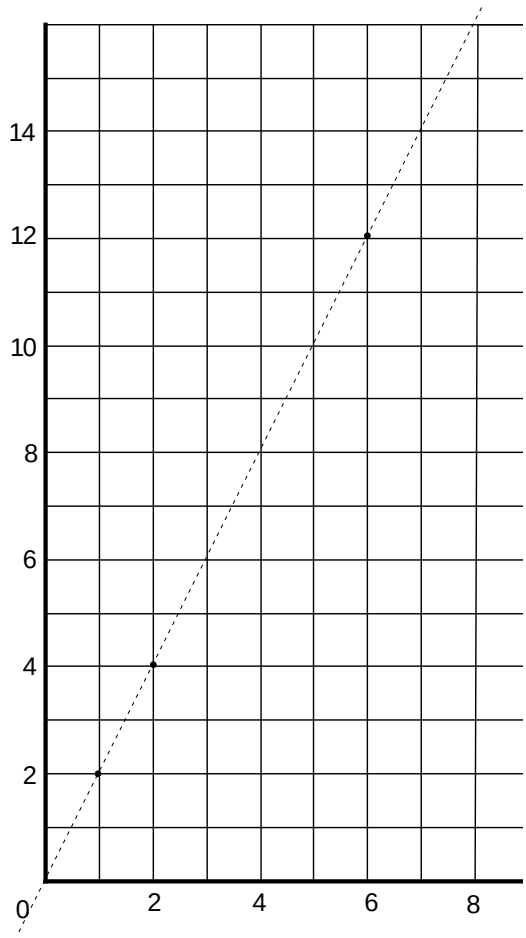


1) On the graph at the left, use the points shown to form a conjecture that any points along a linear graph that cross at the origin are proportional.

2) On the graph below at the right, prove whether the conjecture stated in #1 will stand true for the graph in #2. Explain.



3) Write at least two observations about the graphs in #1 and #2.

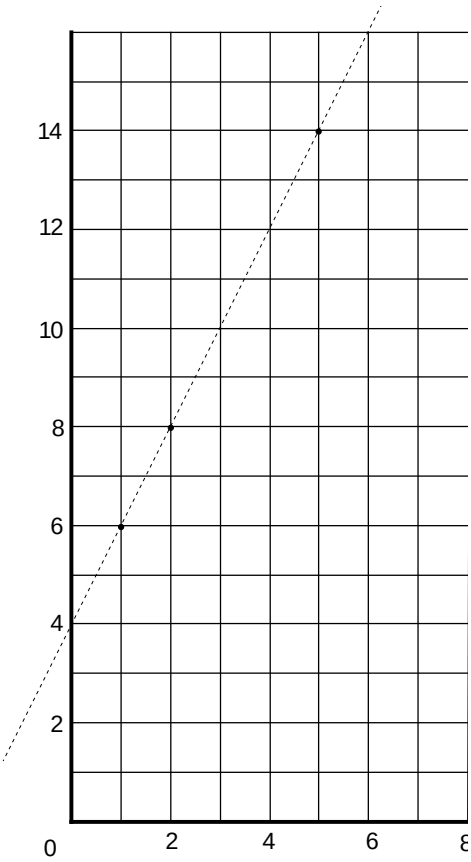


1) On the graph at the left, use the points shown to prove that any two points along a linear graph that cross at the origin are proportional.

Using points (1,2) and (6,12) $\frac{1}{2}=\frac{6}{12}$ *and using points (2,4) and (6,12)* $\frac{2}{4}=\frac{6}{12}$. *This can be done as* $\frac{x}{y}$ *or* $\frac{y}{x}$

2) On the graph at the right, prove whether the conjecture stated in #1 will stand true for the graph in #2. Explain.

Using point (1,6) and (2,8) $\frac{1}{6}\neq\frac{2}{8}$ *so they are not proportional*

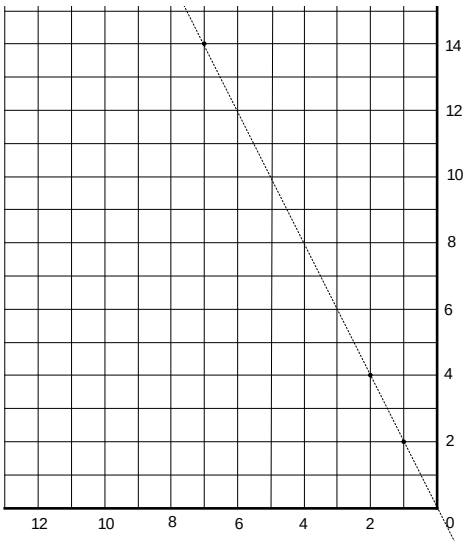


3) Write at least two observations about the graphs in #1 and #2.

Answers will vary, students might see that the two lines are parallel and that one crosses at the origin and the other crosses "y" at (0,4).

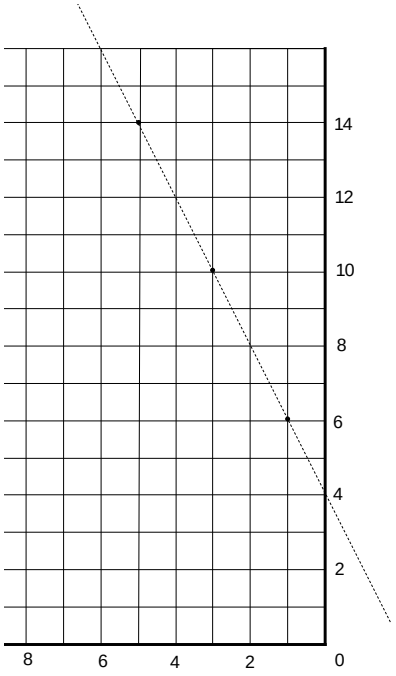
Unit 4, Activity 6, More Exploration with the Slope – y-intercept Form of an Equation

Name _____ Date _____ Hour _____



1) The graph to the left has a negative slope and crosses the *y*- axis at the origin. Determine if the relationship of the ordered pair (-1, 2), (-2, 4) and (-7, 14) are proportional. Justify your answer.

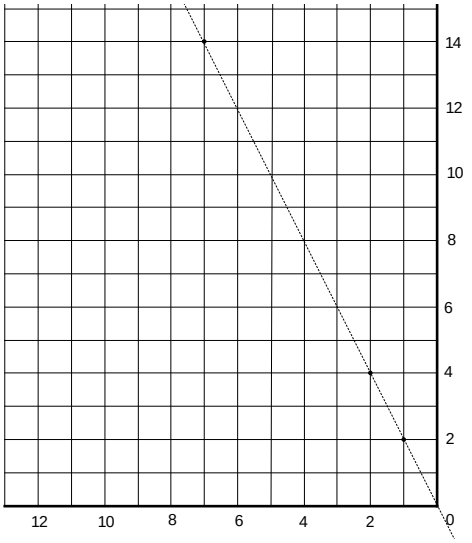
2) The graph to the right also has a negative slope. Using what was learned about the *y*-intercept with the graph having a positive slope, determine if the same rules hold true for graphs with a negative slope and do not cross the origin.



3) Write the equation for this line using the *slope-intercept* form of an equation.

Unit 4, Activity 6, More Exploration with the Slope -intercept Form of an Equation with Answers

Name _____ Date _____ Hour _____



1) The graph below has a negative slope and crosses the "*y*" axis at the origin. Determine if the relationships of the ordered pair (-1, 2), (-2, 4) and (-7, 14) are proportional. Justify your answer.

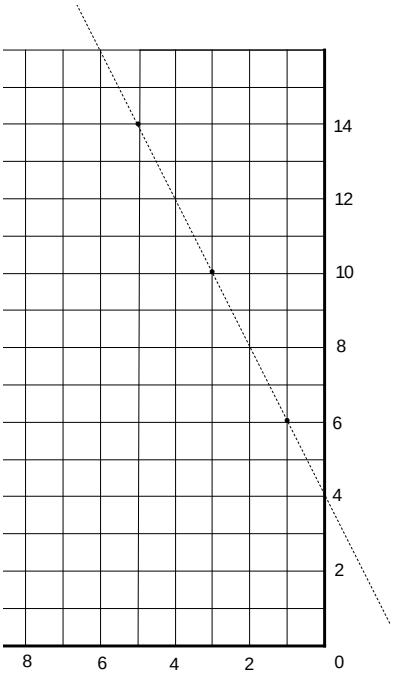
The points (-1, 2) and (-2, 4) are proportional shown by $\frac{y}{x} = \frac{2}{-1} = \frac{4}{-2}$ *so the slope of the line is -2*

$-2 = -2$

Points (-2, 4) and (-7, 14) are proportional.

$\frac{y}{x} = \frac{4}{-2} = \frac{14}{-7}$ *both of which we look at as* $\frac{y}{x} = \frac{m}{1}$, *the slope will be a -2 in both cases.*

2) The graph to the right also has a negative slope. Using what was learned about the *y*-intercept with the graph having a positive slope, determine if the same rules hold true for graphs with a negative slope, and do not cross the origin.



If the y-intercept, which is (0,4)' is subtracted from the y values of the ordered pair, the lines are the same just as with the positive slope. If you add the y intercept (4), you can use the same formula.

$\frac{y}{x} = \frac{6-4}{-1} = \frac{2}{-1} = -\left(\frac{2}{1}\right)$ *y = mx + b where "b" represents the "y-intercept"*

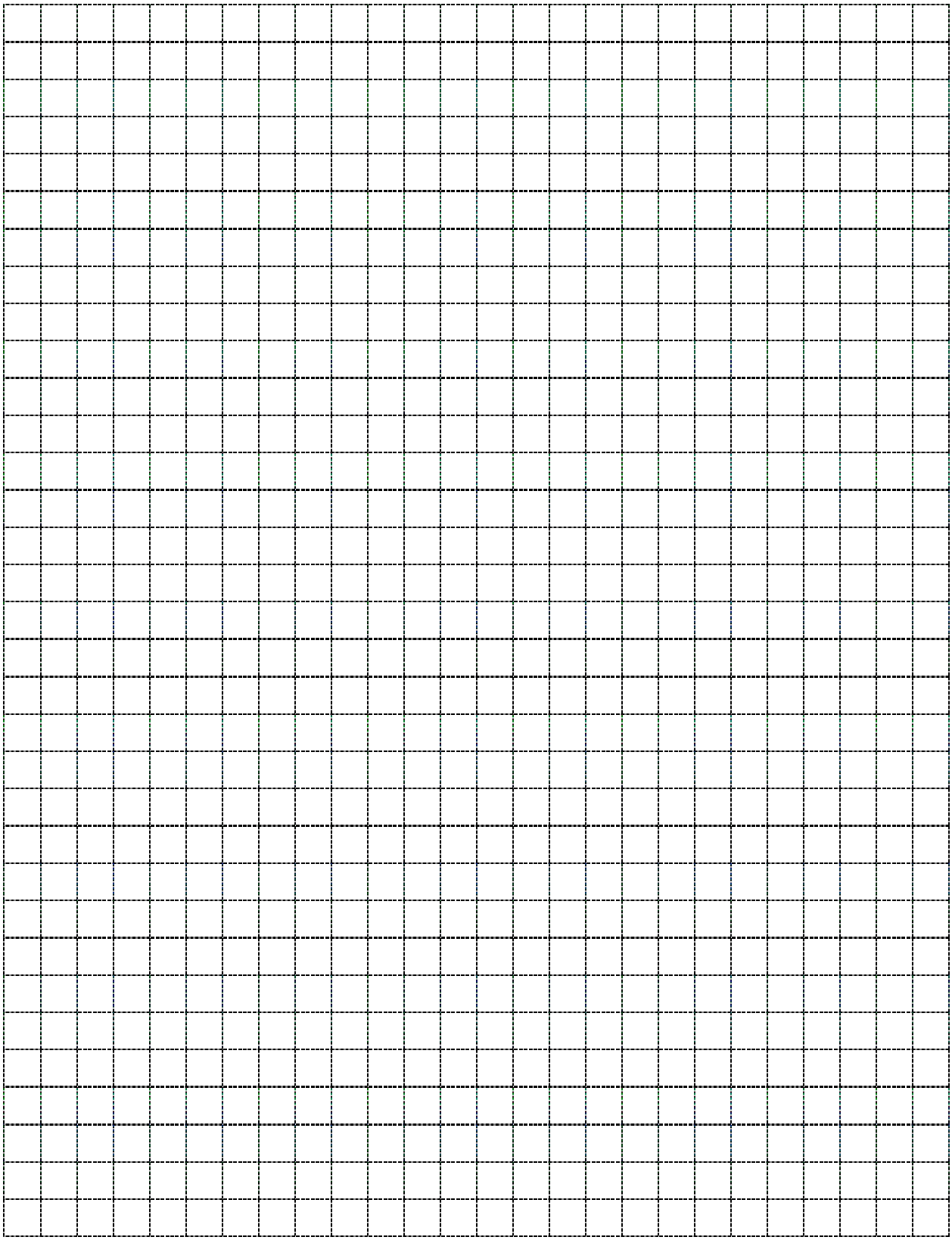
3) Write the equation for this line using the *slope-intercept* form of an equation.

With the same slope of -2, you can write $y = mx$

and with the y intercept not at the origin, $y = mx + 4$

You can substitute the slope value and write y = -2x + 4 for the second graph's equation.

Unit 4, Activity 7, Grid



Name _____ Date _____ Hour _____

1. Raccoons ate 117 marshmallows total from three bags. The raccoons ate 47 from Sue's bag and 31 from Sam's bag. How many were eaten from Melissa's bag? Write your equation and solve.

2. Melissa ate some marshmallows on Saturday and 3 less on Sunday. She ate four times as many on Friday as she did on Saturday. If Melissa ate a total of 33 marshmallows, how many marshmallows did Melissa eat on Saturday? Write your equation and solve.

3. Jack wanted to go canoeing. He has carried the canoe for 14 minutes. The trip should take 21 minutes for him to get to the lake. How much more time, *t*, does he have to walk? Write your equation. Make a graph of Jack's walk to the lake if he walks $\frac{1}{4}$ mile every 3 minutes.

4. Sam is hiking on a trail that is 280 feet long. He has hiked 20 feet less than half the distance. How far, *d*, has he walked? Write your equation and solve. If Sam walks 10 feet per second and completes the trail, make a graph of his hike along the trail.

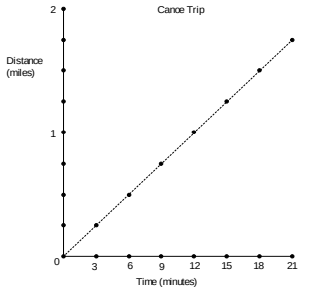
5. A bag of marshmallows has about 150 small marshmallows in each bag. Campers took marshmallows on a camping trip. A group of raccoons came to the campsite and ate about 20 marshmallows each hour. Make a table of values to find the length of time it took for the raccoons to eat the bag of marshmallows. Graph your values on the Grid for Questions 5 and 6 BLM. Do not forget to label your graph.

6. Jack wants to canoe down river. The guide told him that the average speed down river is 20 mph. Jack will leave the campsite to canoe at 10:20 a.m. Make a table of values to find how far Jack will have gone by 5:00 p.m. Graph your values on the Grid for Questions 5 and 6 BLM. Do not forget to label your graph.

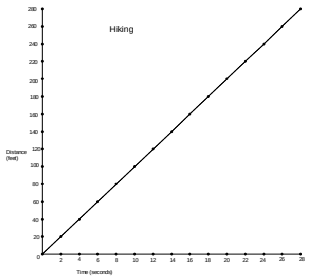
Unit 4, Activity 7, Camping Sounds with Answers

1. Raccoons ate 117 marshmallows total from three bags. The raccoons ate 47 from Sue's bag and 31 from Sam's bag. How many were eaten from Melissa's bag? Write your equation and solve. *Solution: $117 = 31 + 47 + n; n = 39$*

2. Melissa ate some marshmallows on Saturday and 3 less on Sunday. She ate four times as many on Friday as she did on Saturday. If Melissa ate a total of 33 marshmallows, how many marshmallows did Melissa eat on Saturday? Write your equation and solve. *Solution $33 = 4(x) + x + (x - 3); \ x = 6$*



3. Jack wanted to go canoeing. He has carried the canoe for 14 minutes. The trip should take 21 minutes for him to get to the lake. How much more time, *t*, does he have to walk? Write your equation. *Solution: $21 - 14 = t$;* Make a graph of Jack's walk to the lake if he walks $\frac{1}{4}$ mile every 3 minutes.



4. Sam is hiking on a trail that is 280 feet long. He has hiked 20 feet less than half the distance. How far, *d*, has he walked? Write your equation and solve. *Solution:* $\frac{280}{2} - 20 = d; d = 120$ *feet* If Sam walks 10 feet per second and completes the trail, make a graph of his hike along the trail.

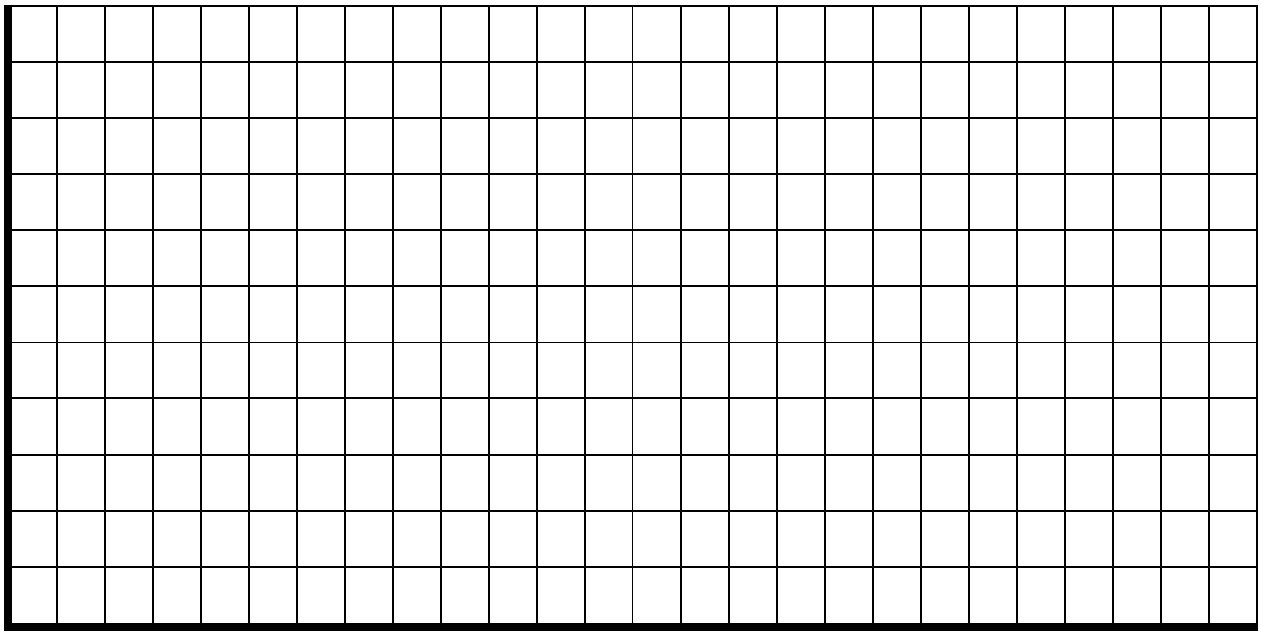
5. A bag of marshmallows has about 150 small marshmallows in each bag. Campers took marshmallows on a camping trip. A group of raccoons came to the campsite and ate about 20 marshmallows each hour. Make a table of values to find the length of time it took for the raccoons to eat the bag of marshmallows. Graph your values on the Grid for Questions 5 and 6 BLM.

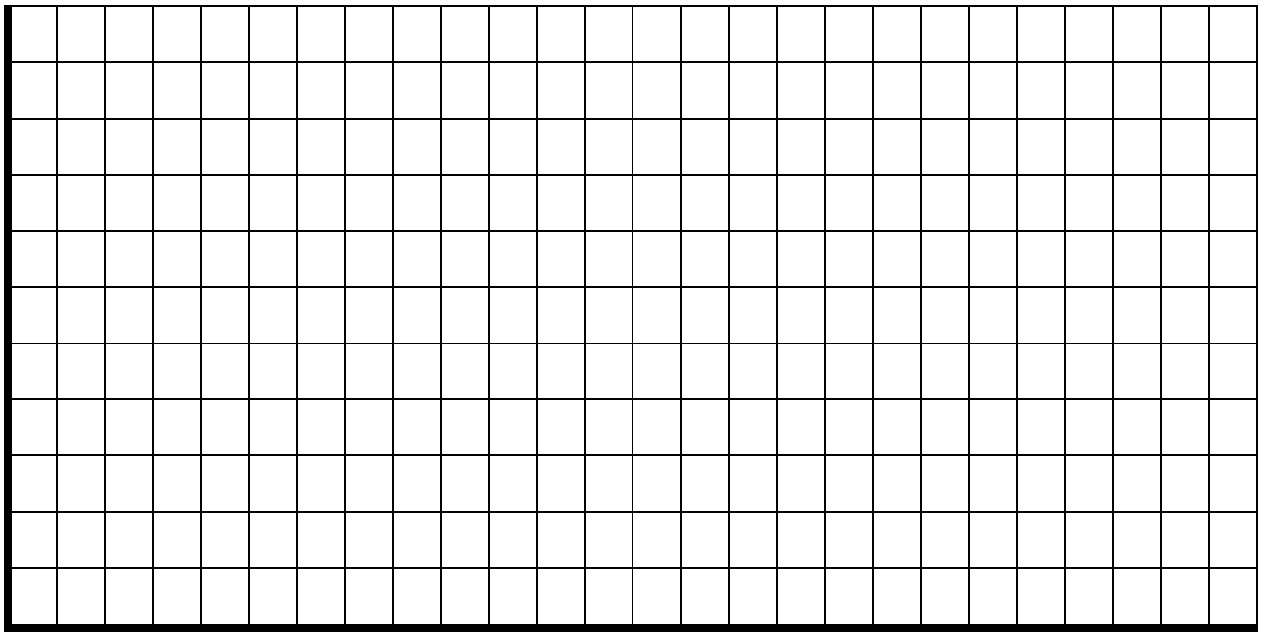
Hours	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Marshmallows left in bag	*150*	*130*	*110*	*90*	*70*	*50*	*30*	*10*	*Finished bag in about ½ hour*

6. Jack wants to canoe down river. The guide told him that the average speed down river is 20 mph. Jack will leave the campsite to canoe at 10:20 a.m. Make a table of values to find how far Jack will have gone by 5:00 p.m. Graph your values on the Grid for Questions 5 and 6 BLM.

Time	*10:20 a.m.*	*11:20 a.m.*	*12:20 a.m.*	*1:20 p.m.*	*2:20 p.m.*	*3:20 p.m.*	*4:20 p.m.*	*5:00 p.m.*
Distance (miles)	*0*	*20*	*40*	*60*	*80*	*100*	*120*	$133\frac{1}{3}$ *miles*

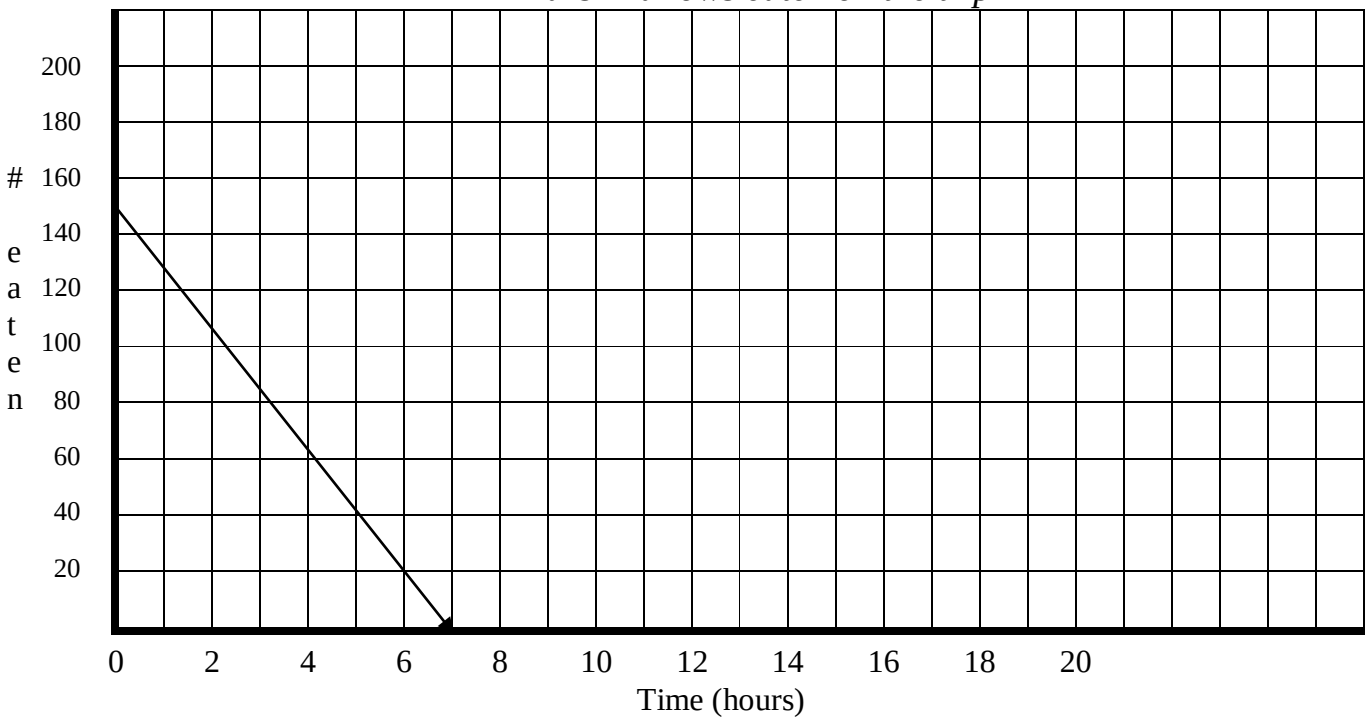
Unit 4, Activity 7, Grid for Questions 5 & 6

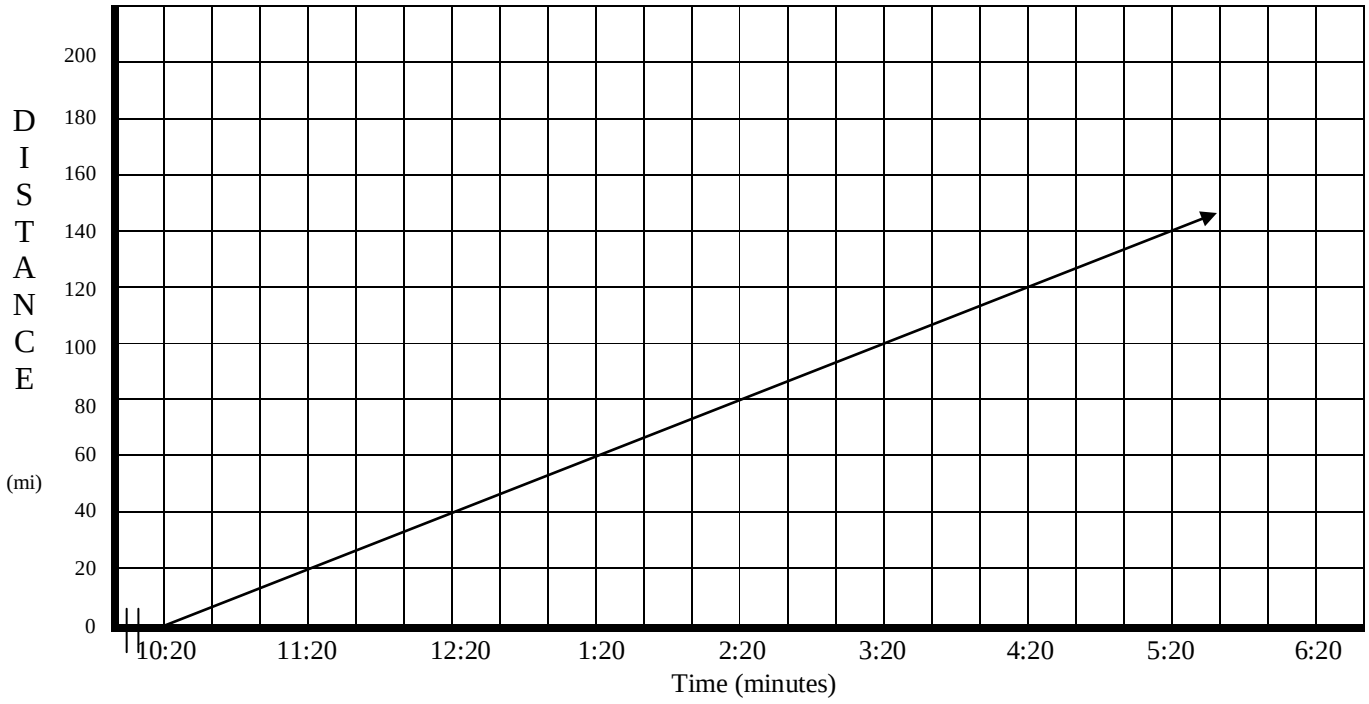




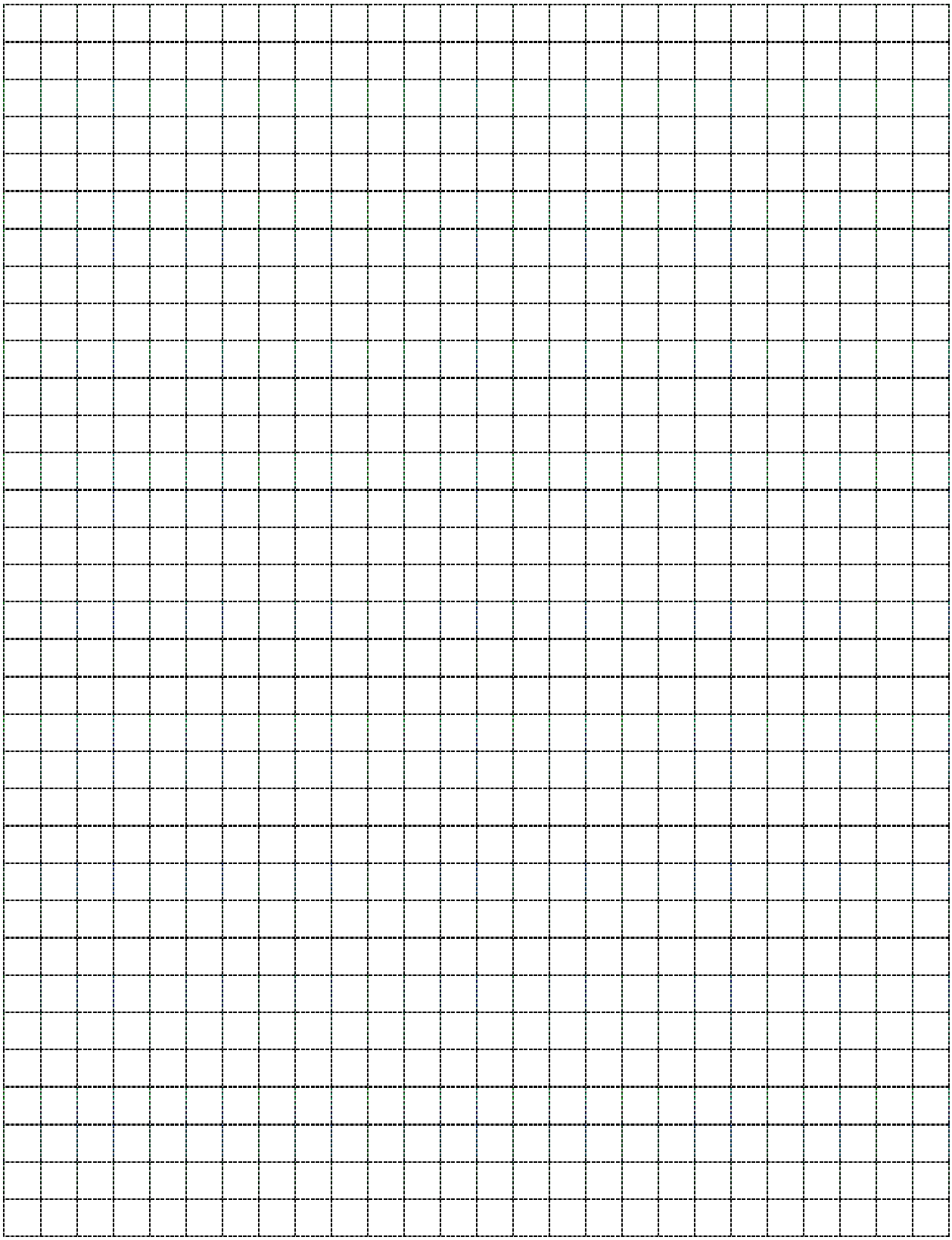
Unit 4, Activity 7, Grid for Question for 5 & 6 with Answers

Marshmallows eaten on the trip



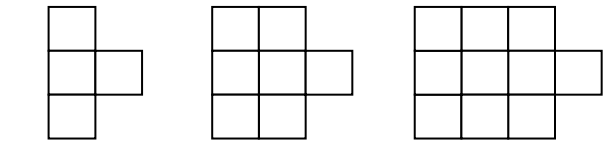


Unit 4, Activity 8, Grid



Name _____ Date _____ Hour _____

Pattern 1



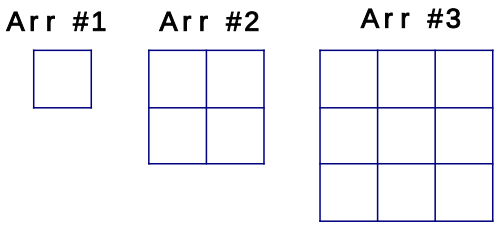
Arrangement 1 | Arrangement 2 | Arrangement 3

a) Sketch the 4th and 5th arrangement in the pattern.
b) Make a table that shows the arrangement number and the total number of tiles in the pattern.

c) Describe a 'rule' for determining the number of tiles in the 25th pattern, 100th pattern.

d) Is the rate of change in this pattern linear? Explain why or why not.

Pattern 2

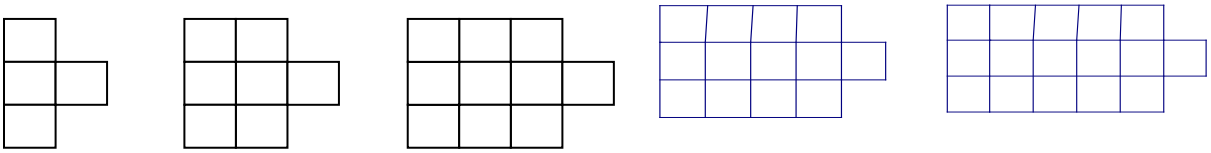


a) Sketch the 4th and 5th arrangement in the pattern.
b) Make a table that shows the arrangement number and the total number of tiles in the pattern.

c) Describe a "rule" for determining the number of tiles in the 25th pattern, 100th pattern.

d) Is the rate of change in this pattern linear? Explain why or why not.

Pattern



Arrangement 1 | Arrangement 2 | Arrangement 3 | *Arrangement 4* | *Arrangement 5*

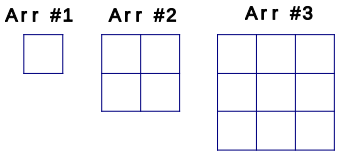
a) Sketch the 4th and 5th arrangement in the pattern.
b) Make a table that shows the arrangement number and the total number of tiles in the pattern.

Arrangment #	***Total tiles***
1	***4***
2	***7***
3	***10***
4	***13***
5	***16***

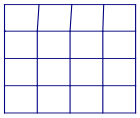
c) Describe a "rule" for determining the number of tiles in the 25th pattern, 100th pattern.
3 times the arrangement number plus 1
3x + 1

d) Is the rate of change in this pattern linear? Explain why or why not? *Linear, no exponents.*

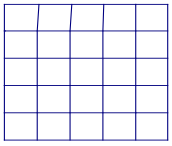
Pattern 2



Arr # 4



Arr # 5



Arrangement #	*Total # of tiles*
1	*1*
2	*4*
3	*9*
4	*16*
5	*25*

c) the arrangement number times itself or the arrangement number squared.

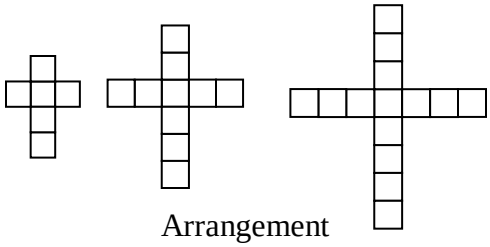
d) no, the total number of tiles does not change at a constant rate.

Unit 4, Activity 8, More Practice with Patterns

Name _____Date _____ Hour _____

Sketch the 4th and 5th arrangements in each of the patterns below. Answer the questions that follow.

1.



Arrangement
#1 #2 #3

a) How many tiles will be in the 10th arrangement?

b) One arrangement in this pattern has 86 tiles. Explain how you will determine the arrangement number that this number of tiles represents. Which arrangement is it?

c) There are two consecutive arrangements of this pattern that contain a total of 128 tiles. What are the two consecutive arrangements?

d) Explain which consecutive arrangements contain exactly this number of tiles.

e) Write an equation to represent this pattern.

Make a table and graph this equation on a coordinate grid.

Name _____

.

2. Sketch the 4th and 5th arrangements in each of the patterns below. Answer the questions that follow.

Arrangement Number

#1 #2 #3

a) Make a table of values with the *x* value representing the arrangement number and the *y* value representing the perimeter of the figures 1 - 5 (the sides of the equilateral triangle represent 1 unit).

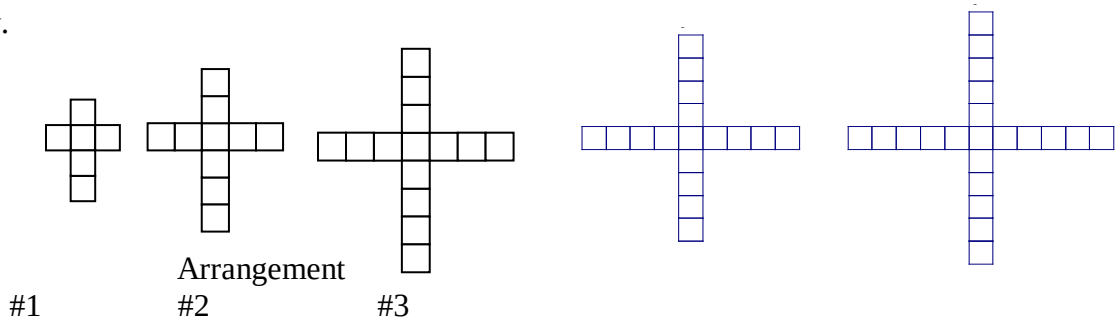
b) Plot the coordinates of the pattern on grid paper. Use the grid paper to determine which arrangement will have a perimeter of 57 units. Explain how you determined this.

c) Write an equation to represent the growth represented in this pattern. Explain how you determined this.

Unit 4, Activity 8, More Practice with Patterns with Answers

Sketch the 4th and 5th arrangements in each of the patterns below. Answer the questions that follow.

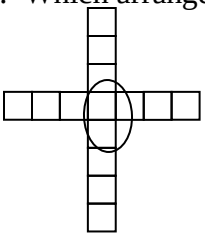
1.



a. How many tiles will be in the 10th arrangement? *42 tiles*

b. One arrangement in this pattern has 86 tiles. Explain how you will determine the arrangement number that this number of tiles represents. Which arrangement is it?
(86 – 2) ÷ 4 = 21 *21 is the arrangement number*

There is a constant of 2 squares in the center---and each leg is the arrangement number.



c. There are two consecutive arrangements in this pattern that contain a total of 128 tiles. What are the two consecutive arrangements?

Arrangements 15 and 16

d. Explain which consecutive arrangements contain exactly this number of tiles.
One possible explanation: Arrangement 15 will contain 4(15) + 2 and arrangement 16 will contain 4(16) + 2 tiles. These two arrangements would give the exact 128 tile. 15 tile in 3 of the four legs of the 15th and 16 tile in 3 of the 4 legs of the 16th and the 2 extra center tiles.

e. Write an equation to represent this pattern.
Total = 4 times the arrangement number plus 2, T = 4n + 2

f. *Make a table and graph this equation on a coordinate grid.*

Arrangement # *x*	*total tile* *y*
1	*6*
2	*10*
3	*14*
4	*18*
5	*22*

2. *Sketch the 4th and 5th arrangement in each of the patterns below. Answer the questions that follow.*

Arrangement Number
#1 #2 #3

4TH arrangement has 4 hexagons and 4 equilateral triangles.

5th arrangement has 5 hexagons and 5 equilateral triangles

a. *Make a table of values with the 'x' value represent the arrangement number and the 'y' value represent the perimeter of the figures 1 - 5 (the sides of the equilateral triangle represent 1 unit).*

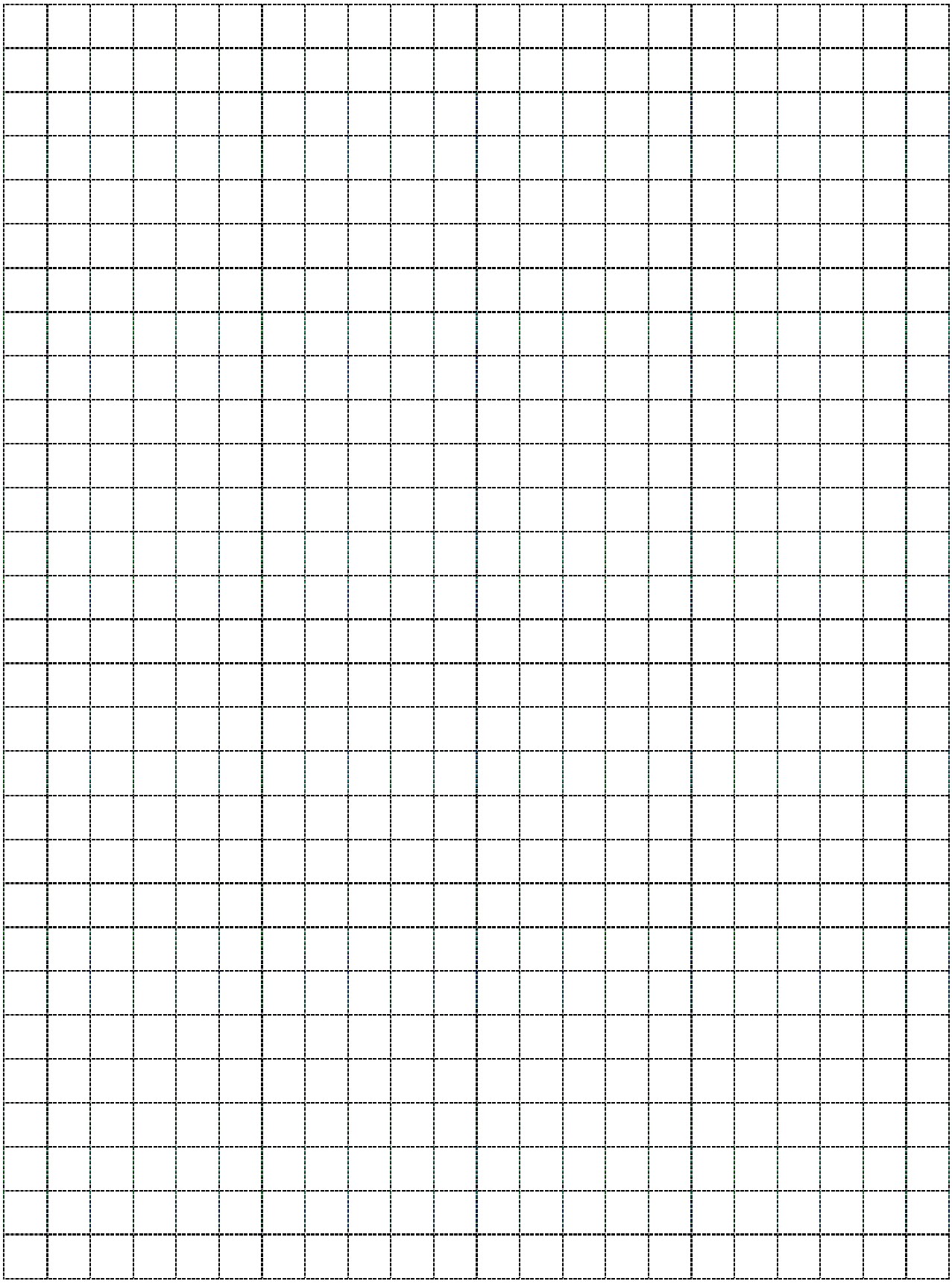
arrangement number *x*	*Perimeter* *y*
1	*7*
2	*12*
3	*17*
4	*22*
5	*27*

b. *Plot the coordinates of the pattern on grid paper. Use the grid paper to determine which arrangement will have a perimeter of 57 units. Explain how you determined this.*

(57 – 2)÷ 2 = 11, the 11th arrangement has 57 units.
Continued the line on the graph and found the coordinates of the line on the grid.

c. *Write an equation to represent the growth shown in this pattern. Explain how you determined this.*

Perimeter = arrangement number times 5 plus 2, y = 5x + 2



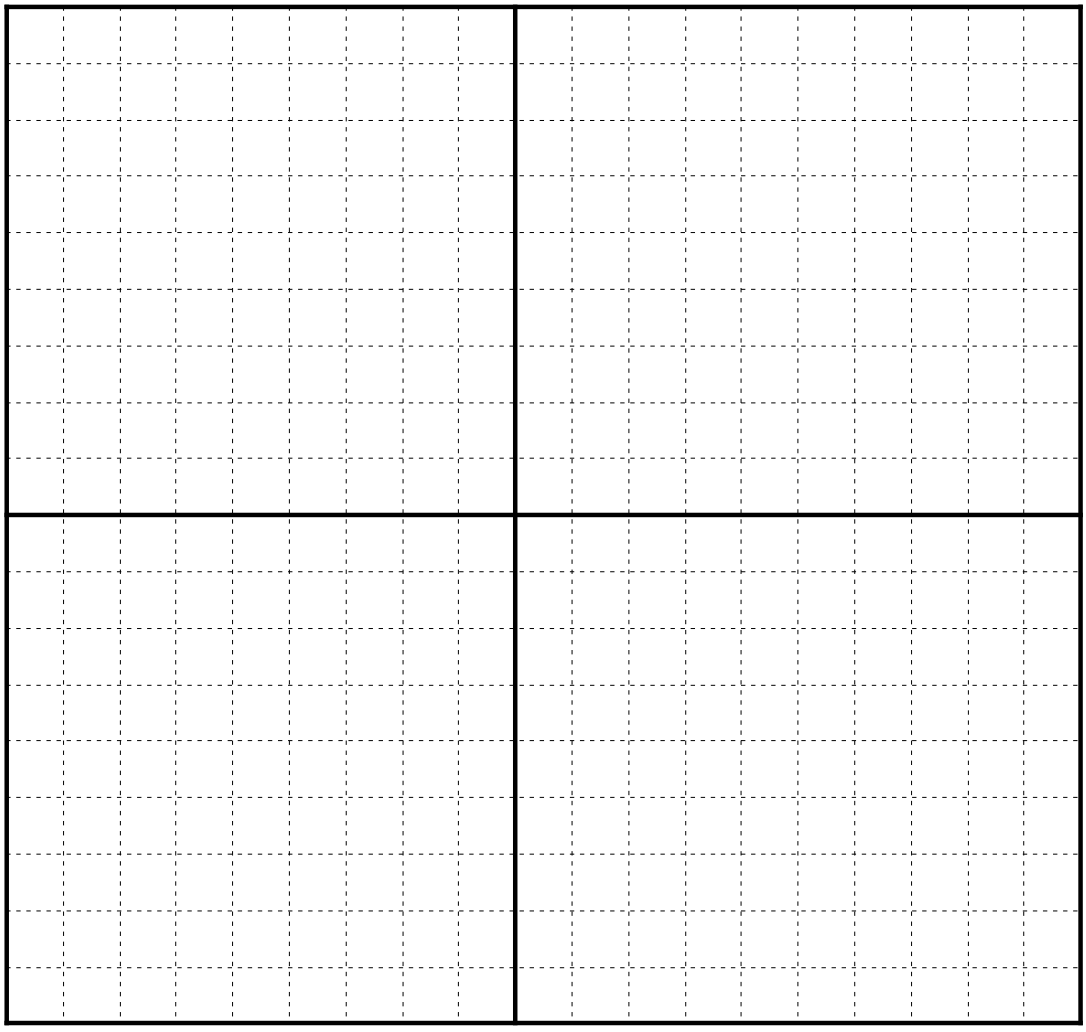
Unit 4, Activity 11, Rate of Change Grid 1

x	$y = \frac{1}{2}x$

x	$y = 2x$

x	$y = 3x$

x	$y = x^2$



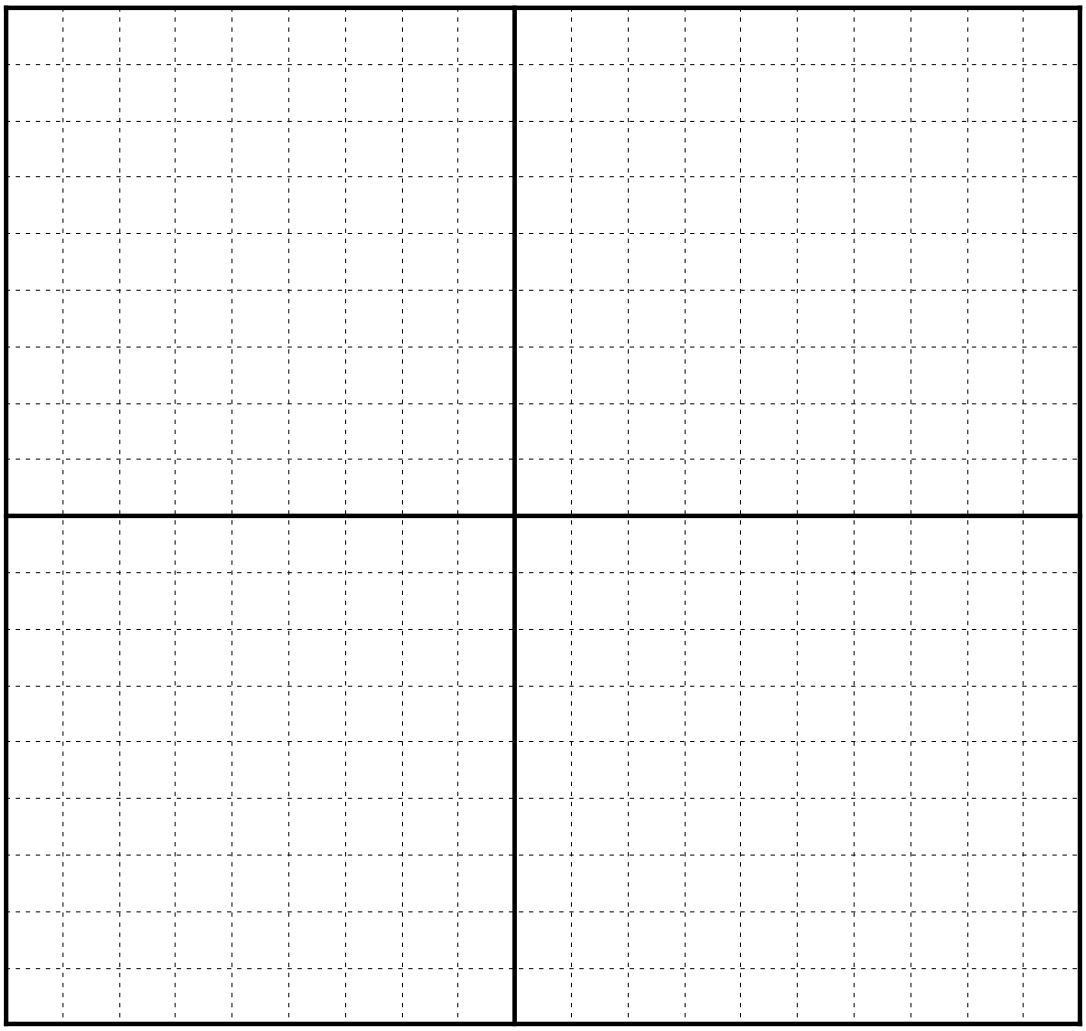
Unit 4, Activity 11, Rate of Change Grid 2

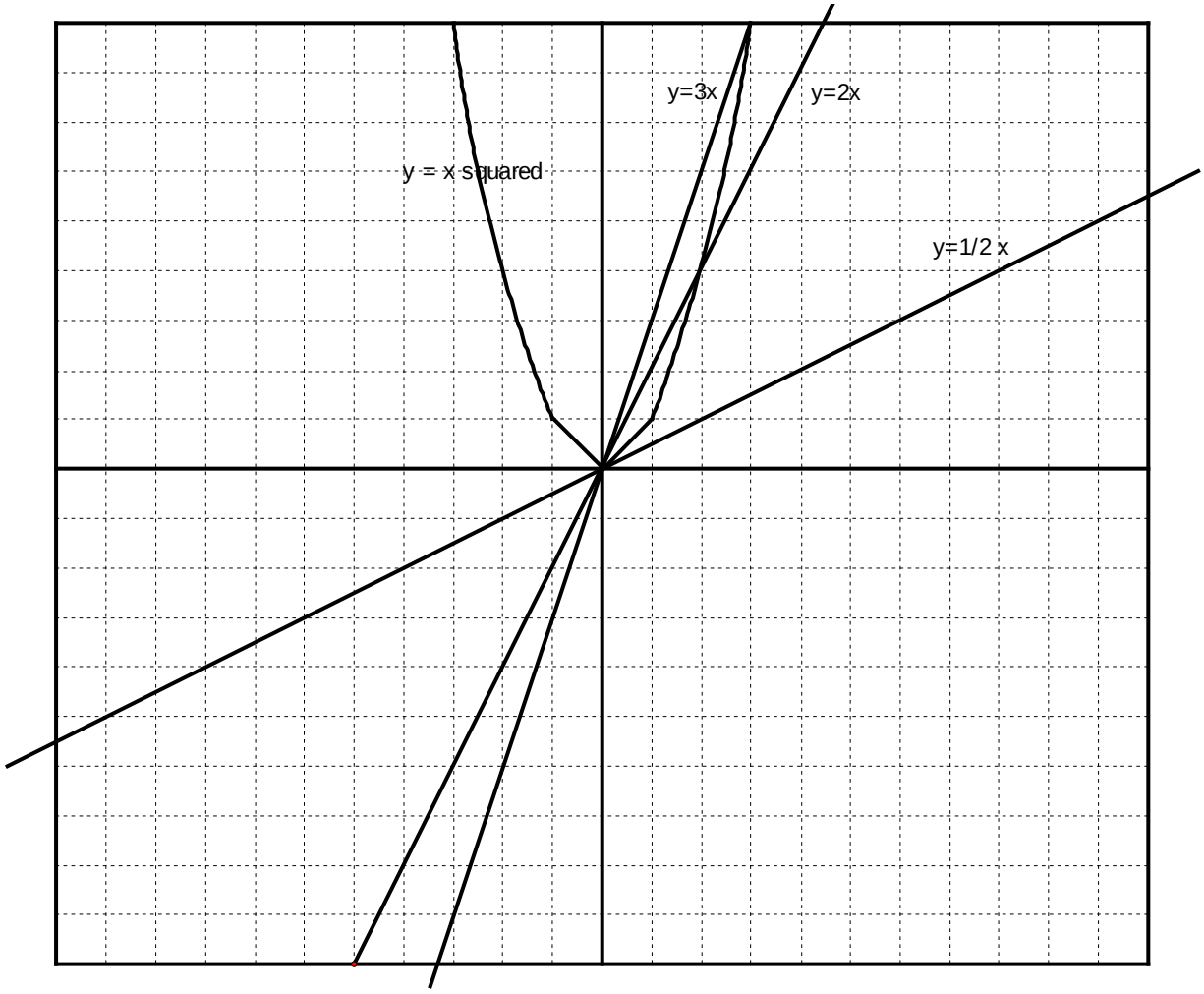
x	*y =x+2*

x	*y=x-2*

x	*y=(-x)+2*

x	*y=(-x)-2*




y=3x
y=2x
y = x squared
y=1/2 x

Unit 4, Activity 11, More Exploration with the Slope – y-intercept Form of an Equation with Answers