Unit 6, Activity 1, Practice with Rules

Name _____ Date _____ Hour _____

Find the missing numbers in each sequence below.
Describe the procedure used to find the next term in the sequence.
Write a rule or an equation that describes the sequence.
HINT: Make a table with the *x* values representing the arrangement numbers.

a) -3, 2, 7, 12, _____, _____, _____, _____ RULE or EQUATION:

Procedure that describes the sequence (what function(s) did you perform to find the next term?).

b) 2, 5, 8, 11, _____, _____, _____, _____ RULE or EQUATION:

Procedure that describes the sequence.

c) 3, 6, 11, 18, _____, _____, _____, _____ RULE or EQUATION:

Procedure that describes the sequence.

d) 6, 7, 8, 9, 10, _____, _____, _____, _____ RULE or EQUATION:

Procedure that describes the sequence.

e) _____, _____, _____, _____ , 18, 22, 26, 30, _____, _____, _____, _____

RULE:
Procedure that describes the sequence.

Unit 6, Activity 1, Practice with Rules with Answers

Find the missing numbers in each sequence below. Write a rule that could represent the sequence. HINT: Make a table with the *x* values representing the arrangement numbers.

a) -3, 2, 7, 12, *17, 22, 27* RULE or EQUATION: $y = 5x - 8$
PROCEDURE: *add 5 to previous value*

b) 2, 5, 8, 11, *14, 17, 20, 23* RULE or EQUATION: $y = 3x - 1$
PROCEDURE: *add three to previous value*

c) 3, 6, 11, 18, *27, 38, 51, 67* RULE or EQUATION: $y = x^2 + 2$
PROCEDURE: *add the next odd number to the previous value*

d) 6, 7, 8, 9, 10, *11, 12, 13, 14, 15,* RULE or EQUATION: $y = x + 5$
PROCEDURE: *add one to the previous value*

e) *2, 6, 10, 14,* 18, 22, 26, 30, *34, 38, 42, 46*

RULE or EQUATION: $y = 4x - 2$
PROCEDURE: *The numbers differ by 4. Subtract 4 to find numbers to the left of a given number. Add 4 to find numbers to the right of a given number.*

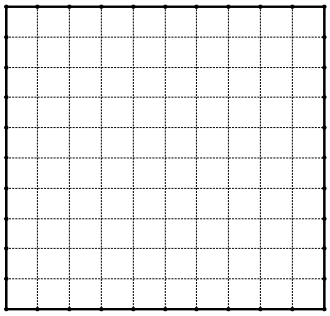
http://www.fueleconomy.gov/feg/best-worst.shtml

2012 Most Fuel Efficient Cars by EPA Size Class (including electric vehicles)

EPA Class	Vehicle Description	Fuel Economy Combined
Two-Seaters	Honda CR-Z 4 cyl, 1.5 L, Automatic (AV-S7), HEV, Regular	37
Minicompacts	Scion iQ 4 cyl, 1.3 L, Automatic (CVT), Regular	37
Subcompacts	Mitsubishi i-MiEV A-1, 66 kW DCPM, Electric Vehicle	112‡
Compacts	Ford Focus BEV Automatic (CVT), 107 kW AC Induction, Electric Vehicle	105‡
Midsize	Nissan Leaf A-1, 80 kW DCPM Electric Vehicle	99‡
Large	Hyundai Sonata 4 cyl, 2.4 L, Manual (6), Regular Hyundai Sonata 4 cyl, 2.4 L, Automatic (6), Regular	28
Small Station Wagons	Audi A3 4 cyl, 2.0 L, Automatic (S6), Diesel	34
	Volkswagen Jetta SportWagen 4 cyl, 2.0 L, Manual (6), Diesel	34
Midsize Station Wagons	Toyota Prius v 4 cyl, 1.8 L, Automatic (CVT), HEV, Regular	42

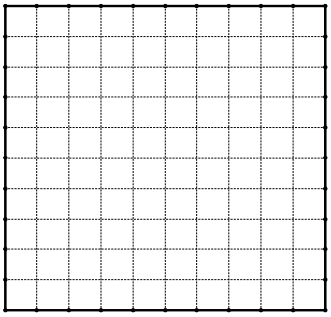
Name _____ Date _____ Hour _____

1. Sam's dad drives an Acura NSX that can go 255 miles on a tank of gas. Suppose Sam's dad's car has a 15 gallon tank. Make a table to show how many miles he can travel on 5, 10, 15, 20, and 25 gallons of gasoline. Write a rule and graph your results.

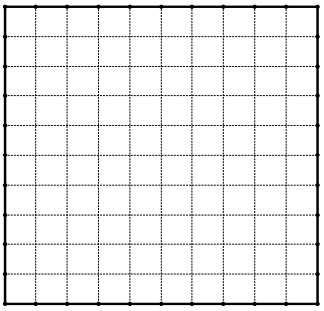


2. Julie's dad drives a BMW Roadster, and he can travel 324 miles on a tank of gas. The table below shows the number of miles he can travel at given distances. Determine the size of his gasoline tank. Complete the chart, write a rule and graph your results.

#gallons	5	8	11	14	18
# miles traveled	90	144	198		



3. Jeremy wanted to mail a letter that weighed 10 ounces. He looked up the charges for the US Post Office and found that they charged \$0.45 for the *first ounce and \$0.20 for each additional ounce for first class mailings.* Make a table, then write the rule that will help Jeremy find the amount he will have to pay**.** Plot a graph showing the cost for a letter weighing 1 ounce, 5 ounces, 10 ounces, and 15 ounces.



4. Susan wanted to go on a trip with her friend's family over spring break. Her parents told her she could if she worked to earn part of the money. Susan needs \$500 to go on the trip and she already has \$25.00. Her parents told her that they would double the amount she makes each week babysitting. If Susan makes \$8.25/hour babysitting and works 4 hours the first week, 5 hours the second week, 3 hours the third week, 6 hours the fourth week, 5 hours the fifth week and 7 hours the sixth week, will she have enough money for the trip?

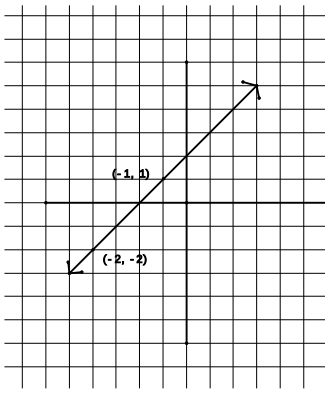
Week #	0	1	2	3	4	5	6	
Amount \$								
Susan's total								

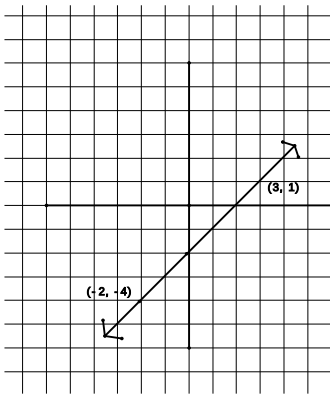
5. The U. S. Post Office will not accept a letter that weighs more than 13 ounces using first class rates given in problem #3. Any package or letter weighing more than 13 ounces will be charged priority mail rates. The rates for local zones are given below:

Weight in pounds	1 pound	2 pounds	3 pounds	4 pounds	5 pounds
Charge	$1.05	$4.25	$7.45	$10.65	$13.86

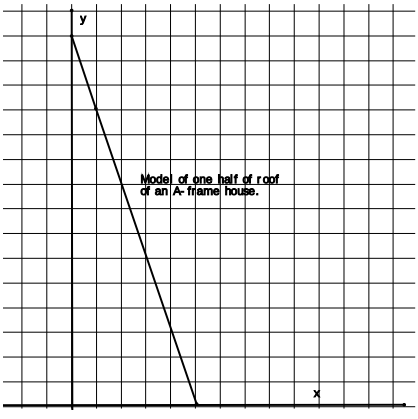
Write a rule and make a graph of the charges per pound for priority mailing. Describe the relationship.

6. Find the slope or rate of change of each linear graph below.





7. The roof of an A-frame cabin slopes from the peak of the cabin down to the ground. It looks like the letter A when viewed from the front or the back. The equation $y = -3x + 15$ can model the relationship formed by one side of the roof. For a point (x,y) on the roof, x is the horizontal distance in feet from the center of the base of the house, and y is the height of the roof in feet. Make a table to represent different points along the roof and graph the equation. Find the slope or rate of change.



Unit 6, Activity 2, Real Situations with Sequences with Answers

1. Sam's dad drives an Acura NSX that can go 255 miles on a tank of gas. Suppose Sam's dad's car has a 15 gallon tank. Make a table to show how many miles he can travel on 5, 10, 15, 20, and 25 gallons of gasoline. Write a rule and graph your results.

Changed by 5

# gallons (x)	*5*	*10*	*15*	*20*	*25*
# miles (y)	*85*	*170*	*255*	*340*	*425*

Changed by 85

CONSTANT RATE OF CHANGE $\frac{\text{change in y value}}{\text{change in x value}}$ *= Slope Slope = 85/5 which is 17/1 or 17*

RULE OR EQUATION: *y = 17x*

2. Julie's dad drives a BMW Roadster, and he can travel 324 miles on a tank of gas. The table below shows the number of miles he can travel at given distances. Determine the size of his gasoline tank. Complete the chart, write a rule and graph your results.

Number of gallons *(x)*	5	8	11	14	18
Number of miles traveled *(y)*	90	144	198	*252*	*324*

CONSTANT RATE OF CHANGE $\frac{\text{change in y value}}{\text{change in x value}}$ *= Slope Slope = 54/3 which is 18/1 or 18*

RULE OR EQUATION: *y = 18x*

3. Jeremy wanted to mail a letter that weighed 10 ounces. He looked up the charges for the US Post Office and found that they charged $0.45 for the first ounce and $0.20 for each additional ounce for first class mailings. Make a table then write the rule that will help Jeremy find the amount he will have to pay**.** Plot a graph showing the cost for a letter weighing 1 ounce, 5 ounces, 10 ounces, and 15 ounces

Ounces (x)	*1*	*5*	*10*	*15*	*20*	
Amt paid (y)	*$.45*	*$1.25*	*$2.25*	*$3.25*	*$4.25*	

Expression .45 + .20(x -1) Notice: The rate of change is not the same(for the x value) from 1 ounce to 5 ounces, but it is constant from 5 to 10 and 15 to 20; therefore, the(y value) is not constant from .45 to 1.25, but becomes constant from 1.25 to 2.25 and 3.25 to 4.25. The EQUATION WILL BE:

y = .20(x-1) + .45

4. Susan wanted to go on a trip with her friend's family over spring break. Her parents told her she could if she worked to earn part of the money. Susan needs $500 to go on the trip and she already has $25.00. Her parents told her that they would double the amount she makes each week babysitting. If Susan makes $8.25/hour babysitting and works 4 hours the first week, 5 hours the second week, 3 hours the third week, 6 hours the fourth week, 5 hours the fifth week and 7 hours the sixth week, will she have enough money for the trip. *Yes, she would have enough money.*

Week # *(x)*	0	1	2	3	4	5	6
Amount $ *(y)*	25	66	82.50	49.50	99	82.50	115.50
Susan's total		91	173.50	223.00	322	404.50	520

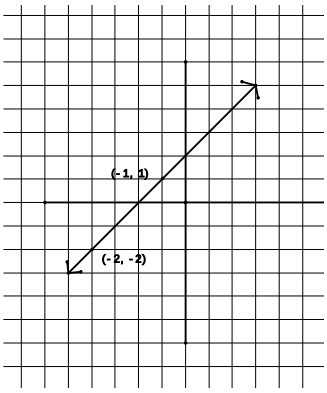
5. The U. S. Post Office will not accept a letter that weighs more than 13 ounces using first class rates given in problem #3. Any package or letter weighing more than 13 ounces will be charged priority mail rates. The rates for local zones are given below:

Weight in pounds	1 pound	2 pounds	3 pounds	4 pounds	5 pounds
Charge	$1.05	4.25	7.45	10.65	13.86

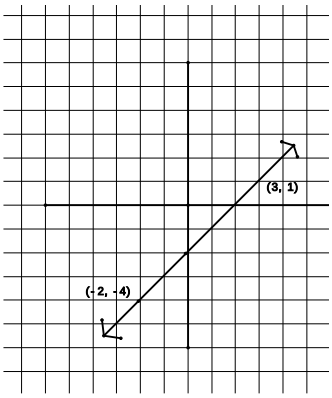
Write a rule then make a graph of the charges per pound for priority mailing. Describe the relationship.

Varying rate of change—pounds have a constant rate of change, but the charge does not. 3.85 to 3.95 is a change of .10, 3.95 to 4.75 is a change of .80, 4.75 to 5.30 is a change of .55 and 5.30 to 5.85 is a change of .55 This will not be a linear graph.

6. Find the slope or rate of change of each linear graph below.

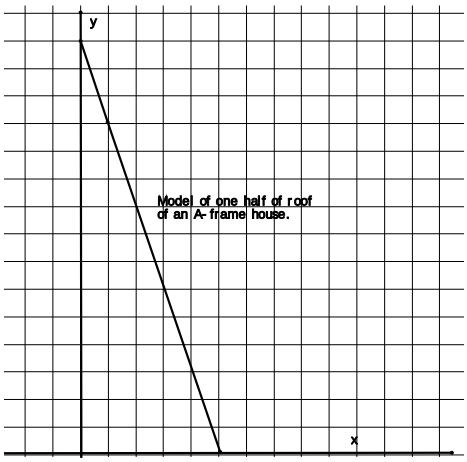


Slope of 1



Slope of 1

7. The roof of an A-frame cabin slopes from the peak of the cabin down to the ground. It looks like the letter A when viewed from the front or the back. The equation $y = -3x + 15$ can model the relationship formed by one side of the roof. For a point (x,y) on the roof, x is the horizontal distance in feet from the center of the base of the house, and y is the height of the roof in feet. Make a table to represent different points along the roof and graph the equation. Find the slope or rate of change.



X	*Y*
5	*0*
4	*3*
3	*6*
2	*9*
1	*12*
0	*15*

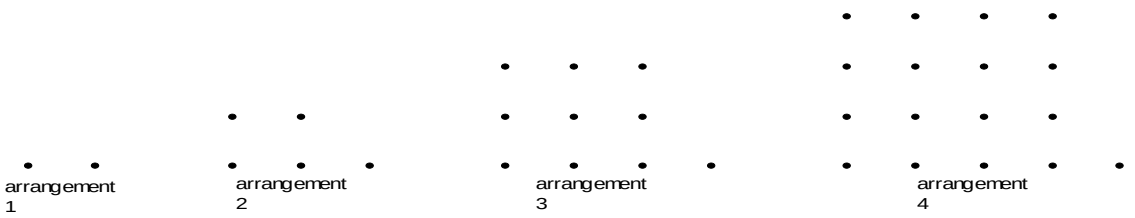
The x value goes down 1 each time, the y value goes up 3. The slope is -3.

Unit 6, Activity 3, Name that Term

Name _____ Date _____ Hour _____

1.
Dominique sketched the following dot pattern to represent the number of quarters he saved each week during the summer. Make a table to represent the weeks *w* and the number of quarters *q* he saved each week.

a) Find the number of quarters Dominique will save during the 5^{th} week.



b) Write a rule or an equation to represent Dominique's savings plan.

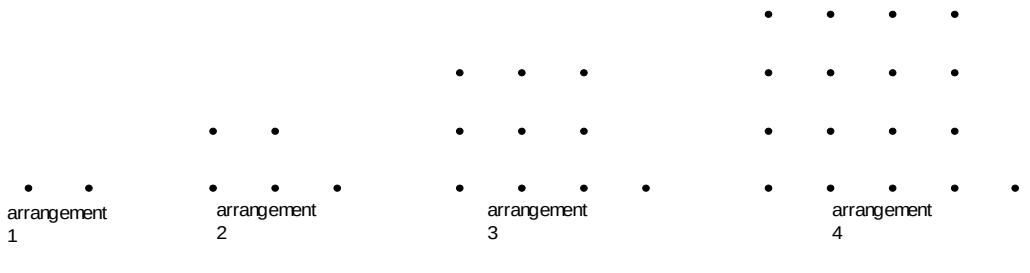
c) During which week will Dominique save 122 quarters? Explain.

d) How much money will Dominique have at the end of 12 weeks if he does not spend any of his savings? Explain.

2. 68 is what term of the sequence given by –2, 3, 8, . . .? Explain.

Unit 6 Activity 3, Name that Term with Answers

1. Dominique sketched the following dot pattern to represent the number of quarters he saved each week during the summer. Make a table to represent the weeks *w* and the number of quarters *q* he saved each week.



x (week)	y # quarters
1	2
2	5
3	10
4	17

a) Find the number of quarters Dominique will save during the 5th week.
He will save 26 quarters
b) Write a rule to represent Dominique's savings plan.
The number of the week times itself plus one is the rule
$y = x^2 + 1$ is the equation
c) During which week will Dominique save 122 quarters? Explain.

11th week. 11 x 11 = 121 + 1 = 122

d) How much money will Dominique have at the end of 12weeks if he does not spend any of his savings? Explain.

12 x 12 + 1 = 145 quarters. 11 x 11 + 1 = 122, 10 x 10 + 1 = 101, 9 x 9 + 1 = 82, 8 x 8 + 1 = 65, 7 x 7 + 1 = 50, 6 x 6 + 1 = 37, 5 x 5 + 1 = 26

145 + 122 + 101 + 82+ 65+ 50 + 37 + 26 + 17 + 10 + 5 + 2 = 662 quarters = $165.50

2. 68 is what term of the sequence given by –2, 3, 8, . . .? Explain.

The sequence increases by 5 each time, and the equation would be $y = 5x – 7$.
Therefore, if $68 = 5x – 7$, then $75 = 5x$, and it would be the 15th term in the sequence.

Unit 6, Activity 5 Generally Speaking

Name _____ Date _____ Hour _____

Complete the following math grid using the sequences in column on the left.

Sequence	**Procedure to find the next term in the sequence**	**Equation or Rule**
2, 4, 8, 16. . .		
3, 7, 11, 15, . . .		
-5, -9, -13, . . .		
4, 7, 10 . . .		
3, 9, 27, 81 . . .		

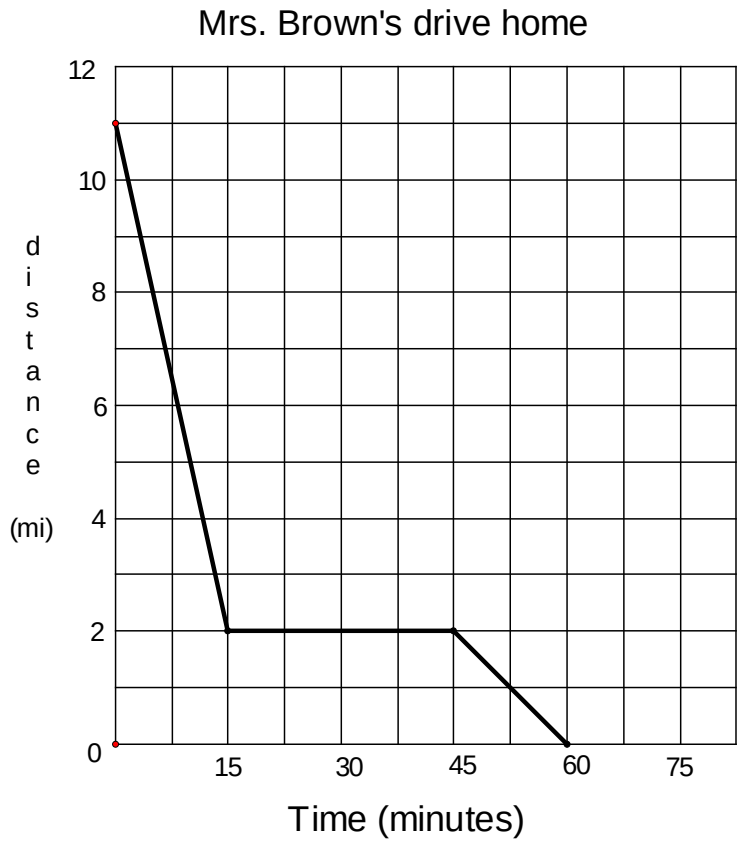
Word Grid

Sequence	**Linear**	**Non linear**	**Arithmetic**	**Geometric**
2, 4, 8, 16. . .				
3, 7, 11, 15, . . .				
-5, -9, -13, . . .				
4, 7, 10 . . .				
3, 9, 27, 81 . . .				

Sequence	**Procedure to find the next term in the sequence**	**Equation or Rule**
2, 4, 8, 16. . .	*Two raised to the power of the term*	$y = 2^x$
3, 7, 11, 15, . . .	*Add four to the previous term*	*y= 4x-1*
-5, -9, -13, . . .	*Subtract 4 from the previous term*	*y = -4x*
4, 7, 10 . . .	*Add three*	*y = 3x +1*
3, 9, 27, 81 . . .	*Three raised to the power of the term*	$y = 3^x$

Sequence	**Linear**	**Non linear**	**Arithmetic**	**Geometric**
2, 4, 8, 16. . .		✓		✓
3, 7, 11, 15, . . .	✓		✓	
-5, -9, -13, . . .	✓		✓	
4, 7, 10 . . .	✓		✓	
3, 9, 27, 81 . . .		✓		✓

Name _____ Date_____ Hour ____



Mrs. Brown works eleven miles from home. She travels 9 miles toward home every day and stops at the grocery store to get something for dinner. The last two miles takes her 15 minutes because it is through neighborhoods with small children.

1. The section on the graph from (0, 11) and (15, 2) has a slope that is _____ than the section from (45, 2) and (60,).

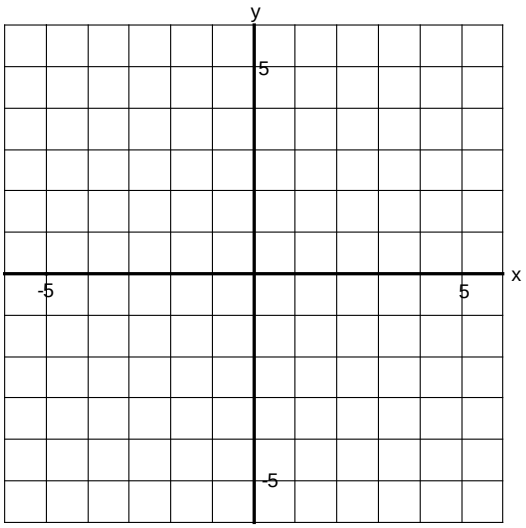
2. The section on the graph from (15, 2) and (45, 2) tells the reader that _____

3. The section on the graph from (15, 2) and (45, 2) represents this amount of time _____

4. The graph shows that Mrs. Brown left work and traveled at a constant speed for _____minutes, stopped at the store for _____ minutes and then the last _____ traveled at a slower speed than she traveled at the first part of her trip home.

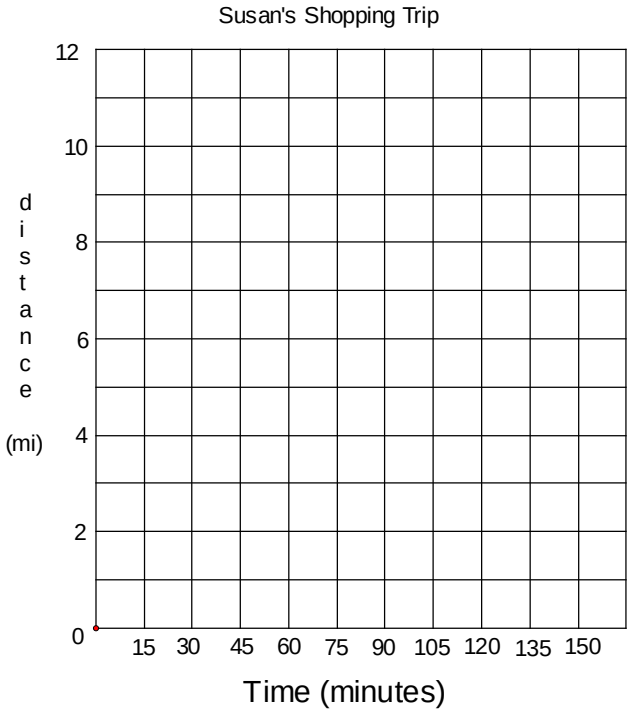
Name_____ Date _____ Hour _____

1. Graph this function on the graph at the right.
   - It increases at a constant rate between points (-5,-6) and (0, 2).
   - It decreases from point (0, 2) and (3, -3)
   - It remains constant from point (3, -3) to (5, -3)

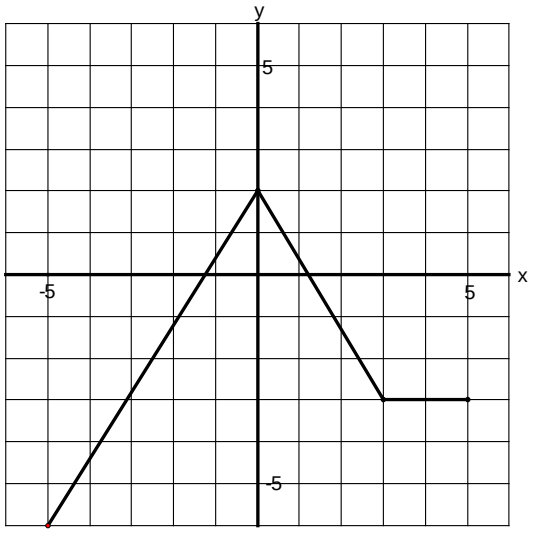


2. Sketch the following situation on the graph at the right.

Susan walked to Sally's house one mile away in 15 minutes. She stopped and waited for Sally and her older sister to get dressed for 15 minutes and then Sally's older sister drove the girls to the mall which took about 30 minutes because it was 10 miles. They shopped for two hours. Then they met Sally's sister and she took both girls to Susan's house to spend the night. This took 30 minutes. Sketch the situation on the graph below.

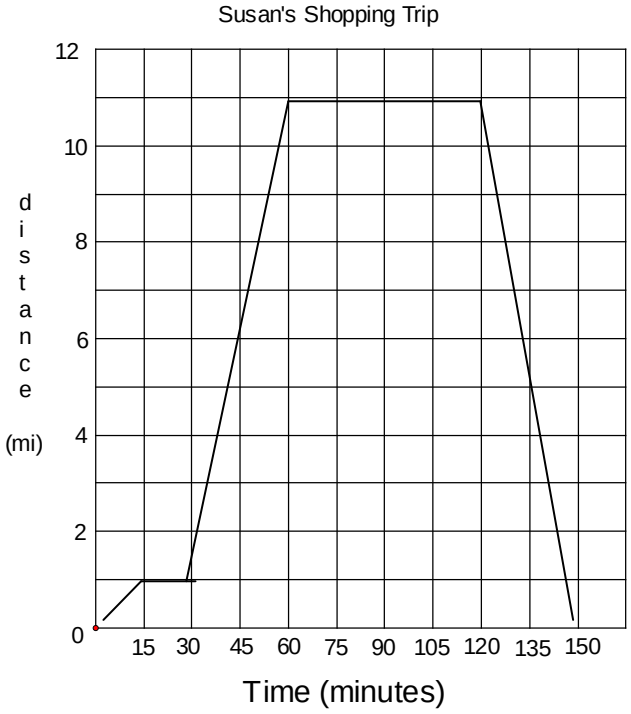


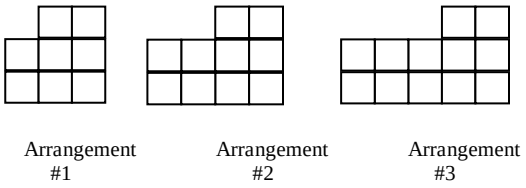
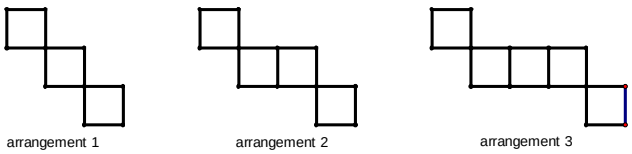
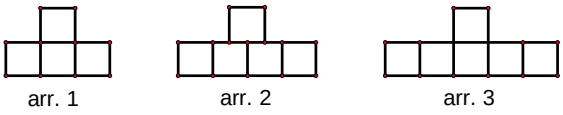
1. Graph this function on the graph at the right.
   - It increases at a constant rate between points (-5,-6) and (0, 2).
   - It decreases from point (0, 2) and (3, -3)
   - It remains constant from point (3, -3) to (5, -3)



2. Sketch the following situation on the graph at the right.

Susan walked to Sally's house which was one mile in 15 minutes. She stopped and waited for Sally and her older sister to get dressed for 15 minutes and then Sally's older sister drove the girls to the mall which took about 30 minutes because it was 10 miles. They shopped for two hours. Then they met Sally's sister and she took both girls to Susan's house to spend the night. This took 30 minutes. Sketch the situation on the graph below.



8, 10, 12, 14…	11, 10, 9, 8…
35, 28, 21, 14. . .	4, 7, 10, 13. . .
2, 5, 8, 11. . .	4, 10, 16, 22. . .
	
	42, 33, 24, 15. . .

Directions for Activity

1) Find the value of the $7^{th}$and 10^{th} terms in the sequence you were given.

2) Sketch a tile or dot pattern that represents your sequence or draw a table to show the values of the tile or dot pattern.

3) Write an equation in y-intercept form to represent the n^{th} term in the sequence you were given.

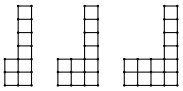
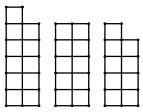
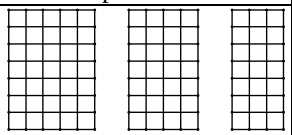
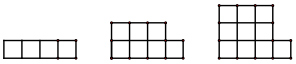
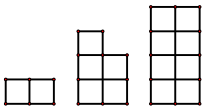
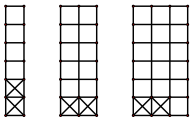
4) Make a graph of your equation.

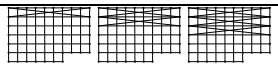
5) Determine whether your sequence represents a positive or negative relationship.

6) Write two questions from your sequence where the solution will be the "*y*" value. Show your work on another sheet of paper with your correct answer.

7) Write two questions from your sequence where the solution will be the "*x*" value. Show your work on another sheet of paper with your correct answer.

8) Explain how you can determine the slope of your equation.

① 8, 10, 12, 14…  7^{th} term =20, 10^{th} term =66 $y = 2x + 6$ positive relationship the slope is 2.	② 11, 10, 9, 8… 7^{th} term =5, 10^{th} term =2 $y = 12 - x$ negative relationship slope = -1 
③ 35, 28, 21, 14. . .  7^{th} term =-7, 10^{th} term =-28 $y = 42 - 7x$ negative relationship the slope is -7	④ 4, 7, 10, 13. . . 7^{th} term = 22, 10^{th} term =31 $y = 3x+1$ positive relationship the slope is +3 
⑤2, 5, 8, 11. . . 7^{th} term = 20, 10^{th} term =29 $y = 3x-1$  positive relationship Slope is +3	⑥4, 10, 16, 22. . . 7^{th} term = 22, 10^{th} term =31 $y = 6x-2$ positive relationship Slope is +6 

⑦ (picture is already there) 7^{th} term =20, 10^{th} term =26 $y = 2x+6$ positive relationship the slope is +2	⑧ (picture is already there) 7^{th} term =9, 10^{th} term =12 $y = x+2$ positive relationship the slope is +1
⑨ (picture is already there) 7^{th} term =10, 10^{th} term =13 $y = x+3$ positive relationship the slope is +1	⑩42, 33, 24, 15. . .  7^{th} term =-12, 10^{th} term =-39 $y = -9x+51$ negative relationship the slope is -9

Unit 5, Activity 9, Comparing Slopes and y-Intercepts

Name _____ Date _____ Hour _____

1. Graph these equations.

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

How are these equations alike? _____

How are these equations different? _____

In the general form $y = mx + b$, how does a change in b affect the graph?

_____

2. Graph these equations.

$y = -3x + 3$
$y = -3x$
$y = -3x - 2$

How are these equations alike? _____

How are these equations different? _____

In the general form $y = mx + b$, how does a change in b affect the graph?

_____

3. Graph these equations.

$y = \frac{1}{3}x + 5$
$y = \frac{1}{3}x$
$y = \frac{1}{3}x - 1$

How are these equations alike? _____

How are these equations different? _____

In the general form $y = mx + b$, how does a change in b affect the graph?

_____

4. Graph these equations.

$y = -2x + 5$
$y = \frac{2}{3}x + 5$
$y = 5x + 5$

In the general form $y = mx + b$, how does a change in m affect the graph?

_____

What do you observe about the difference in graphs of functions with positive and negative slopes? _____

Unit 6, Activity 9, Comparing Slopes and y-Intercepts with Answers

1. Graph these equations.

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

How are these equations alike? *They have the same slope.*
How are these equations different? *They have different y-intercepts.*
How does the change in the y-intercept affect the graph? *It shifts the line up or down on the y-axis.*

2. Graph these equations.

$y = -3x + 3$
$y = -3x$
$y = -3x - 2$

How are these equations alike? *They have the same slope.*
How are these equations different? *They have different y-intercepts.*
How does the change in the y-intercept affect the graph? *It shifts the line up or down on the y-axis.*

3. Graph these equations.

$y = \frac{1}{3}x + 5$
$y = \frac{1}{3}x$
$y = \frac{1}{3}x - 1$

How are these equations alike? *They have the same slope.*
How are these equations different? *They have different y-intercepts.*
How does the change in the y-intercept affect the graph? *It shifts the line up or down on the y-axis.*

4. Graph these equations.

$y = -2x + 5$
$y = \frac{2}{3}x + 5$
$y = 5x + 5$

How does changing the slope affect the graph? *It makes the line steeper or flatter and it changes the direction of the slant of the line.*
What do you observe about the difference in the graphs of positive and negative slopes? *Graph of line with positive slope slants right; negative slope slants left.*

Unit 6, Activity 10, Comparing Functions

Name _____ Date_____ Hour _____

Work with a partner to solve each of the following situations.
Compare the rates of change for each of the situations below and write the equations that represent information in tables, graphs or charts.

1. Compare the rates of change for each of the functions:

Function 1: $y = \frac{1}{4}x + 3$

Function 2:

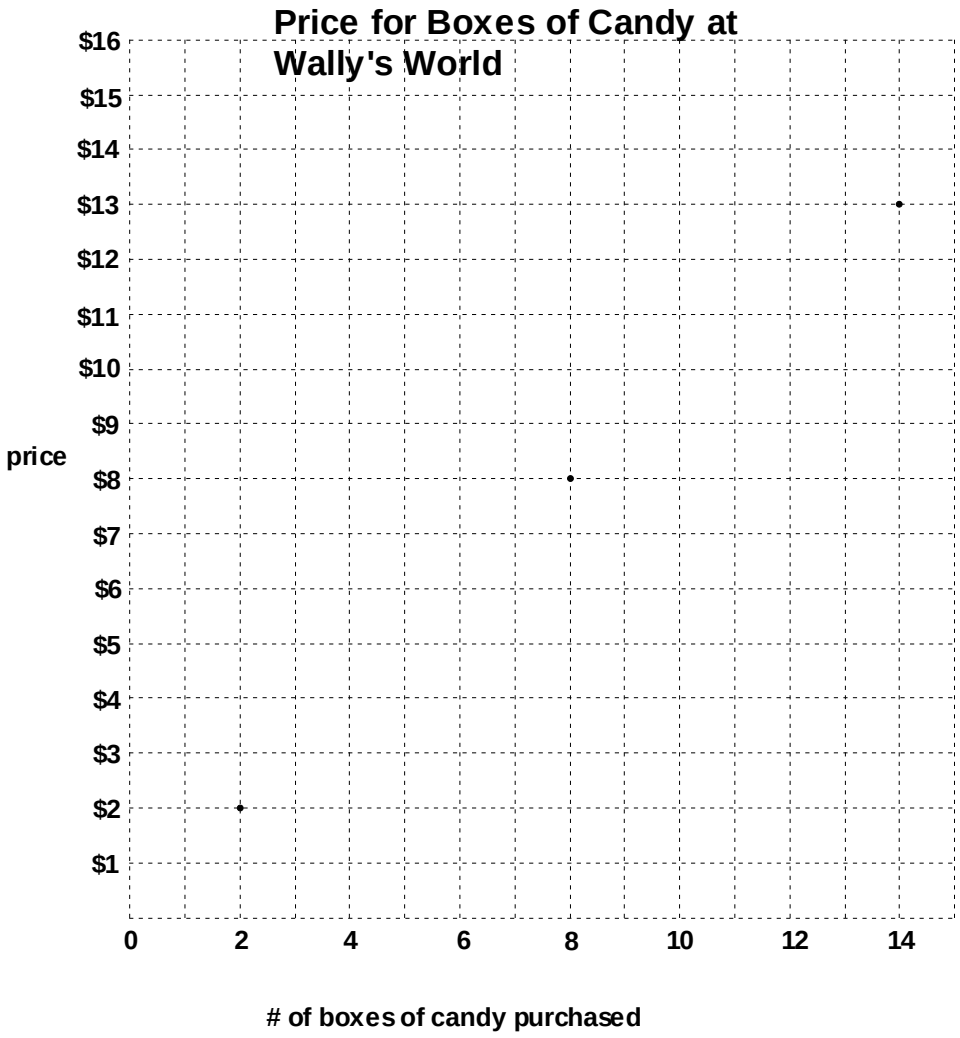
x	2	3	4	5	6
y	-2.5	-1.75	-1	-0.25	0.5

2. Which of the situations is the best if you need 15 boxes of candy? Explain.

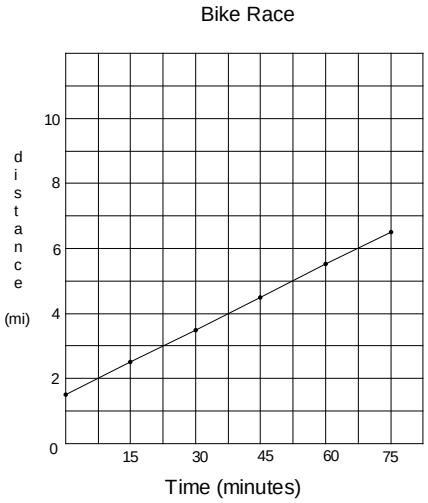
Winston's Discount

Boxes of candy

$3.00 for the first box and $0.75 for each box after that!



3. Cliff and Billy are racing their bicycles around the bike path at the lake. The path is 10 miles long. Since Billy is a practiced bicyclist, he gave Cliff a 1.5 mile head start. The graph shows Cliff's first lap.



Billy's first lap time is represented in the chart below:

x (minutes)	10	20	25	35
y (distance)	2	4	5	7

Write two true mathematical statements about the race.

1.

2.

Function 1: $y = \frac{1}{4}x + 3$

Function 2:

x	2	3	4	5	6
y	-2.5	-1.75	-1	-0.25	0.5

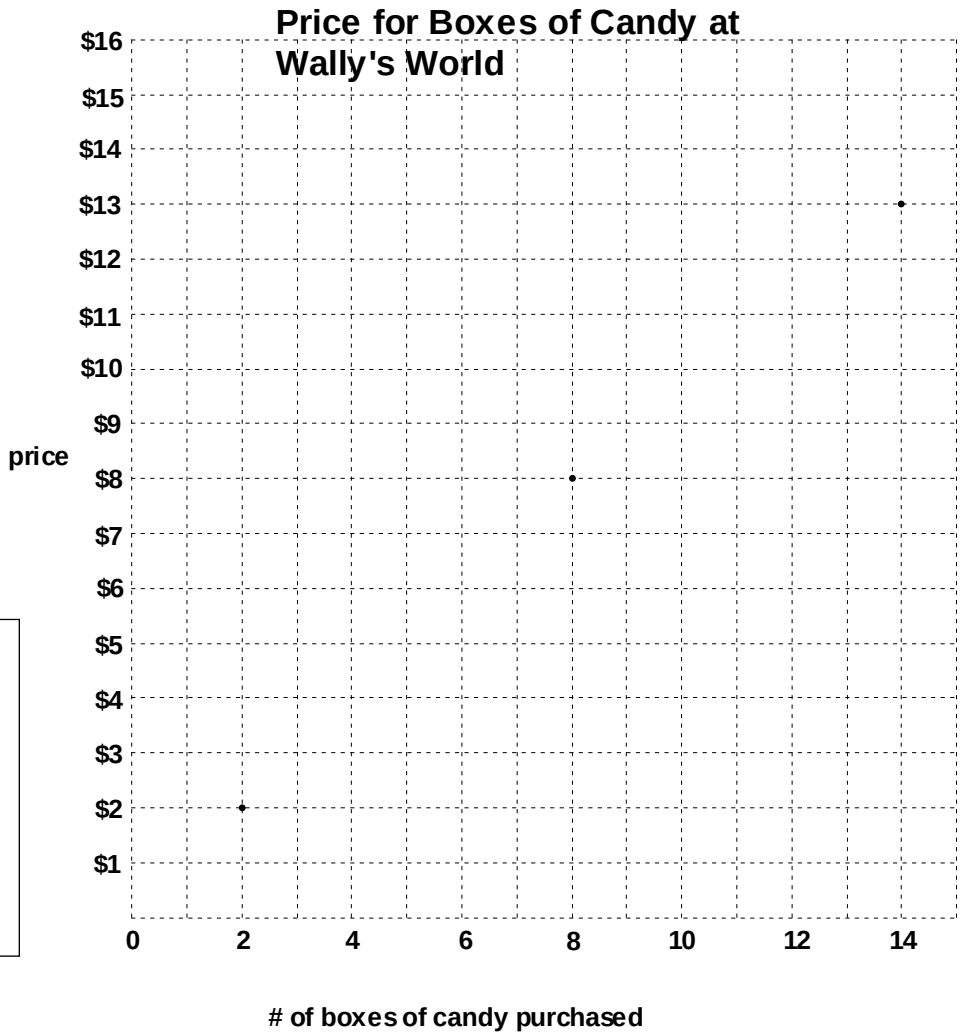
The rate of change in the first function is ¼ and the rate of change in the second function is ¾.

The equation for the table values would be y = ¾ x -4

2. Which of the situations is the best if you need 15 boxes of candy? Explain.

Boxes of candy at Wally's World are $1.00 each and for 15 boxes it would cost $15.00.

Boxes of candy at Winston's Discount are $0.75 for 14 of the boxes and 3 dollars for one. This would cost a total of $13.50, so it would be the best price.

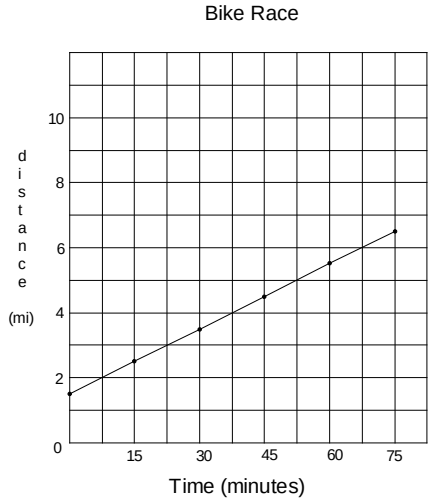


Winston's Discount

Boxes of candy

$3.00 for the first box and $0.75 for each box after that!

3. Cliff and Billy are racing their bicycles around the bike path at the lake. The path is 10 miles long. Since Billy is a practiced bicyclist, he gave Cliff a 1.5 mile head start. The graph shows Cliff's first lap.



Billy's first lap time is represented in the chart below:

x (minutes)	10	20	25	35
y (distance)	2	4	5	7

The graph shows Cliff traveling 1 mile every 15 minutes and the table shows Billy traveling 2 miles every 10 minutes.

Cliff's equation is approximately y = 0.067x + 1.5

Billy's equation is y = 0.2x

Write two true mathematical statements about the race.

These will vary.
Possible statements are
Billy travels faster than Cliff.
In 15 minutes, they will have both traveled 2.5 miles because of his head start, he will be at 2.5 miles and Billy at 2.5 miles.

Name _____ Date _____ Hour ____

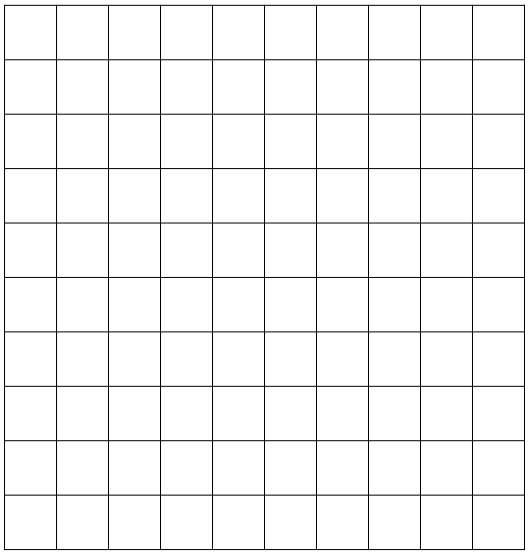
1) Sam left for work at 7:00 a.m. walking at a rate of 1.5 miles per hour. One hour later, his brother, James, noticed that he had forgotten his lunch. He leaves home walking at a rate of 2.5 miles per hour. When will he catch up with Sam to give him his lunch?

Graph each situation on the same graph.

Sam:
Table

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:



James:
Table:

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

Using two or more equations to model a situation is called using a system of equations.

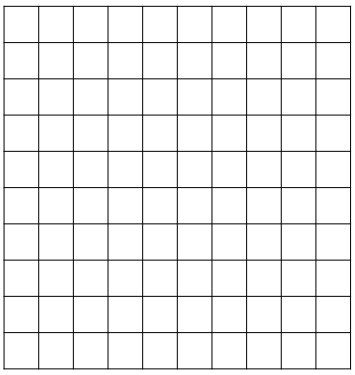
Definition

System of equations:

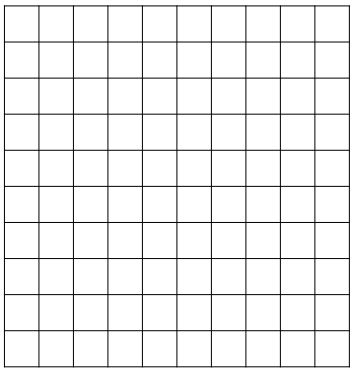
A solution to a system of equations is the set of points that makes the system true.

2) Solve each of the following systems of equations by graphing.

A. $y = -x + 3$
$y = x + 1$



B. $3x + 2y = 4$
$-x + 3y = -5$

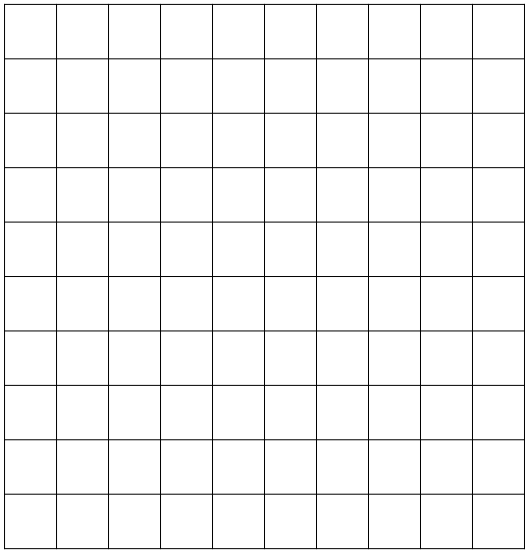


3) Suppose James leaves his house one hour later, but he walks at the same rate as Sam, 1.5 miles per hour. When will he catch up with Sam?

Sam:
Table

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:



James:
Table:

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

When will a system of equations have no solution?

4) Suppose James leaves at the same time as Sam and walks at the same rate as Sam. Demonstrate what this would look like graphically.

Sam:
Table

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

James:
Table:

Time (hours)	Miles
0	
0.5	
1	
1.5	
2	
2.5	
3	

Equation:

When will a system of equations have an infinite number of solutions?

1) Sam left for work at 7:00 a.m. walking at a rate of 1.5 miles per hour. One hour later, his brother, James, noticed that he had forgotten his lunch. He leaves home walking at a rate of 2.5 miles per hour. When will he catch up with Sam to give him his lunch?

Graph each situation on the same graph.

Sam:

Table

Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

Equation:

$y = 1.5x$

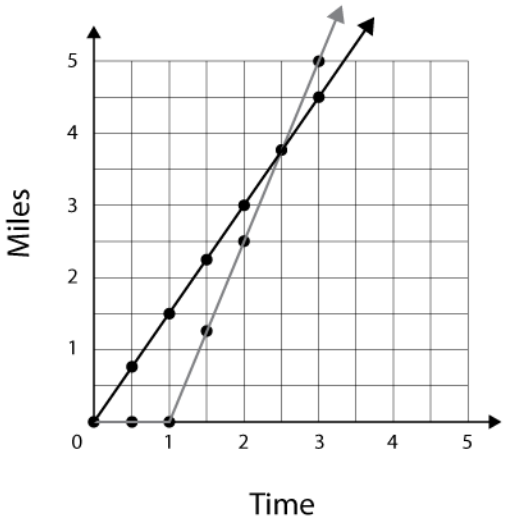
James:

Table:

Time (hours)	Miles
0	*0*
0.5	*0*
1	*0*
1.5	*1.25*
2	*2.5*
2.5	*3.75*
3	*5*

Equation:

$y = 2.5(x - 1)$



This situation is an example of a system of equations.

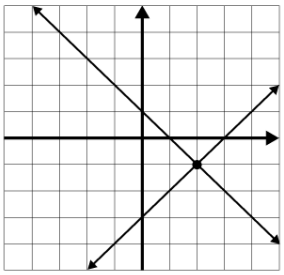
Definition

System of equations: *a set of two or more equations with two or more variables*

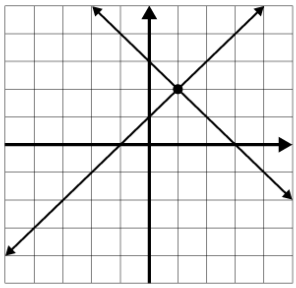
A solution to a system of equations is the ordered pair that makes both equations true.

2) Solve each of the following systems of equations by graphing.

A. $y = -x + 3$
$y = x + 1$ *Answer: (1, 2)*



B. $3x + 2y = 4$
$-x + 3y = -5$ *Answer: (2, -1)*



3) Suppose James leaves his house one hour later but he walks at the same rate as Sam, 1.5 miles per hour. When will he catch up with Sam? *never*

Sam:
Table

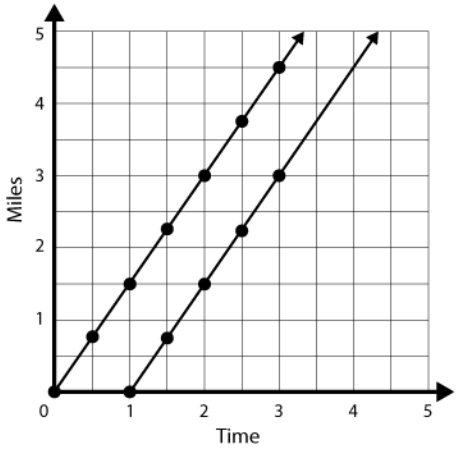
Equation: $y = 1.5x$

Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

James:
Table:

Equation: $y = 1.5(x - 1)$

Time (hours)	Miles
0	*0*
0.5	*0*
1	*0*
1.5	*.75*
2	*1.5*
2.5	*2.25*
3	*3*



When will a system of equations have no solution? *When the slopes of the lines are the same and the y-intercepts are different (parallel lines, the lines will never intersect so there will be no solution.)*

4) Suppose James leaves at the same time as Sam and walks at the same rate as Sam. Demonstrate what this would look like graphically.

Sam:
Table

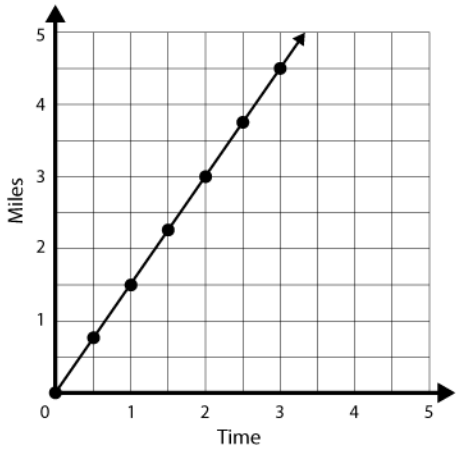
Equation: $y = 1.5x$

Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*

James:
Table:

Equation: $y = 1.5x$

Time (hours)	Miles
0	*0*
0.5	*.75*
1	*1.5*
1.5	*2.25*
2	*3*
2.5	*3.75*
3	*4.5*



When will a system of equations have an infinite number of solutions? *When the equations are equivalent.*