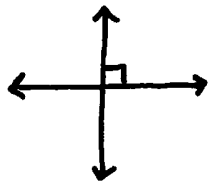
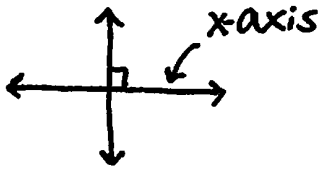
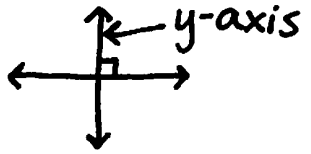
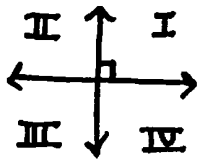
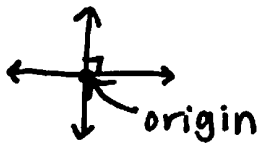
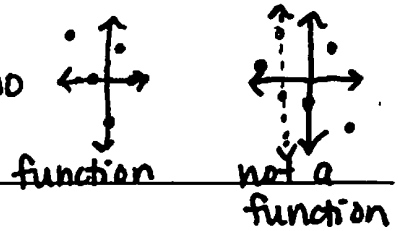
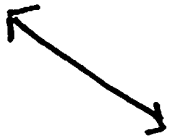
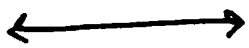
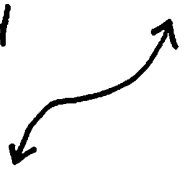
FUNCTIONS & LINEAR RELATIONSHIPS DICTIONARY

GRAPHING BASICS	DEFINITION	EXAMPLE OR VISUAL
COORDINATE PLANE	Formed by the intersection of two number lines, the horizontal axis and the vertical axis.	
X-AXIS	The horizontal axis on the coordinate plane.	
Y-AXIS	The vertical axis on the coordinate plane.	
QUADRANTS	The four regions into which the x and y-axis separate the coordinate plane.	
ORIGIN	The point at which the x and y-axis intersect on the coordinate plane. (0,0)	
ORDERED PAIR	The set of numbers, or coordinates, written in the form (x,y).	(-1, 5) x y
X-COORDINATE	The x-value of an ordered pair, represents the horizontal placement of the point.	(12, 7) x-coordinate
Y-COORDINATE	The y-value of an ordered pair, represents the vertical placement of the point.	(0, 6) y-coordinate

FUNCTIONS	DEFINITION	EXAMPLE OR VISUAL
RELATION	A set of ordered pairs.	$\{(5,-1),(-6,2),(4,0)\}$
DOMAIN	The set of x-values within the ordered pairs of a relation.	$\{(5,-1),(-6,2),(4,0)\}$ D: $\{-6,4,5\}$
RANGE	The set of y-values within the ordered pairs of a relation.	$\{(5,-1),(-6,2),(4,0)\}$ R: $\{-1,0,2\}$
FUNCTION	A relation in which each element of the domain is paired with exactly one element of the range.	$\{(5,-1),(-6,2),(4,0)\}$ x's do not repeat
INDEPENDENT VARIABLE	The x-value within a function.	$y = m(x)+b$ (x) independent
DEPENDENT VARIABLE	The y-value within a function.	$(y) = mx+b$ (y) dependent
VERTICAL LINE TEST	If any vertical line passes through the graph of a relation no more than once, then it is a function.	 function not a function

LINEAR EQUATIONS	DEFINITION	EXAMPLE OR VISUAL
RATE OF CHANGE	A ratio that shows how one variable changes with respect to another.	\$7.50/hr 23 mi/gal 31 ft/sec

SLOPE	A ratio that compares the vertical to horizontal change between points.	$m = \frac{\text{rise}}{\text{run}}$
POSITIVE SLOPE	A line that is increasing from left to right.	
NEGATIVE SLOPE	A line that is decreasing from left to right.	
ZERO SLOPE	A horizontal line	
UNDEFINED SLOPE	A vertical line	
SLOPE FORMULA	A formula used to find the slope between 2 points.	$m = \frac{y_2 - y_1}{x_2 - x_1}$
SLOPE-INTERCEPT FORM	The form of a line, used to graph the line.	$y = mx + b$ (m: slope; b: y-intercept)
STANDARD FORM	Another form of a line	$Ax + By = C$
VERTICAL LINE	A line with an undefined slope; $x = a$	

HORIZONTAL LINE	A line with zero slope; $y=a$	
LINEAR FUNCTION	A function represented by a line; rate of change is constant	
NONLINEAR FUNCTION	A function that cannot be represented by a line, but often is a curve; rate of change is <u>not</u> constant	

DIRECT VARIATION	DEFINITION	EXAMPLE OR VISUAL
PROPORTIONAL RELATIONSHIP	If the ratios of quantities are equal, then they are proportional.	5 candies = \$.50 7 candies = \$.70
NONPROPORTIONAL RELATIONSHIP	If the ratios of quantities are not equal, then they are not proportional.	12 candies = \$1 30 candies = \$2
CONSTANT OF VARIATION	The ratio between all ordered pairs	$k=\frac{y}{x}$
DIRECT VARIATION	A specific relationship in which there is a constant ratio between all ordered pairs.	$y=k\cdot x$

COORDINATE PLANE

Formed by the intersection of two number lines, the horizontal axis and the vertical axis.

parts of the plane

x-axis
The horizontal axis

y-axis
The vertical axis

ORIGIN:
The point at which the x-axis and y-axis intersect; (0,0).

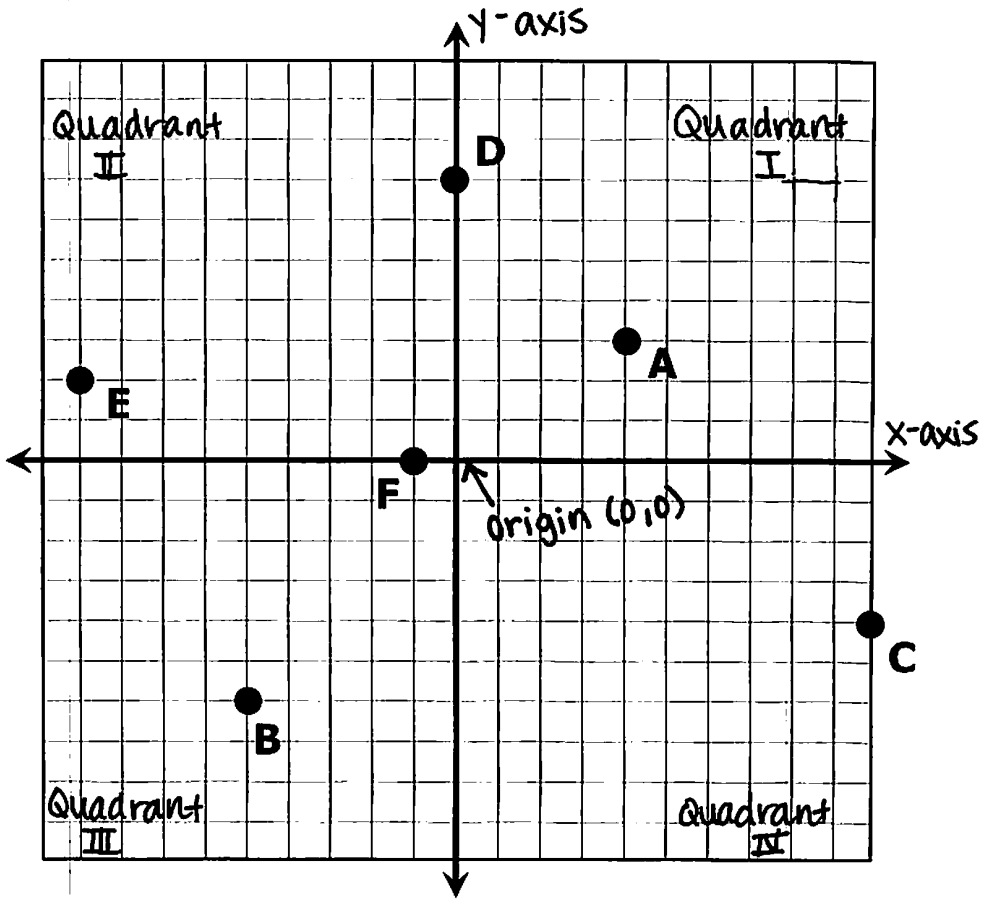
QUADRANTS:
The four regions into which the x and y-axis separate the coordinate plane.

ORDERED PAIR:
A pair of numbers used to locate any point on the plane.

$$(x, y)$$

x-coordinate

y-coordinate



LOCATING POINTS: Identify the ordered pair and quadrant (or axis) for each point.

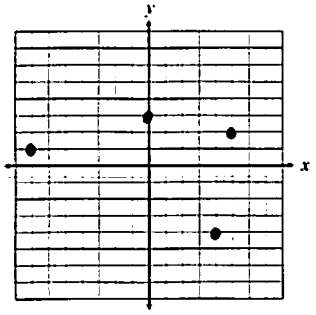
POINT	ORDERED PAIR	QUADRANT
A	(4,3)	I
B	(-5,-6)	III
C	(10,-4)	IV
D	(0,7)	y-axis
E	(-9,2)	II
F	(-1,0)	x-axis

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
RELATION	A set of ordered pairs. Example: $\{(-6,2), (5,-1), (0,6), (-4,1)\}$ Can be shown as: ordered pairs, tables, graphs
DOMAIN	The set of x-values within a relation.
RANGE	The set of y-values within a relation.

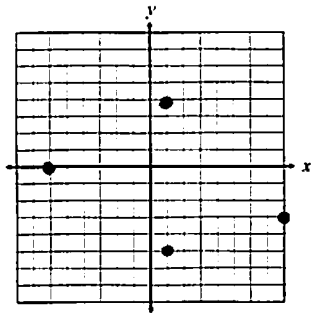
examples

1

ORDERED PAIRS	TABLE	GRAPH
{(5, 2), (-7, 1), (0, 3), (4, -4)}	x | y 5 | 2 -7 | 1 0 | 3 4 | -4	

Domain: $\{-7, 0, 4, 5\}$ Range: $\{-4, 1, 2, 3\}$

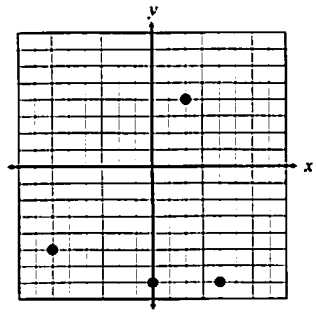
2

ORDERED PAIRS	TABLE	GRAPH
{(-6, 0), (1, 4), (8, -3), (1, -5)}	x | y -6 | 0 1 | 4 8 | -3 1 | -5	

Domain: $\{-6, 1, 8\}$ Range: $\{-5, -3, 0, 4\}$

3

For questions 3 and 4, use the points plotted on the graph.

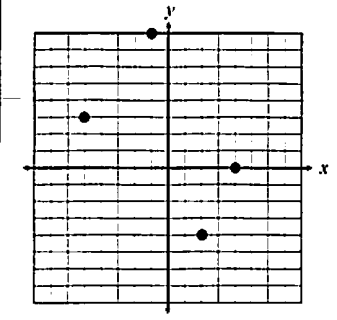
ORDERED PAIRS	TABLE	GRAPH
$\{(-6,-5), (0,-7), (2,4), (4,-7)\}$	x | y -6 | -5 0 | -7 2 | 4 4 | -7	

Domain: $\{-6, 0, 2, 4\}$ Range: $\{-7, -5, 4\}$

4

{(-5,3), (-1,8), (2,-4), (4,0)}

x	y
-5	3
-1	8
2	-4
4	0



Domain: {-5, -1, 2, 4}

Range: {-4, 0, 3, 8}

FUNCTION

A relation is a function if each x-value is paired with one & only one y-value.

examples

Directions: Determine whether each relation is a function.

5 {(6, -2), (-4, -1), (2, 0), (-7, 4)}

yes

6 {(1, 5), (-5, -3), (-8, -1), (1, -7)}

no

7 {(1, 4), (2, 4), (3, 4), (4, 4)}

yes

8 {(-7, 4), (-4, 1), (-4, -9), (0, -6)}

no

9

x	y
-2	4
-1	1
0	0
1	1
2	4

yes

10

x	y
-7	0
-4	1
-1	2
5	3
8	4

yes

11

x	y
-3	-2
-3	-1
-3	0
-3	5
-3	9

no

VERTICAL LINE TEST

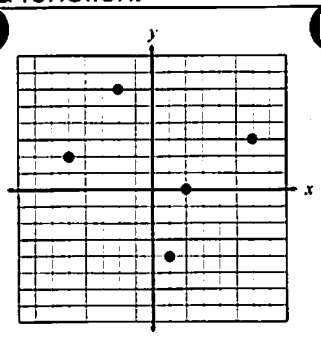
When given the **graph** of a relation, the vertical line test can be used to determine whether the relation is a function.

Vertical Line Test: If any vertical line passes through the graph of a relation no more than once, then its a function.

examples

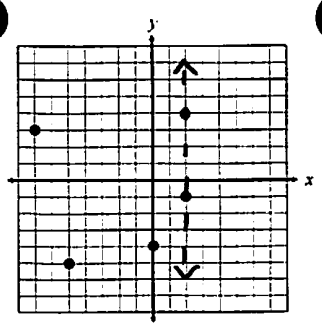
Directions: Use the vertical line test to determine whether each relation is a function.

12



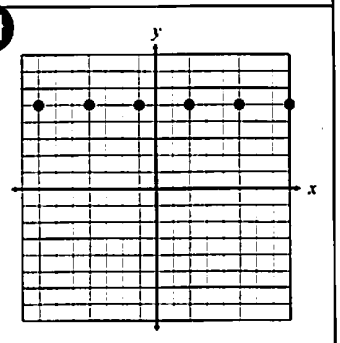
yes

13



no

14



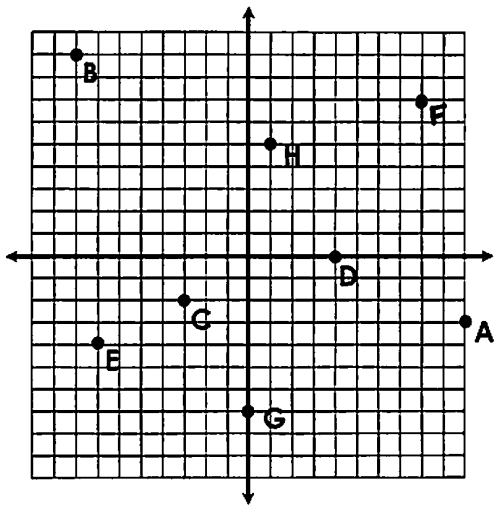
yes

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ Per: _____ **Homework 1:** Coordinate Plane, Relations, & Functions

**** This is a 2-page document! ****

1. Identify the ordered pair and quadrant (or axis) for each point on the graph.



Point	Ordered Pair	Quadrant
A	(10, -3)	IV
B	(-8, 9)	II
C	(-3, -2)	III
D	(4, 0)	x-axis
E	(7, -4)	III
F	(8, 7)	I
G	(0, -7)	y-axis
H	(1, 5)	I

Directions: For questions 2 and 3, complete the table and graph for each relation. Then give the domain and range. For questions 4 and 5, give the ordered pairs and complete the table for the relation shown on the graph. Then give the domain and range.

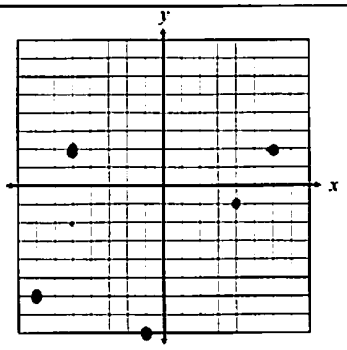
2.

ORDERED PAIRS: {(4, -1), (6, 2), (-7, -6), (-5, 2), (-1, -8)}

TABLE:

x	y
4	-1
6	2
-7	-6
-5	2
-1	-8

GRAPH:



Domain: {-7, -5, -1, 4, 6}

Range: {-8, -6, -1, 2}

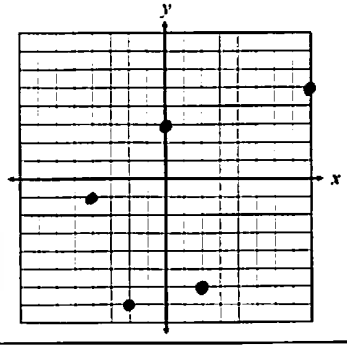
3.

ORDERED PAIRS: {(-4, -1), (0, 3), (-2, -7), (8, 5), (2, -6)}

TABLE:

x	y
-4	-1
0	3
-2	-7
8	5
2	-6

GRAPH:



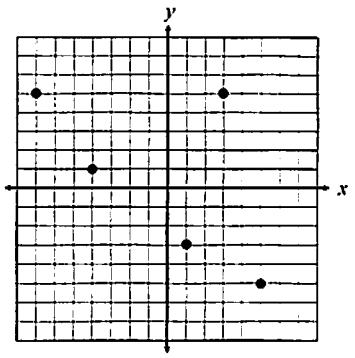
Domain: {-4, -2, 0, 2, 8}

Range: {-7, -6, -1, 3, 5}

4.

{(-7,5), (-4,1), (1,-3), (3,5), (5,-5)}

x	y
-7	5
-4	1
1	-3
3	5
5	-5



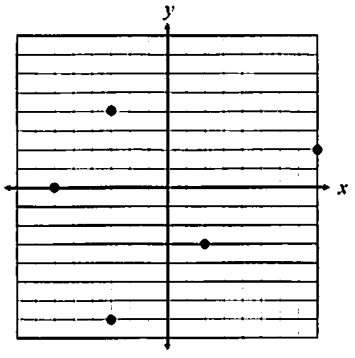
Domain: {-7, -4, 1, 3, 5}

Range: {-5, -3, 1, 5}

5.

{(-6,0), (-3,4), (-3,-7), (2,-3), (8,2)}

x	y
-6	0
-3	4
-3	-7
2	-3
8	2



Domain: {-6, -3, 2, 8}

Range: {-7, -3, 0, 2, 4}

Directions: Determine whether each relation is a function.

6. {(5, 12), (-4, 9), (-2, -7), (-4, 0), (3, 2)}

no

7. {(-1, 1), (-2, 3), (-3, 5), (-4, 7), (-5, 9)}

yes

8.

x	-8	-4	0	4	8
y	5	1	-2	1	5

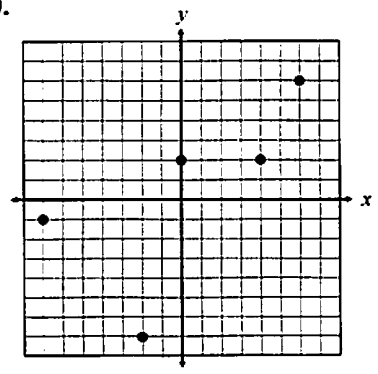
yes

9.

x	7	7	7	7	7
y	0	-5	-8	4	3

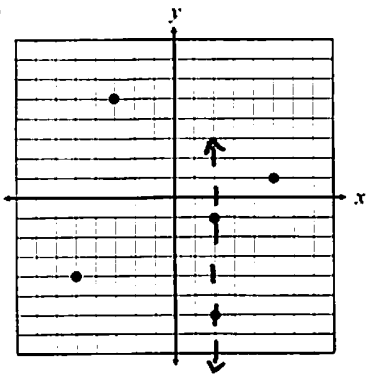
no

10.



yes

11.



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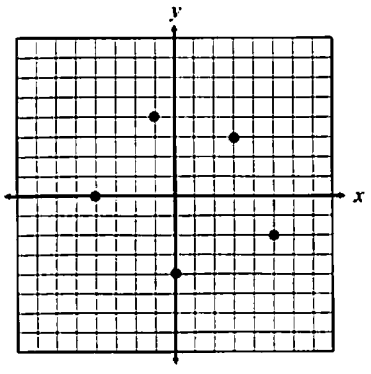
12.



yes

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Equations as Functions

- Functions can also be represented by an equation (or rule).
- The equation will generate ordered pairs by taking an input (x) that results in a certain output.
- The x-value is always called the independent variable.
- The y-value is always called the dependent variable.
- The graph of an equation is the set of all its ordered pairs, which often form a line or a curve.

Function Tables

Directions: Complete each function table.

1. $y = x + 7$

x		y	(x, y)
-1	-1 +7	6	(-1,6)
0	0 +7	7	(0,7)
2	2+7	9	(2,9)
4	4 +7	11	(4,11)

2. $y = x - 13$

x		y	(x, y)
3	3 -13	-10	(3,-10)
6	6 -13	-7	(6,-7)
9	9 - 13	-4	(9,-4)
12	12-13	-1	(12,-1)

3. $y = 1 - x$

x		y	(x, y)
-5	1 -(-5)	6	(-5,6)
-4	1-(-4)	5	(-4,5)
-3	1 -(-3)	4	(-3,4)
-2	1-(-2)	3	(-2,3)

4. $y = 2x - 7$

x		y	(x, y)
0	2(0) -7	-7	(0,-7)
2	2(2) -7	-3	(2,-3)
5	2(5) -7	3	(5,3)
8	2(8) -7	9	(8,9)

5. $y = \frac{1}{2}x - 9$

x		y	(x, y)
-6	$\frac{1}{2}(-6)-9$	-12	(-6,-12)
-2	$\frac{1}{2}(-2)-9$	-10	(-2,-10)
0	$\frac{1}{2}(0)-9$	-9	(0,-9)
14	$\frac{1}{2}(14)-9$	-2	(14,-2)

6. $y = -\frac{4}{3}x + 11$

x		y	(x, y)
-9	$-\frac{4}{3}(-9)+11$	23	(-9,23)
-3	$-\frac{4}{3}(-3)+11$	15	(-3,15)
3	$-\frac{4}{3}(3)+11$	7	(3,7)
6	$-\frac{4}{3}(6)+11$	3	(6,3)

Types of Functions

Directions: Given each function and domain, find the range values.

7. $y = x - 5$; domain = {4, 6, 8}

$y = 4 - 5$
$y = 1$

$y = 8 - 5$
$y = 3$

$y = 6 - 5$
$y = 1$

range = $\{-1, 1, 3\}$

8. $y = 3x + 1$; domain = {-1, 0, 1}

$y = 3(-1) + 1$
$y = -2$

$y = 3(0) + 1$
$y = 1$

$y = 3(1) + 1$
$y = 4$

range = $\{-2, 1, 4\}$

9. $y = -2x + 5$; domain = {-2, 2, 4}

$y = -2(-2) + 5$
$y = 9$

$y = -2(2) + 5$
$y = 1$

$y = -2(4) + 5$
$y = -3$

range = $\{-3, 1, 9\}$

10. $y = -4 - x$; domain = {-6, 2, 7}

$y = -4 - (-6)$
$y = 2$

$y = -4 - 2$
$y = -6$

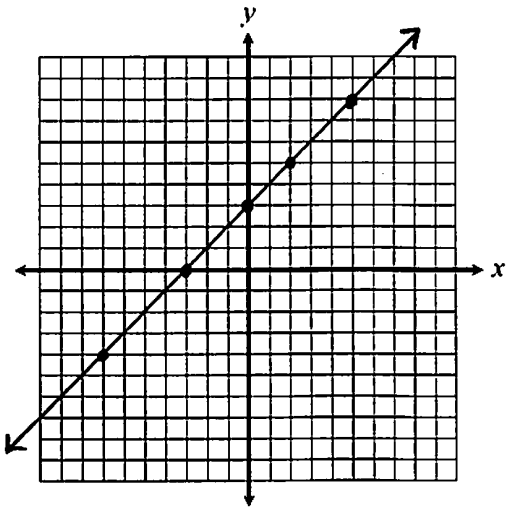
$y = -4 - 7$
$y = -11$

range = $\{-11, -6, 2\}$

Directions: Complete each function table. Then graph the function.

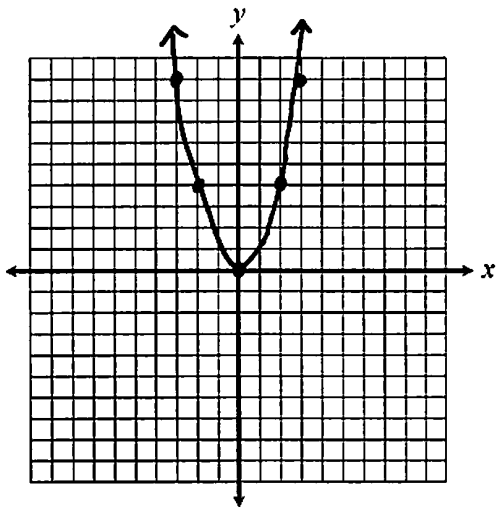
Equation 1: $y = x + 3$

x		y	(x, y)
-7	-7+3	-4	(-7, -4)
-3	-3+3	0	(-3, 0)
0	0+3	3	(0, 3)
2	2+3	5	(2, 5)
5	5+3	8	(5, 8)



Equation 2: $y = x^2$

x		y	(x, y)
-3	$(-3)^2$	9	(-3, 9)
-2	$(-2)^2$	4	(-2, 4)
0	$(0)^2$	0	(0, 0)
2	$(2)^2$	4	(2, 4)
3	$(3)^2$	9	(3, 9)



- The first equation produced a line, so it is called a linear equation.
- The second equation produced a curve, so it is called a quadratic equation.
- We will focus on graphing linear equations in this unit!

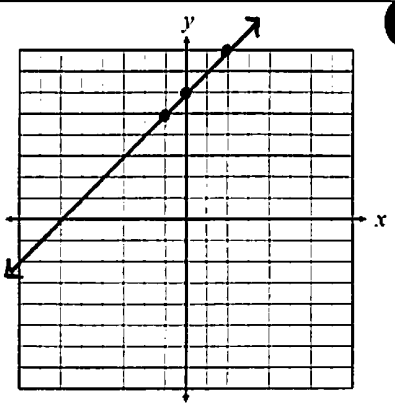
GRAPHING LINEAR EQUATIONS

{Using a Table!}

Directions: Complete each table, then graph the equation.

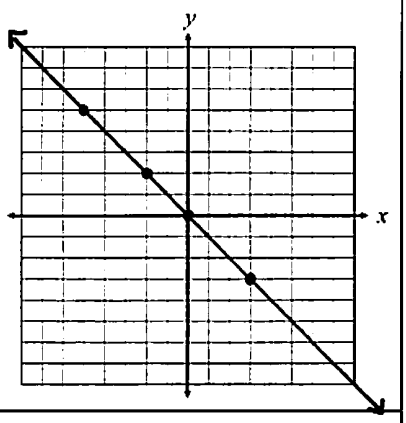
1 $y = x + 6$

x	y
-1	5
0	6
2	8
4	10



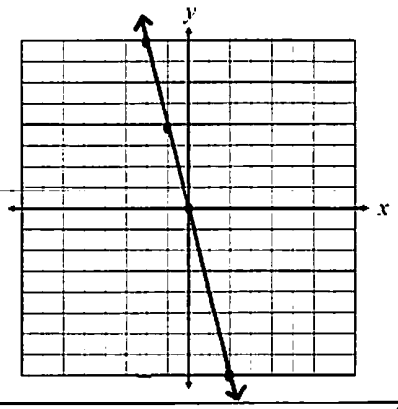
2 $y = -x$

x	y
-5	5
-2	2
0	0
3	-3



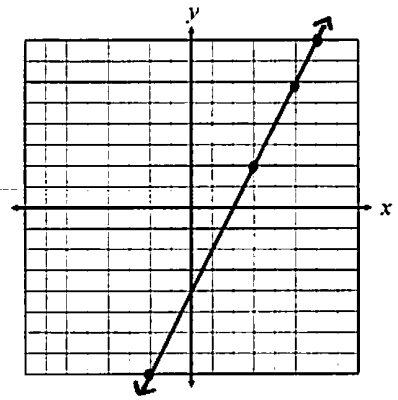
3 $y = -4x$

x	y
-2	8
-1	4
0	0
2	-8



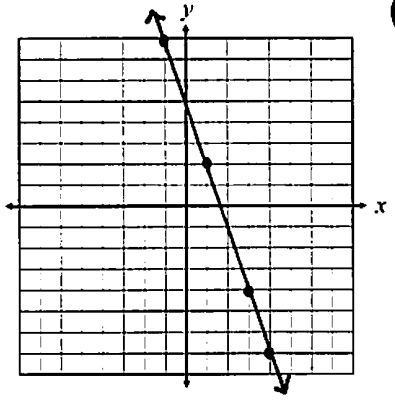
4 $y = 2x - 4$

x	y
-2	-8
3	2
5	6
6	8



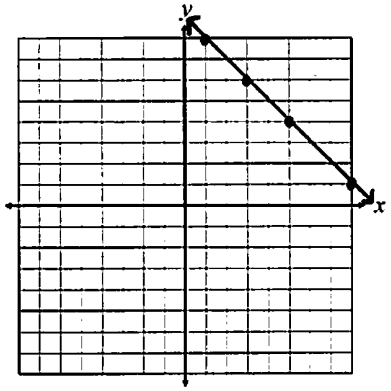
5 $y = -3x + 5$

x	y
-1	8
1	2
3	-4
4	-7



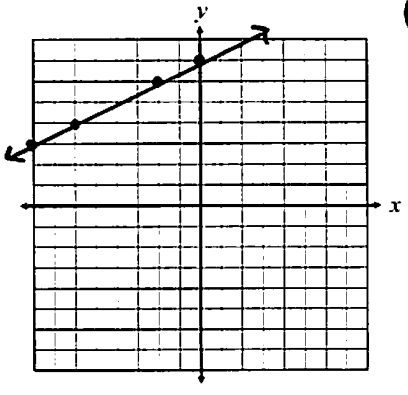
6 $y = -x + 9$

x	y
1	8
3	6
5	4
8	1



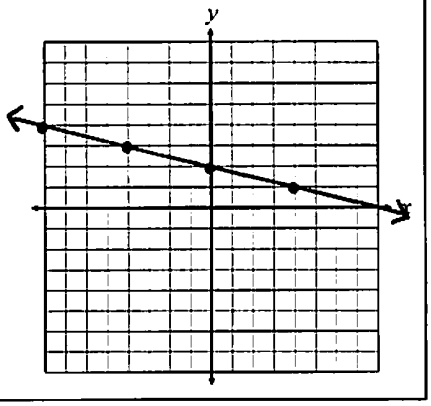
7 $y = \frac{x}{2} + 7$

x	y
-8	3
-6	4
-2	6
0	7



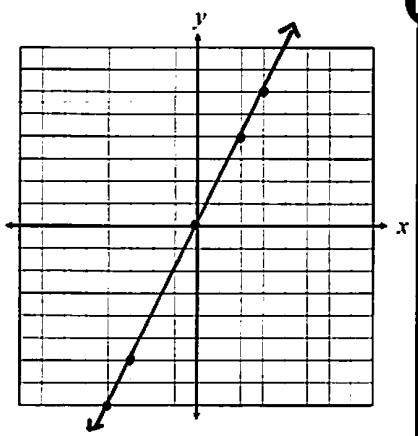
8 $y = -\frac{1}{4}x + 2$

x	y
-8	4
-4	3
0	2
4	1



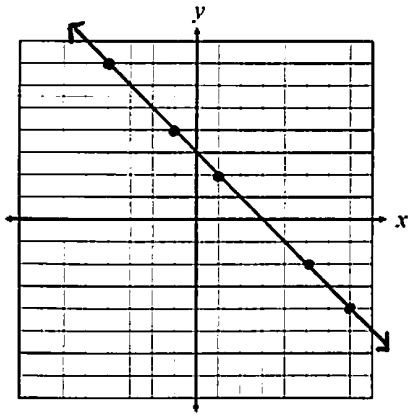
9 $y = 2x$

x	y
-4	-8
-3	-6
0	0
2	4
3	6



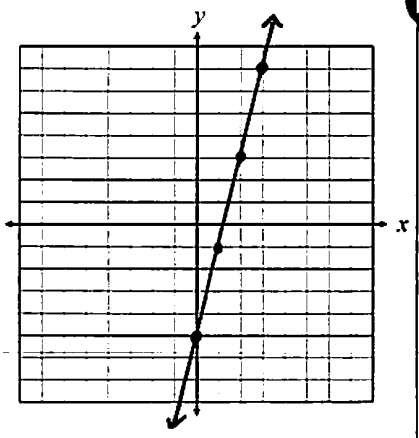
10 $y = 3 - x$

x	y
-4	7
-1	4
1	2
5	-2
7	-4



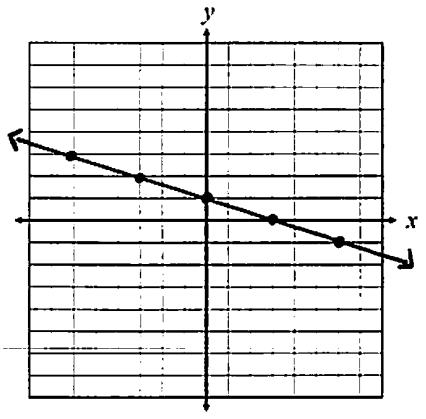
11 $y = 4x - 5$

x	y
-1	-9
0	-5
1	-1
2	3
3	7



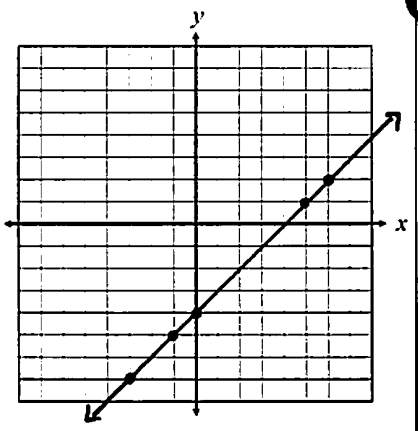
12 $y = 1 - \frac{x}{3}$

x	y
-6	3
-3	2
0	1
3	0
6	-1



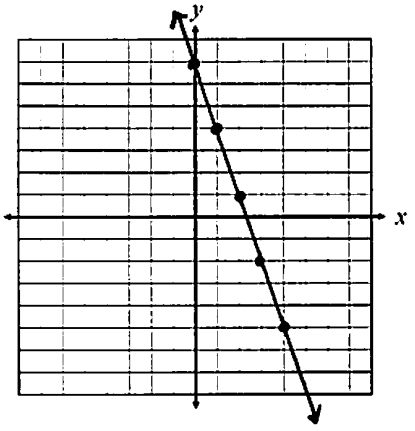
13 $y = x - 4$

x	y
-3	-7
-1	-5
0	-4
5	1
6	2



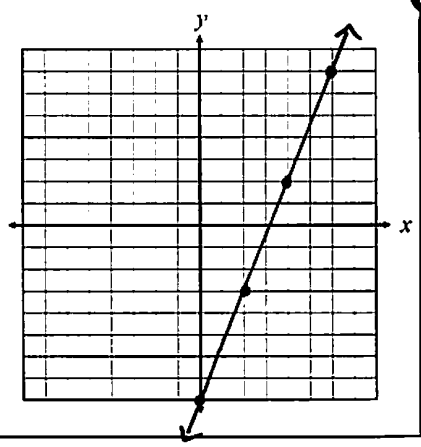
14 $y = 7 - 3x$

x	y
0	7
1	4
2	1
3	-2
4	-5



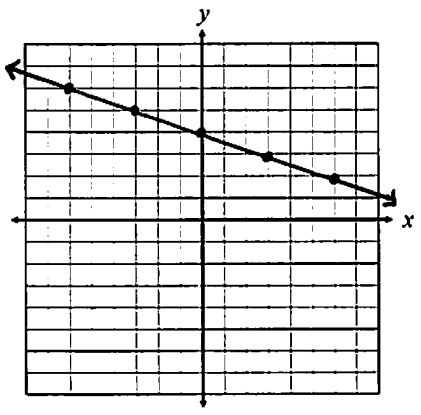
15 $y = \frac{5}{2}x - 8$

x	y
0	-8
2	-3
4	2
6	7
8	12



16 $y = 4 - \frac{1}{3}x$

x	y
-6	6
-3	5
0	4
3	3
6	2



Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 2:** Graphing Linear Equations (by table

**** This is a 2-page document! ****

Directions: Given each function and domain, find the range values.

1. $y = 5x - 9$; domain = {1, 3, 7}

$y=5(1)-9$
$y=-4$

$y=5(3)-9$
$y=6$

$y=5(7)-9$
$y=26$

range = {-4, 6, 26}

2. $y = x^2 - 2x$; domain = {-3, 0, 5}

$y=(-3)^2-2(-3)$
$y=15$

$y=(0)^2-2(0)$
$y=0$

$y=(5)^2-2(5)$
$y=15$

range = {0, 15}

3. $y = \frac{3}{4}x + 7$; domain = {-8, -4, 12}

$y=3/4(-8)+7$
$y=1$

$y=3/4(-4)+7$
$y=4$

$y=3/4(12)+7$
$y=16$

range = {1, 4, 16}

4. $y = 14 - 3x$; domain = {-6, 5, 13}

$y=14-3(-6)$
$y=32$

$y=14-3(5)$
$y=-1$

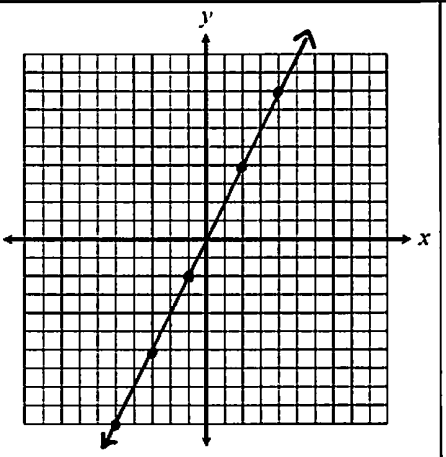
$y=14-3(13)$
$y=-25$

range = {-25, -1, 32}

Directions: Complete each table, then graph the equation.

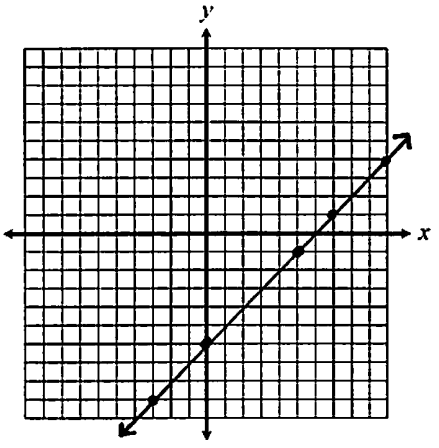
5. $y = 2x$

x	y
-5	-10
-3	-6
-1	-2
2	4
4	8



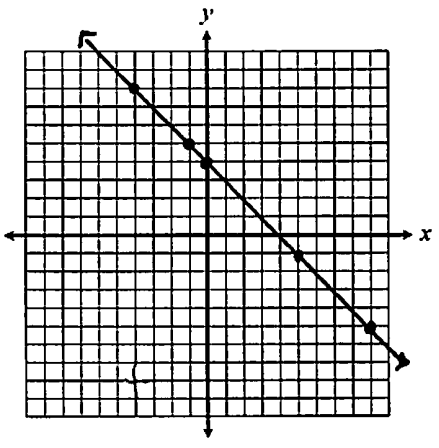
6. $y = x - 6$

x	y
-3	-9
0	-6
5	-1
7	1
10	4



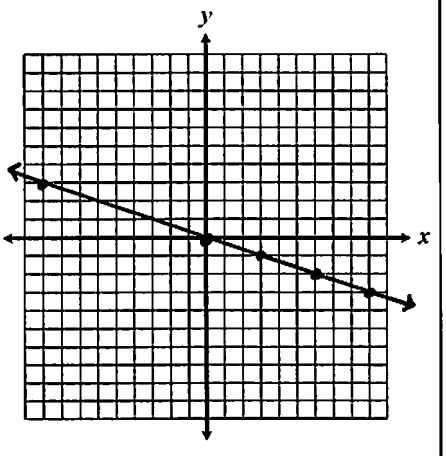
7. $y = 4 - x$

x	y
-4	8
-1	5
0	4
5	-1
9	-5



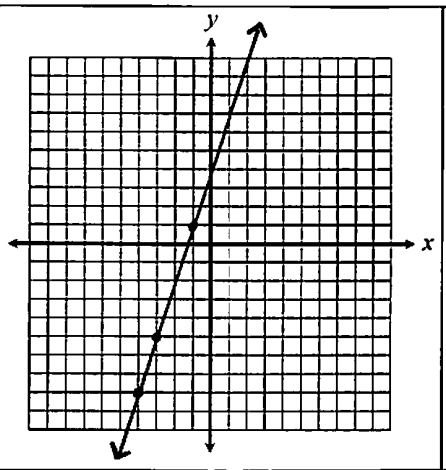
8. $y = -\frac{1}{3}x$

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



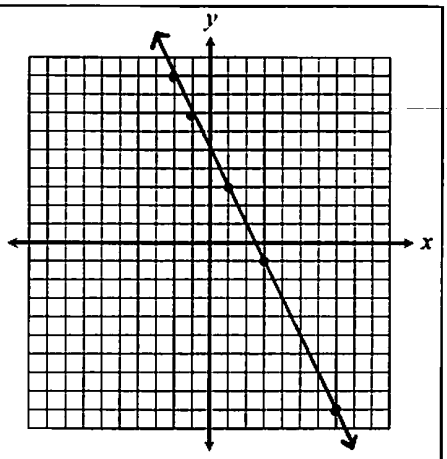
9. $y = 3x + 4$

x	y
-4	-8
-3	-5
-1	1
5	19
9	31



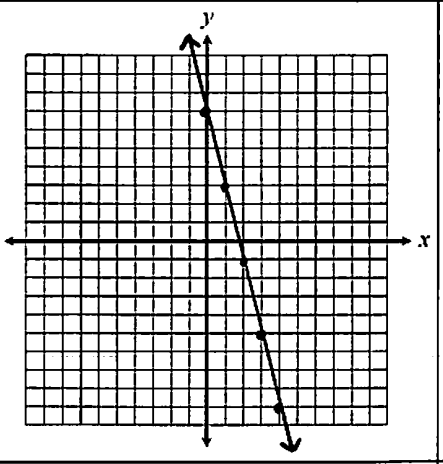
10. $y = -2x + 5$

x	y
-2	9
-1	7
1	3
3	-1
7	-9



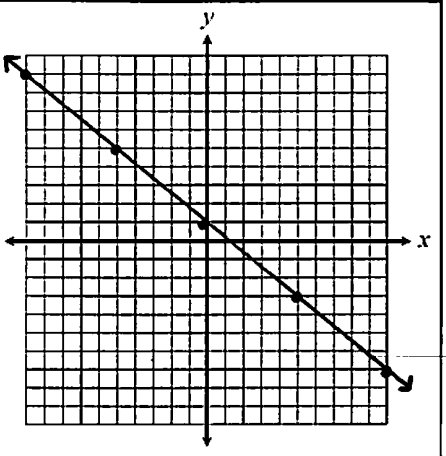
11. $y = 7 - 4x$

x	y
0	7
1	3
2	-1
3	-5
4	-9



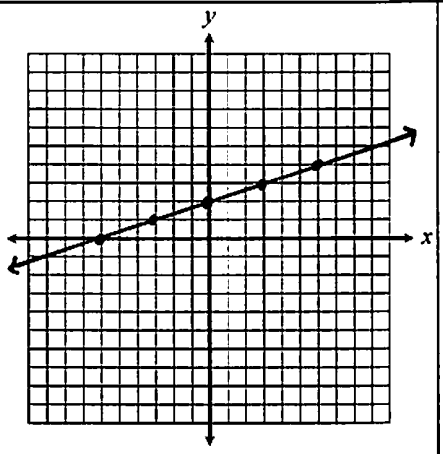
12. $y = -\frac{4}{5}x + 1$

x	y
-10	9
-5	5
0	1
5	-3
10	-7



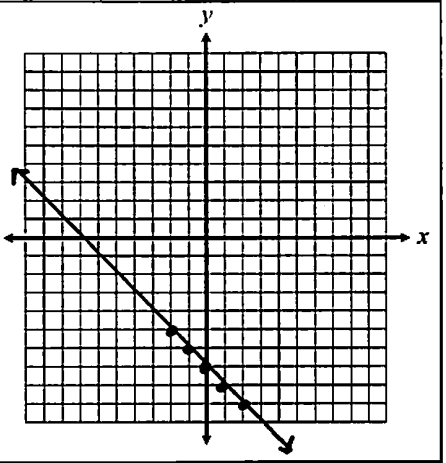
13. $y = \frac{x}{3} + 2$

x	y
-6	0
-3	1
0	2
3	3
6	4



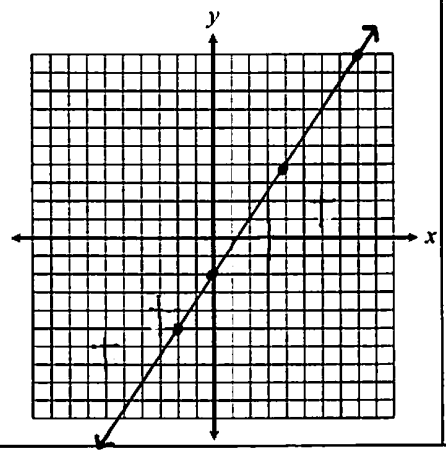
14. $y = -7 - x$

x	y
-2	-5
-1	-6
0	-7
1	-8
2	-9



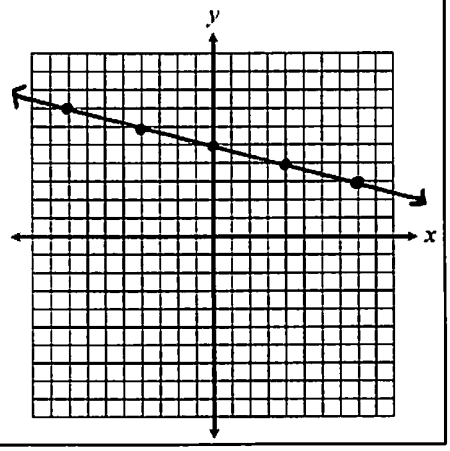
15. $y = \frac{3}{2}x - 2$

x	y
-6	-11
-2	-5
0	-2
4	4
8	10

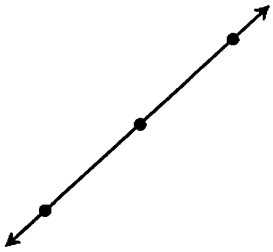


16. $y = 5 - \frac{1}{4}x$

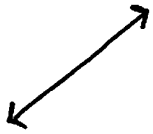
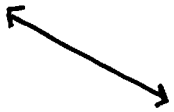
x	y
-8	7
-4	6
0	5
4	4
8	3



Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Rate of Change	A ratio that shows how one variable changes with respect to another. On a linear graph, this is called the Slope of the line!
Slope 	• Slope is written as a ratio of the **vertical change** (rise) to the **horizontal change** (run) between any two points on a line. • This remains constant for any two points on the same line. • Slope is written as a fraction in simplest form (reduced). • Variable for slope: m

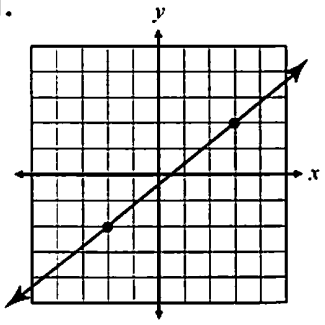
Types of Slope

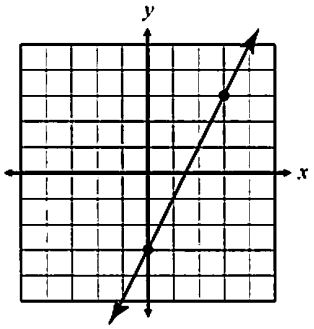
			
Positive	Negative	Zero	Undefined

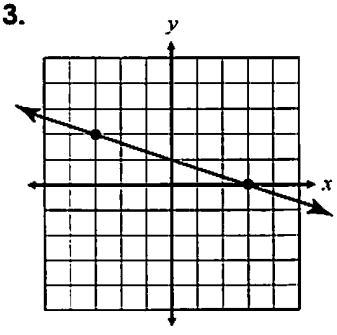
Finding Slope on a Graph

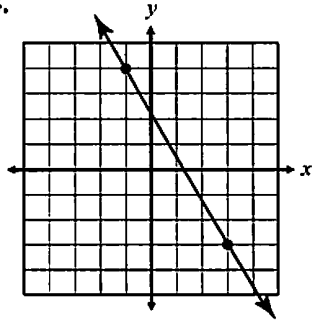
$$m = \frac{\text{rise}}{\text{run}}$$

Directions: Find the slope of each line. Write your answer in simplest form!

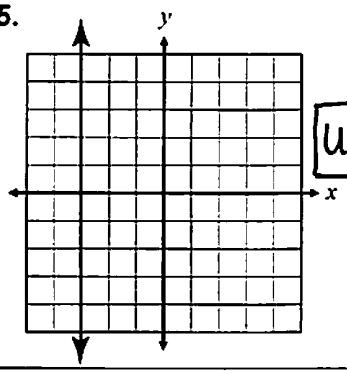
1.  $\frac{4}{5}$

2.  $\frac{6}{3} = 2$

3.  $\frac{-2}{6} = \frac{-1}{3}$

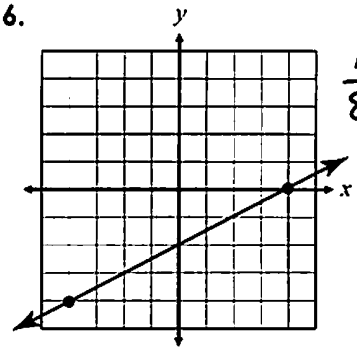
4.  $\frac{-7}{4}$

5.



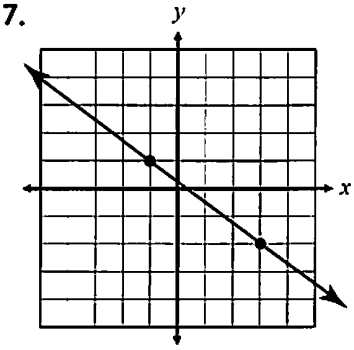
undef

6.



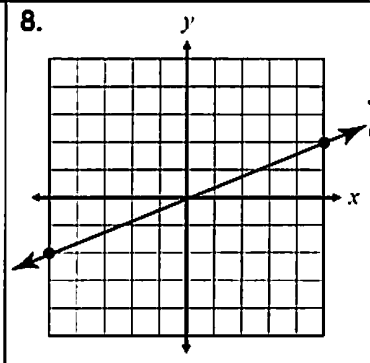
$\frac{4}{8} = \frac{1}{2}$

7.



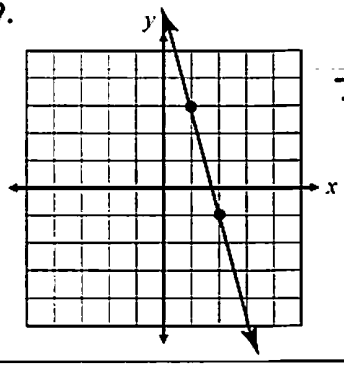
$\frac{-3}{4}$

8.



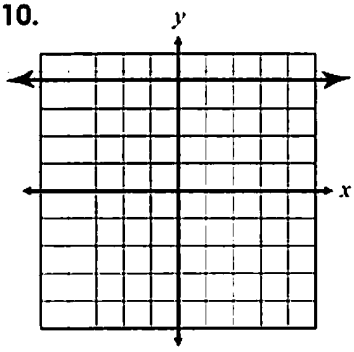
$\frac{4}{10} = \frac{2}{5}$

9.



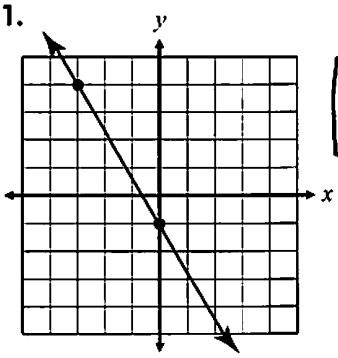
$\frac{-4}{1} = -4$

10.



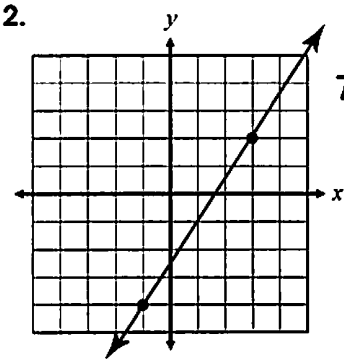
0

11.



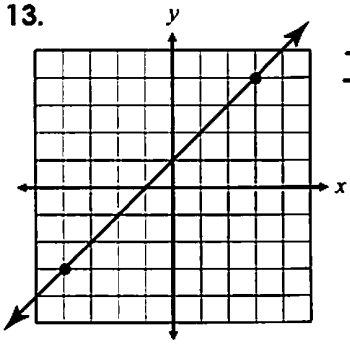
$\frac{-5}{3}$

12.



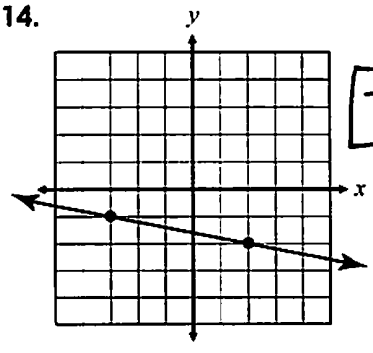
$\frac{6}{4} = \frac{3}{2}$

13.



$\frac{7}{7} = 1$

14.

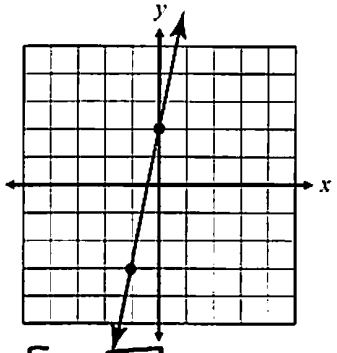


$\frac{-1}{5}$

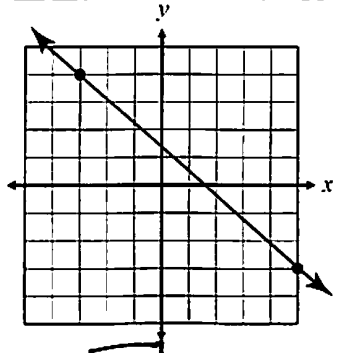
Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 3:** Slope (from a graph)

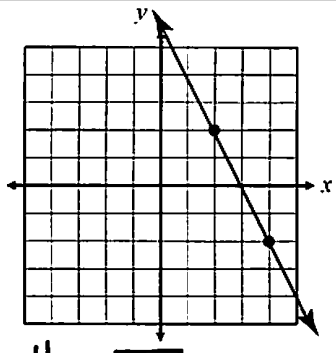
Directions: Find the slope of each line.

1. 

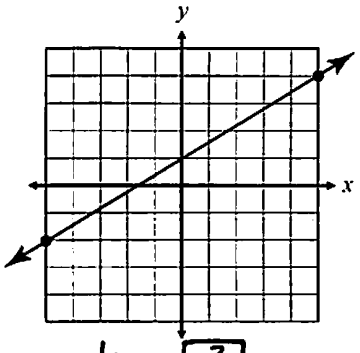
$\frac{5}{1} = 5$

2. 

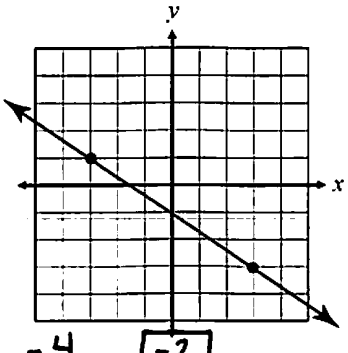
$\frac{-7}{8}$

3. 

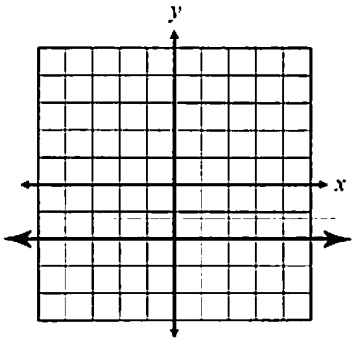
$\frac{-4}{2} = -2$

4. 

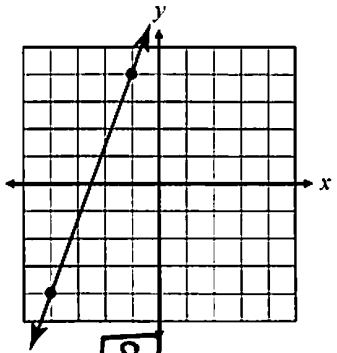
$\frac{6}{10} = \frac{3}{5}$

5. 

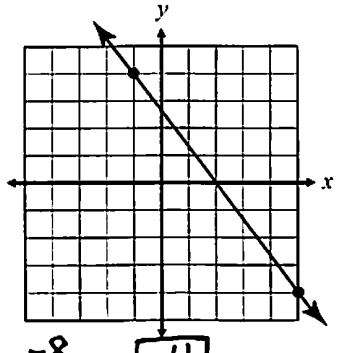
$\frac{-4}{6} = \frac{-2}{3}$

6. 

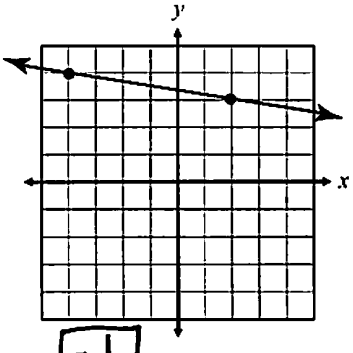
0

7. 

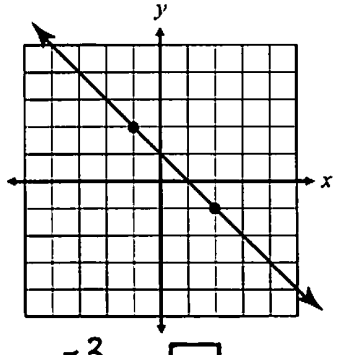
$\frac{8}{3}$

8. 

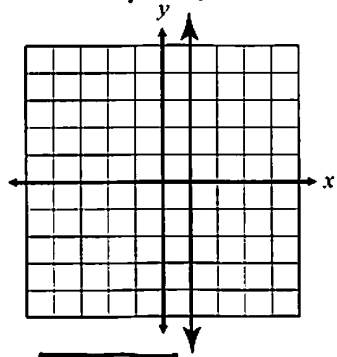
$\frac{-8}{6} = \frac{-4}{3}$

9. 

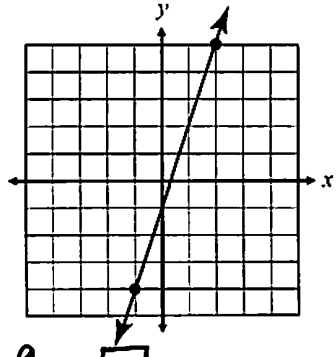
$\frac{-1}{6}$

10. 

$\frac{-3}{3} = -1$

11. 

undef

12. 

$\frac{9}{3} = 3$

Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 5:** Functions & Linear Relationships

Quiz 5-1: Relations, Functions, Linear Equations, & Slope

Give the domain and range of the relation then determine if the relation is a function.

1. {(-3, 3), (1, 1), (0, -2), (1, -4), (5, -1)}

Domain: {-3, 0, 1, 5}

Range: {-4, -2, -1, 1, 3}

Function? No

2.

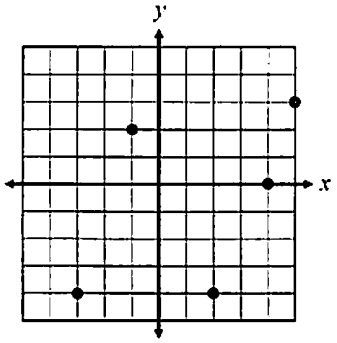
x	-2	-1	0	1	2
y	-7	-2	1	-2	-7

Domain: {-2, -1, 0, 1, 2}

Range: {-7, -2, 1}

Function? yes

3.

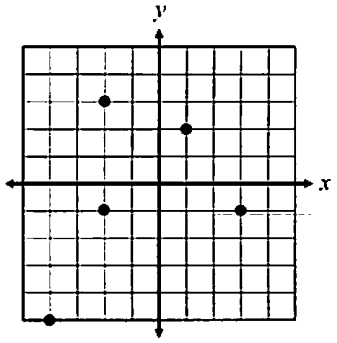


Domain: {-3, -1, 2, 4, 5}

Range: {-4, 0, 2, 3}

Function? yes

4.



Domain: {-4, -2, 1, 3}

Range: {-5, -1, 2, 3}

Function? no

5. Given the function $y = 3x + 5$, find the range if the domain is {-4, -1, 2, 5}

$y = 3(-4) + 5 = -7$

$y = 3(-1) + 5 = 2$

$y = 3(2) + 5 = 11$

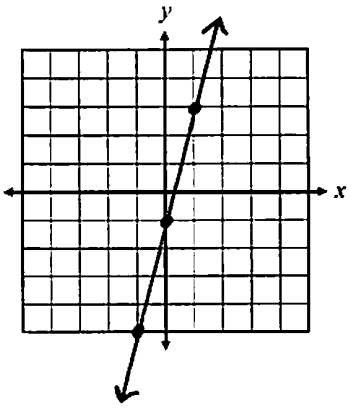
$y = 3(5) + 5 = 20$

Range: {-7, 2, 11, 20}

Complete the function tables, then graph the equation.

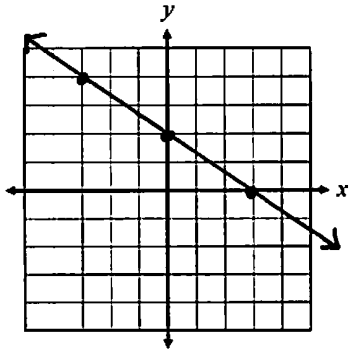
6. $y = 4x - 1$

x	y
-1	-5
0	-1
1	3
2	7



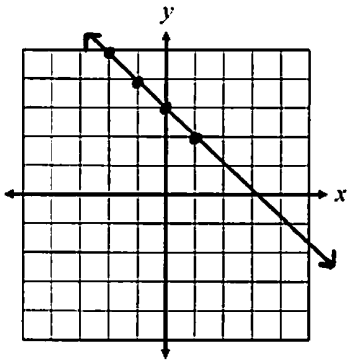
7. $y = -\frac{2}{3}x + 2$

x	y
-3	4
0	2
3	0
6	-2



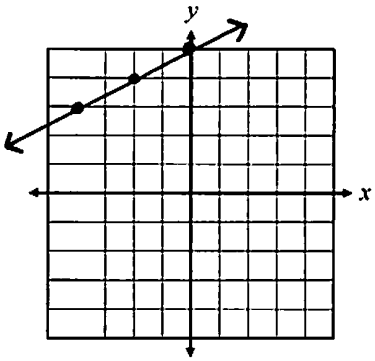
8. $y = 3 - x$

x	y
-2	5
-1	4
0	3
1	2



9. $y = \frac{1}{2}x + 5$

x	y
-4	3
-2	4
0	5
2	6



10. Which function could represent the values shown in the table?

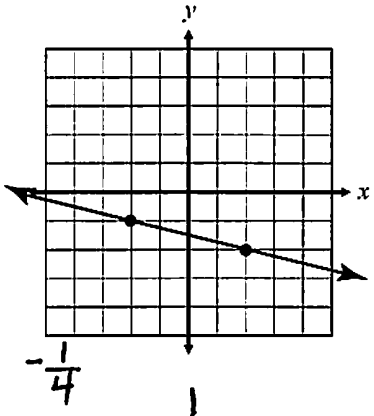
x	1	2	3	4	5
y	1	4	7	10	13

A. $y = 2x - 1$ **C.** $y = 4x - 3$

B. $y = 3x - 2$ **D.** $y = 2x + 3$

For questions 11-16, find the slope of the line. Give all answers in simplest form.

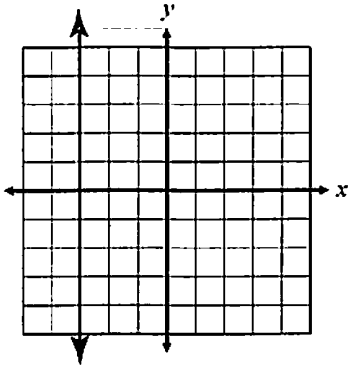
11.



$-\frac{1}{4}$

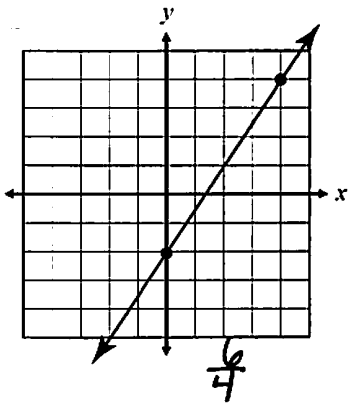
$m = \frac{-1}{4}$

12.



$m =$ undef

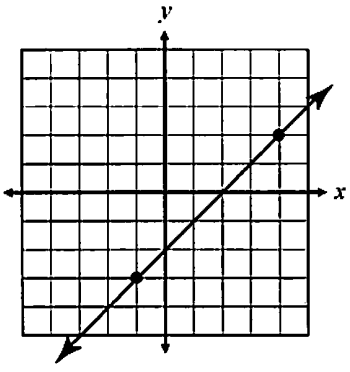
13.



$\frac{6}{4}$

$m = \frac{3}{2}$

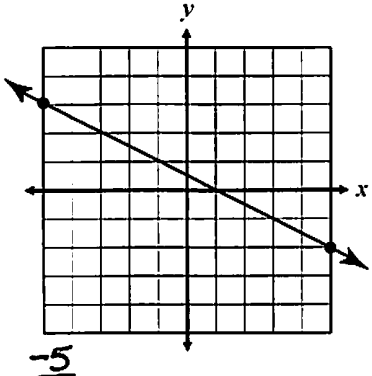
14.



$\frac{5}{5}$

$m = 1$

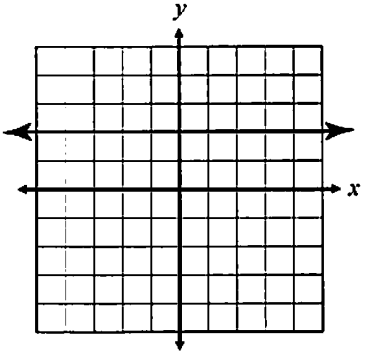
15.



$\frac{-5}{10}$

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

16.



$m = 0$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Slope Formula	Used to find the slope between any two points (x_1, y_1) and (x_2, y_2)
	Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$
	Always remember to simplify your answer!
Examples	**Directions:** Find the slope of the line between each pair of points.

1. (-13, 8) and (3, 12)

$m = \frac{12-8}{3-(-13)} = \frac{4}{16} = \boxed{\frac{1}{4}}$

2. (19, -12) and (5, 16)

$m = \frac{16-(-12)}{5-19} = \frac{28}{-14} = \boxed{-2}$

3. (-15, 9) and (-10, 3)

$m = \frac{3-9}{-10-(-15)} = \boxed{\frac{-6}{5}}$

4. (-1, 8) and (8, -4)

$m = \frac{-4-8}{8-(-1)} = \frac{-12}{9} = \boxed{\frac{-4}{3}}$

5. (7, 3) and (6, -2)

$m = \frac{-2-3}{6-7} = \frac{-5}{-1} = \boxed{5}$

6. (12, 7) and (5, 9)

$m = \frac{9-7}{5-12} = \boxed{\frac{2}{-7}}$

7. (-7, -4) and (2, -7)

$m = \frac{-7-(-4)}{2-(-7)} = \frac{-3}{9} = \boxed{\frac{-1}{3}}$

8. (-4, 4) and (-9, 6)

$m = \frac{6-4}{-9-(-4)} = \boxed{\frac{2}{-5}}$

9. (4, -13) and (8, -8)

$m = \frac{-8-(-13)}{8-4} = \boxed{\frac{5}{4}}$

10. (-7, -5) and (5, -17)

$m = \frac{-17-(-5)}{5-(-7)} = \frac{-12}{12} = \boxed{-1}$

Special Cases

11. (-5, -4) and (1, -4)

$m = \frac{-4-(-4)}{1-(-5)} = \frac{0}{6}$

$= \boxed{0}$

12. (7, 3) and (7, -2)

$m = \frac{-2-3}{7-7} = \frac{-5}{0}$

$= \boxed{\text{undef}}$

****Remember, a zero UNDERNEATH means** undefined **!**

More Practice

13. (-9, -2) and (-9, 8)

$m = \frac{8-(-2)}{-9-(-9)} = \frac{10}{0}$

$= \boxed{\text{undef.}}$

14. (-4, 1) and (11, 1)

$m = \frac{1-1}{11-(-4)} = \frac{0}{15}$

$= \boxed{0}$

15. (15, -2) and (9, -2)

$m = \frac{-2-(-2)}{9-15} = \frac{0}{-6}$

$= \boxed{0}$

16. (12, 7) and (12, -2)

$m = \frac{-2-7}{12-12} = \frac{-9}{0}$

$= \boxed{\text{undef.}}$

Given a Table

Directions: Find the slope of the line that passes through the points give in the table.

17.

x	y
-6	11
-2	1
2	-9
4	-14

(-6, 11) (-2, 1)

$m = \frac{1-11}{-2-(-6)} = \frac{-10}{4}$

$= \boxed{-\frac{5}{2}}$

18.

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

(-4, -5) (-3, -2)

$m = \frac{-2-(-5)}{-3-(-4)}$

$= \frac{3}{1} = \boxed{3}$

19.

x	y
-1	6
3	6
5	6
8	6

$m = \frac{6-6}{3-(-1)}$

$= \frac{0}{4} = \boxed{0}$

20.

x	y
1	8
2	7
4	5
6	3

$m = \frac{7-8}{2-1}$

$= \frac{-1}{1} = \boxed{-1}$

21.

x	y
-3	-8
0	-1
3	6
6	13

$m = \frac{-1-(-8)}{0-(-3)}$

$= \boxed{\frac{7}{3}}$

22.

x	y
-2	5
-2	3
-2	-1
-2	-7

$m = \frac{3-5}{-2-(-2)}$

$= \frac{-2}{0}$

$= \boxed{\text{undef.}}$

RIDDLE: Why was the Mathematician Late for Work?

Directions: Find the slope between each pair of points Show all work on a separate sheet of paper. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

SET 1

M. (6, -11) and (2, -1)	$\frac{10}{-4}$	$m = -5/2$	**4.** (-1, 5) and (4, -10)	$\frac{-15}{5}$	$m = -3$
H. (2, -7) and (5, -4)	$\frac{3}{3}$	$m = 1$	**13.** (-2, 4) and (2, -6)	$\frac{-10}{4}$	$m = -5/2$
T. (-8, -6) and (-1, -2)	$\frac{4}{7}$	$m = 4/7$	**2.** (3, -3) and (11, -7)	$\frac{-4}{8}$	$m = -1/2$
E. (-10, 13) and (2, 7)	$\frac{-6}{12}$	$m = -1/2$	**11.** (-8, -10) and (2, 0)	$\frac{10}{10}$	$m = 1$
O. (-2, 1) and (-7, 16)	$\frac{15}{-5}$	$m = -3$	**7.** (-2, 1) and (-9, -3)	$\frac{-4}{-7}$	$m = 4/7$

SET 2

T. (7, 5) and (10, 9)	$\frac{4}{3}$	$m = 4/3$	**16.** (-5, -2) and (9, 2)	$4/14$	$m = 2/7$
B. (-8, 2) and (-5, -4)	$\frac{-6}{3}$	$m = -2$	**8.** (-10, -6) and (2, -8)	$-2/12$	$m = -1/6$
H. (2, -2) and (-4, -1)	$1/6$	$m = -1/6$	**3.** (-2, 1) and (-8, -7)	$-8/-6$	$m = 4/3$
S. (-4, 9) and (-11, 7)	$-2/7$	$m = 2/7$	**5.** (-4, -2) and (-3, 3)	$5/1$	$m = 5$
O. (5, -1) and (4, -6)	$-5/-1$	$m = 5$	**14.** (-2, -4) and (-7, 6)	$10/-5$	$m = -2$

SET 3

K. (1, -3) and (2, -3)	$0/1$	$m = 0$	**9.** (8, -1) and (6, -4)	$-3/2$	$m = 3/2$
R. (3, 0) and (-3, 5)	$5/-6$	$m = -5/6$	**1.** (-11, -6) and (-8, -5)	$1/3$	$m = 1/3$
E. (12, 4) and (8, -2)	$-6/-4$	$m = 3/2$	**15.** (-5, 4) and (-5, 3)	$-1/0$	undef.
U. (7, -3) and (7, -9)	$-6/0$	undef.	**12.** (-2, -3) and (-5, 9)	$12/3$	$m = 4$
O. (3, 1) and (2, 5)	$4/-1$	$m = -4$	**6.** (-3, 8) and (7, 8)	$0/10$	$m = 0$
H. (-1, -6) and (-7, -8)	$-2/-6$	$m = 1/3$	**10.** (-5, 3) and (7, -7)	$-10/12$	$m = -5/6$

ANSWER:

1.	2.		3.	4.	5.	6.		7.	8.	9.		10.	11.	12.	13.	14.	15.	16.	
H	E		T	O	O	K		T	H	E		R	H	O	M	B	U	S	!

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 4:** The Slope Formula

Directions: Find the slope of between each pair of points.

1. (-8, 18) and (-14, -3)

$m = \frac{-3-18}{-14-(-8)} = \frac{-21}{-6}$

$= \boxed{\frac{7}{2}}$

2. (-2, -19) and (-12, 11)

$m = \frac{11-(-19)}{-12-(-2)} = \frac{30}{-10}$

$= \boxed{-3}$

3. (7, -4) and (2, -4)

$m = \frac{-4-(-4)}{2-7} = \frac{0}{-5}$

$= \boxed{0}$

4. (-9, 3) and (-1, 1)

$m = \frac{1-3}{-1-(-9)} = \frac{-2}{8}$

$= \boxed{-\frac{1}{4}}$

5. (7, -6) and (2, -3)

$m = \frac{-3-(-6)}{2-7} = \frac{3}{-5}$

$= \boxed{-\frac{3}{5}}$

6. (-4, -5) and (9, 8)

$m = \frac{8-(-5)}{9-(-4)} = \frac{13}{13}$

$= \boxed{1}$

7. (7, -4) and (7, -1)

$m = \frac{-1-(-4)}{7-7} = \frac{3}{0}$

$= \boxed{\text{undef.}}$

8. (-3, 8) and (-5, -4)

$m = \frac{-4-8}{-5-(-3)} = \frac{-12}{-2}$

$= \boxed{6}$

9. (-7, 6) and (2, -6)

$m = \frac{-6-6}{2-(-7)} = \frac{-12}{9}$

$= \boxed{-\frac{4}{3}}$

Directions: Find the slope of the line that passes through the points given in the table.

10.

x	y
-9	-5
-3	-3
0	-2
9	1

$m = \frac{1-(-2)}{9-0}$

$= \frac{3}{9}$

$= \boxed{\frac{1}{3}}$

11.

x	y
-7	4
-2	4
3	4
5	4

$m = \frac{4-4}{5-3}$

$= \frac{0}{2}$

$= \boxed{0}$

12.

x	y
-5	4
0	1
5	-2
10	-5

$m = \frac{-2-1}{5-0}$

$= \boxed{\frac{-3}{5}}$

13.

x	y
-1	4
-1	7
-1	12
-1	15

$m = \frac{7-4}{-1-(-1)}$

$= \frac{3}{0}$

$= \boxed{\text{undef.}}$

14.

x	y
-1	5
2	2
7	-3
10	-6

$m = \frac{-3-2}{7-2}$

$= \frac{-5}{5}$

$= \boxed{-1}$

15.

x	y
-2	17
3	-3
4	-7
6	-15

$m = \frac{-3-17}{3-(-2)}$

$= \frac{-20}{5}$

$= \boxed{-4}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Slope Applications

1. The table below shows the high temperatures (in degrees Fahrenheit) of a city during the first part of June.

Date	1	6	8	14
High Temperature	72	76	84	86

a) Find the rate of change in high temperature between June 1st and June 6th.

(1, 72) (6, 76)

$m = \frac{76-72}{6-1} = \frac{4}{5} =$ **0.8 deg/day**

b) Find the rate of change in high temperature between June 6th and June 8th.

(6, 76) (8, 84)

$m = \frac{84-76}{8-6} = \frac{8}{2} =$ **4 deg/day**

c) During which of these time intervals did the temperature rise faster?

The temp rose faster between June 6th and 8th.

2. Josh started a diet and decided to record his weight every other week.

Week	0	2	4	6	8
Weight (lbs)	224	219	221	215	215

a) Find the rate of change from week 0 to week 2.

$m = \frac{219-224}{2-0} = \frac{-5}{2} =$ **-2.5 lb/wk**

b) Find the rate of change from week 2 to week 4.

$m = \frac{221-219}{4-2} = \frac{2}{2} =$ **1 lb/wk**

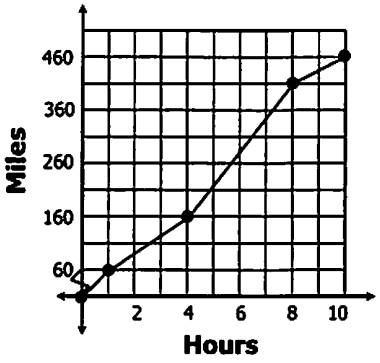
c) Find the rate of change from week 4 to week 6.

$m = \frac{215-221}{6-4} = \frac{-6}{2} =$ **-3 lb/wk**

d) Find the rate of change from week 6 to week 8. Explain what this means.

$m = \frac{215-215}{8-6} = \frac{0}{2} =$ **0 lb/wk** The rate of change is zero, meaning the weight didn't change.

3. The graph below shows the number of miles driven after each hour of a road trip.



a) Find the rate of change from hour 1 to hour 4.

(1, 60)
(4, 160)

$m = \frac{160-60}{4-1} = \frac{100}{3}$

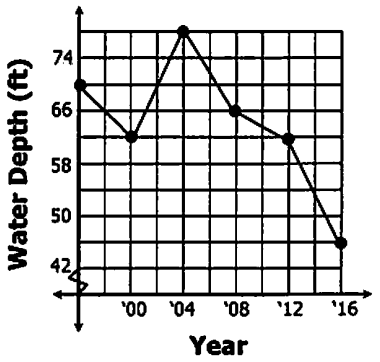
$= 33.\overline{3}$ mi/hr

b) Find the rate of change from hour 8 to hour 10.

(8, 410)
(10, 460)

$m = \frac{460-410}{10-8} = \frac{50}{2} =$ 25 mi/hr

4. The graph below shows the change in the water depth of a lake through various years.



a) Find the rate of change from 2000 to 2004.

(2000, 62)
(2004, 78)

$m = \frac{78-62}{2004-2000} = \frac{16}{4} = 4$

$=$ 4 ft/yr

b) Find the rate of change from 2012 to 2016.

(2012, 62)
(2016, 46)

$m = \frac{46-62}{2016-2012} = \frac{-16}{4} = -4$

5. Ava started a savings account with $500. After 6 months, her savings account balance was $731. Find the rate of change.

(0, 500)
(6, 731)

$m = \frac{731-500}{6-0} = \frac{231}{6} =$ $38.50/mo

6. An airplane is flying at an altitude of 36,000 feet when it begins it's descent for landing. Twelve minutes into its descent, it's at 29,400 feet. Find the rate of change in altitude.

(0, 36000)
(12, 29400)

$m = \frac{29400-36000}{12-0} = \frac{-6600}{12} =$ -550 ft/min

7. Ten minutes into her workout, Laura had burned 98 calories. Twenty-five minutes in, she had burned 272 calories. Find the rate of change in calories burned between ten and twenty-five minutes.

(10, 98)
(25, 272)

$m = \frac{272-98}{25-10} = \frac{174}{15} =$ 11.6 cal/min

8. The population of Buford was 16,200 in 2010 and 13,824 in 2016. Find the rate of change in population.

(2010, 16200)
(2016, 13824)

$m = \frac{13824-16200}{2016-2010} = \frac{-2376}{6} =$ -396 people/year

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ Per: _____ **Homework 5:** The Slope Formula

**** This is a 2-page document! ****

Use for questions 1-3: The table below shows school enrollment at Bayview Middle School.

Year	Enrollment
2002	946
2008	1,124
2016	1,302

1. Find the rate of change from 2002 to 2008. $m = \frac{1124 - 946}{2008 - 2002} = \frac{178}{6} = 29.\bar{6}$ people/yr

2. Find the rate of change from 2008 to 2016. $m = \frac{1302 - 1124}{2016 - 2008} = \frac{178}{8} = 22.25$ people/yr

3. Did the enrollment increase at a faster rate from 2002 to 2008 or 2008 to 2016?

There was a faster increase between 2002 and 2008.

Use for questions 4-6: The table below shows the average price of a gallon of gasoline.

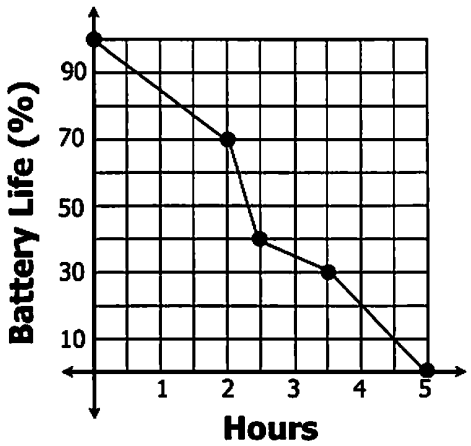
Year	Price
2000	2.02
2004	2.32
2010	3.02
2012	3.64
2015	2.45

4. Find the rate of change from 2004 to 2010. $m = \frac{3.02 - 2.32}{2010 - 2004} = \frac{0.7}{6} = \$0.11\bar{6}$/yr

5. Find the rate of change from 2000 to 2012. $m = \frac{3.64 - 2.02}{2012 - 2000} = \frac{1.62}{12} = \$0.135$/yr

6. Find the rate of change from 2012 to 2015. $m = \frac{2.45 - 3.64}{2015 - 2012} = \frac{-1.19}{3} = \$-0.39\bar{6}$/yr

Use for questions 7-9: Mischa recorded the battery life of her laptop each hour after unplugging it.

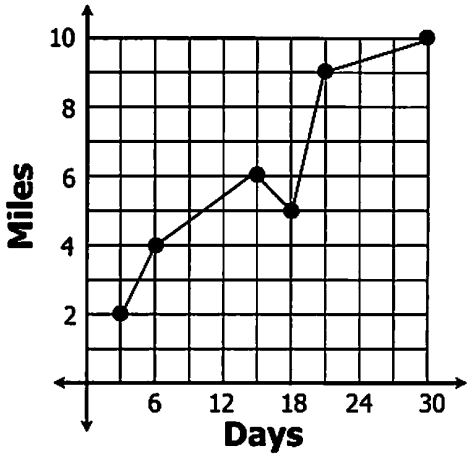


7. Find the rate of change after the first two hours of use after unplugging her laptop. $m = \frac{70 - 100}{2 - 0} = \frac{-30}{2} = -15\%$/hr

8. Find the rate of change from two hours of use to two hours and 30 minutes of use. $m = \frac{40 - 70}{2.5 - 2} = \frac{-30}{0.5} = -60\%$/hr

9. Find the rate of change from three hours and 30 minutes of use to five hours of use. $m = \frac{0 - 30}{5 - 3.5} = \frac{-30}{1.5} = -20\%$/hr

Use for questions 10-12: Stephanie recorded the number of miles that she ran during various days in September.



10. What is the rate of change in miles ran from September 6th to September 15th?

$m = \frac{6-4}{15-6} = \frac{2}{9} =$ 0.$\overline{2}$ mi/day

11. What is the rate of change in miles ran from September 15th to September 18th?

$m = \frac{5-6}{18-15} = \frac{-1}{3} =$ -0.$\overline{3}$ mi/day

12. What is the rate of change in miles ran from September 18th to September 21st?

$m = \frac{9-5}{21-18} = \frac{4}{3} =$ 1.$\overline{3}$ mi/day

13. Braden is hiking on a mountain. At 11:00 a.m., he is at an elevation of 500 feet. At 2:00 p.m., he is at 900 feet. Find the rate of change in elevation.

(0, 500)
(3, 900)

$m = \frac{900-500}{3-0} = \frac{400}{3} =$ 133.$\overline{3}$ ft/hr

14. A car worth $27,500 in 2012 is worth $16,720 in 2016. Find the rate of change in the value of the car.

$m = \frac{16720-27500}{2016-2012} = \frac{-10780}{4} =$ $2695/yr

15. In math class, Blake earned a 94 in the first quarter, an 86 in the second quarter, an 88 in the third quarter, and a 96 in the fourth quarter. Find the rate of change from the second to the fourth quarter.

$m = \frac{96-86}{4-2} = \frac{10}{2} =$ 5 pts/quarter

16. The Boston Red Sox had 949 runs in their 2004 season. In their 2015 season, they had 748 runs. Find the rate of change in runs.

$m = \frac{748-949}{2015-2004} = \frac{-201}{11} =$ -18.$\overline{27}$ runs/yr

17. Kayla consumed 1800 calories on Monday. She consumed 500 more calories on Tuesday than she did on Monday. On Wednesday, she consumed 100 calories less than she had on Tuesday. Find the rate of change in calorie intake from Monday to Wednesday.

(1, 1800)
(2, 2300)
(3, 2200)

$\frac{2200-1800}{3-1} = \frac{400}{2} =$ 200 cal/day

18. Drew measured the snow accumulation during a snowstorm. After the first hour, two inches had acculuated. After six hours, 3 feet had acculated. Find the rate of change.

$m = \frac{36-2}{6-1} = \frac{34}{5} =$ 6.8 in/hr

Name:	Date:
Topic:	Class:

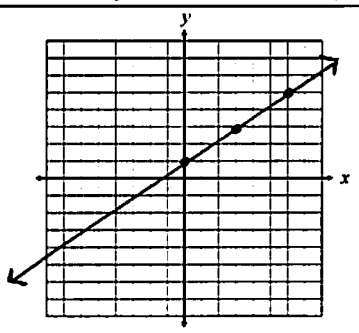
Main Ideas/Questions	Notes/Examples
Slope-Intercept Form	Linear equations are frequently written in **slope-intercept form:** $y = mx + b$ m = slope b = y-intercept
Steps to Graph	➢ **Step 1:** Graph the y-intercept. This is always point $(0, b)$. ➢ **Step 2:** Use the slope of the line to create more points. Remember slope is rise/run! ➢ **Step 3:** Use a ruler to draw a line that extends through the points, placing an arrow on both ends.

Directions: State the slope and y-intercept, then graph the equation.

1. $y = \frac{2}{3}x + 1$

$m = 2/3$

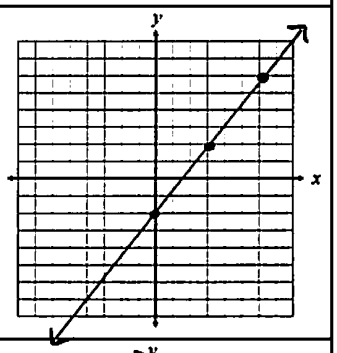
$b = 1$



2. $y = \frac{4}{3}x - 2$

$m = 4/3$

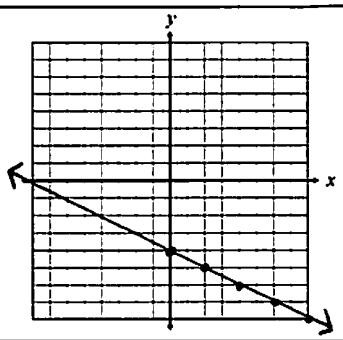
$b = -2$



3. $y = -\frac{1}{2}x - 4$

$m = -1/2$

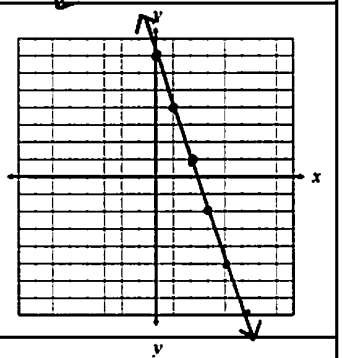
$b = -4$



4. $y = -3x + 7$

$m = -3$

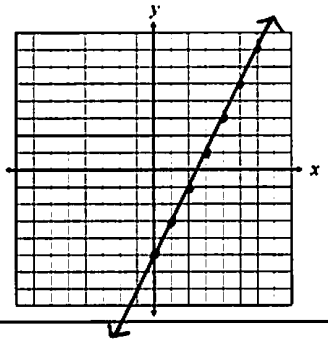
$b = 7$



5. $y = 2x - 5$

$m = 2$

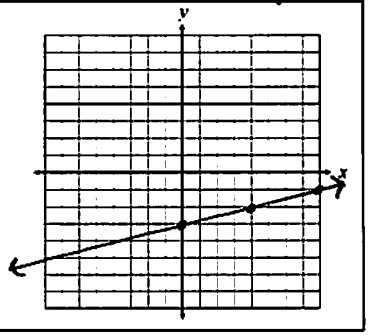
$b = -5$



6. $y = \frac{1}{4}x - 3$

$m = 1/4$

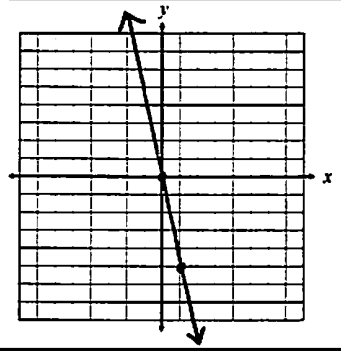
$b = -3$



7. $y = -5x$

$m = -5$

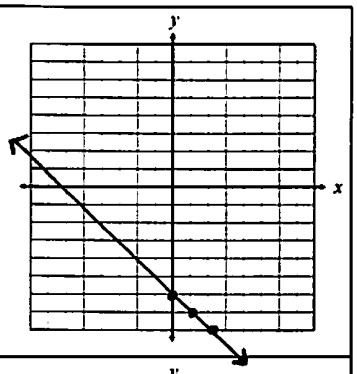
$b = 0$



8. $y = -x - 6$

$m = -1$

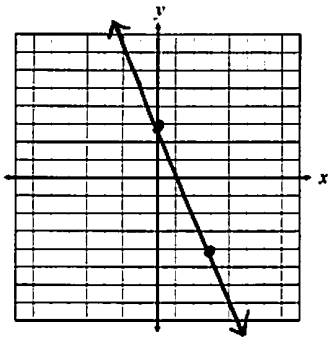
$b = -6$



9. $y = -\frac{7}{3}x + 3$

$m = -7/3$

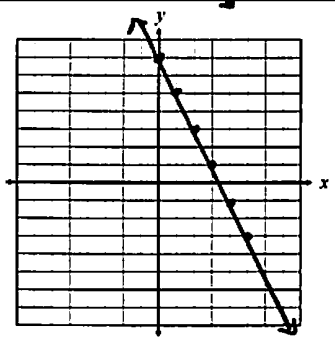
$b = 3$



10. $y = -2x + 7$

$m = -2$

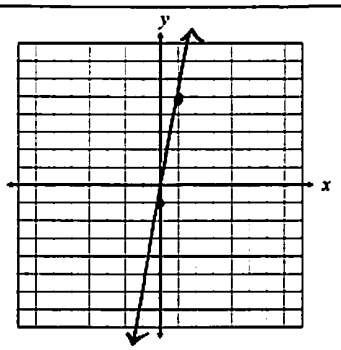
$b = 7$



11. $y = 6x - 1$

$m = 6$

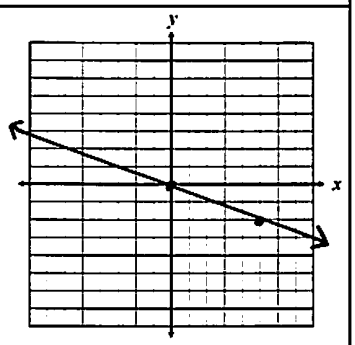
$b = -1$



12. $y = -\frac{2}{5}x$

$m = -2/5$

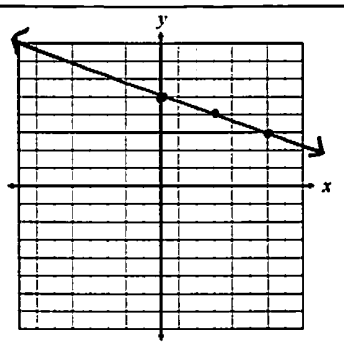
$b = 0$



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

$m = -1/3$

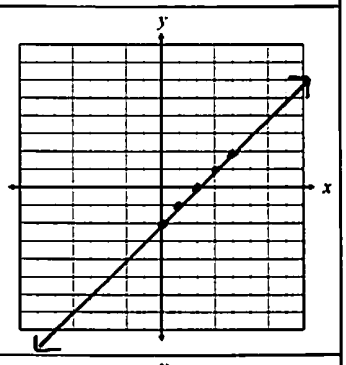
$b = 5$



14. $y = -2 + x$

$m = 1$

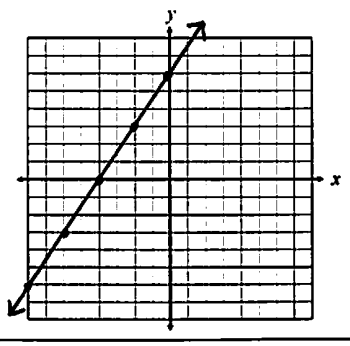
$b = -2$



15. $y = 6 + \frac{3}{2}x$

$m = 3/2$

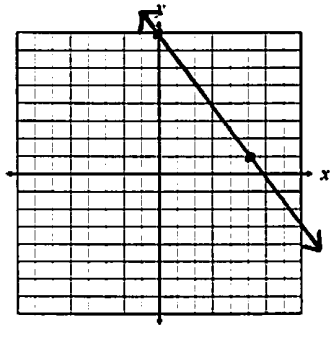
$b = 6$



16. $y = 8 - \frac{7}{5}x$

$m = -7/5$

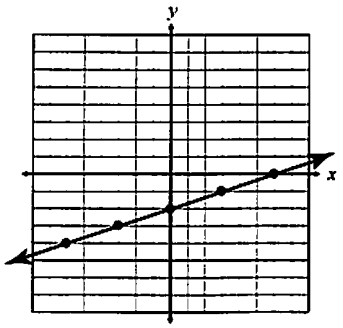
$b = 8$



Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Writing Linear Equations	Given a graph of a line, you can write it's equation in slope-intercept form by simpliy identifying it's slope and y-intercept.

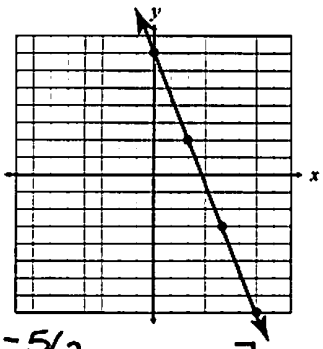
1.



$m =$ 1/3 $b =$ -2

Equation: $y = \frac{1}{3}x - 2$

2.

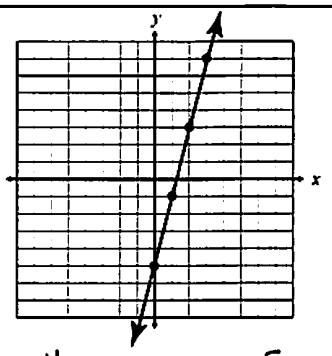


$m =$ -5/2 $b =$ 7

Equation: $y = -\frac{5}{2}x + 7$

You Try!

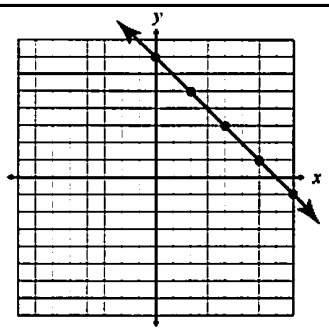
3.



$m =$ 4 $b =$ -5

Equation: $y = 4x - 5$

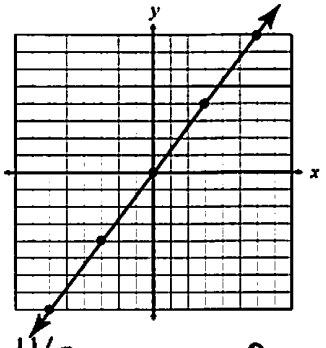
4.



$m =$ $\frac{-2}{2} = -1$ $b =$ 7

Equation: $y = -x + 7$

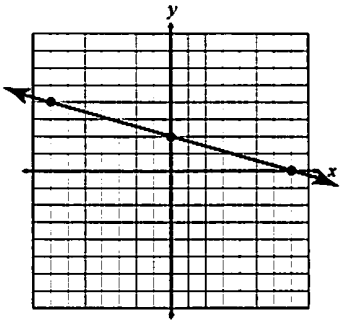
5.



$m =$ 4/3 $b =$ 0

Equation: $y = \frac{4}{3}x$

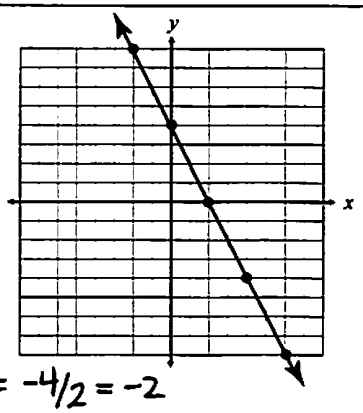
6.



$m =$ -2/7 $b =$ 2

Equation: $y = -\frac{2}{7}x + 2$

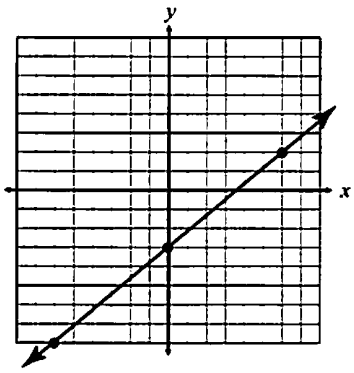
7.



$m = -4/2 = -2$

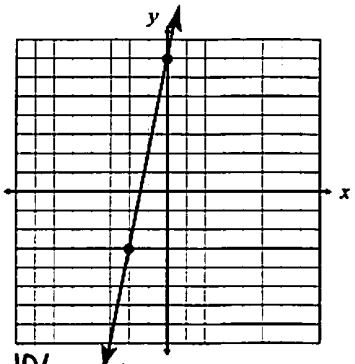
Equation: $y = -2x + 4$

8.



Equation: $y = 5/6x - 3$

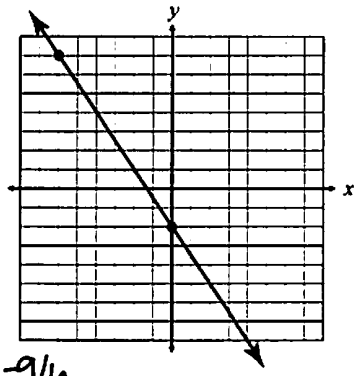
9.



$m = 10/2 = 5$

Equation: $y = 5x + 7$

10.

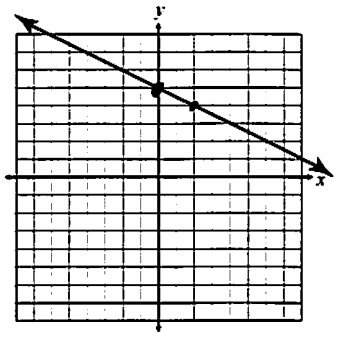


$m = -9/6$

Equation: $y = -3/2x - 2$

Choose the equation that best matches the line shown on the graph.

11.



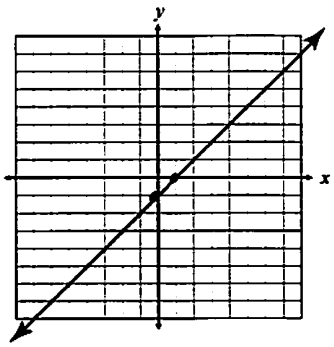
A. $y = 2x + 5$

B. $y = -2x + 5$

C. $y = \frac{1}{2}x + 5$

(D.) $y = -\frac{1}{2}x + 5$

12.



A. $y = x + 1$

(B.) $y = x - 1$

C. $y = -x + 1$

D. $y = -x - 1$

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 6:** Slope-Intercept Form

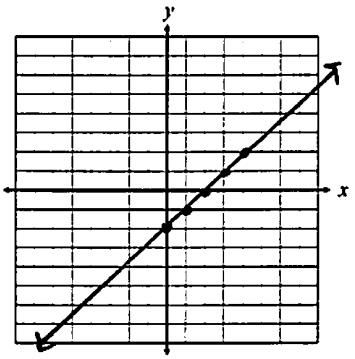
**** This is a 2-page document! ****

Directions: Identify the slope and y-intercept of each equation, then graph the line.

1. $y = x - 2$

$m =$ 1

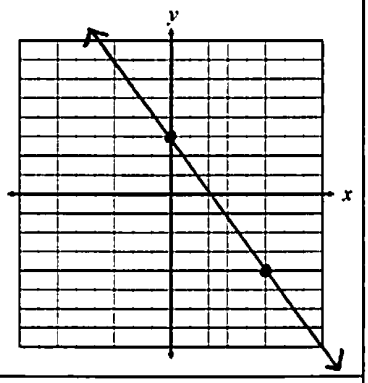
$b =$ -2



2. $y = -\frac{7}{5}x + 3$

$m =$ -7/5

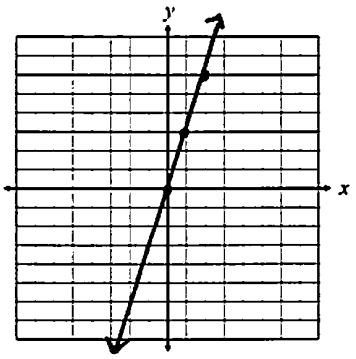
$b =$ 3



3. $y = 3x$

$m =$ 3

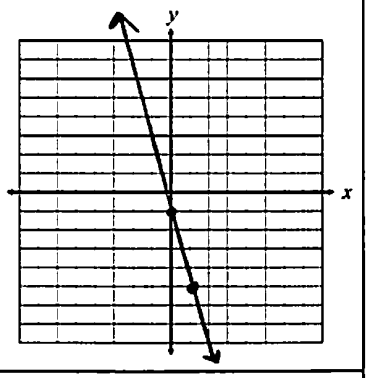
$b =$ 0



4. $y = -4x - 1$

$m =$ -4

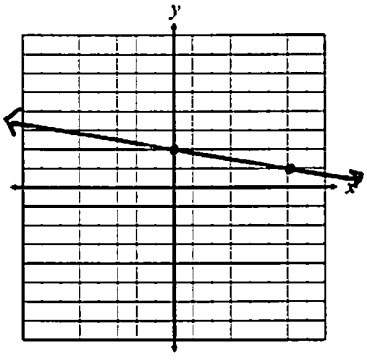
$b =$ -1



5. $y = -\frac{1}{6}x + 2$

$m =$ -1/6

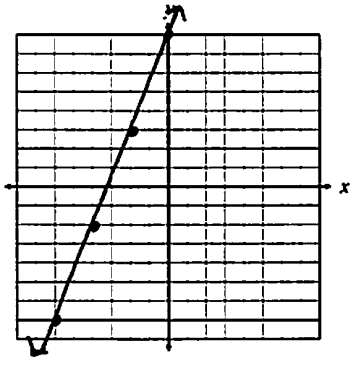
$b =$ 2



6. $y = \frac{5}{2}x + 8$

$m =$ 5/2

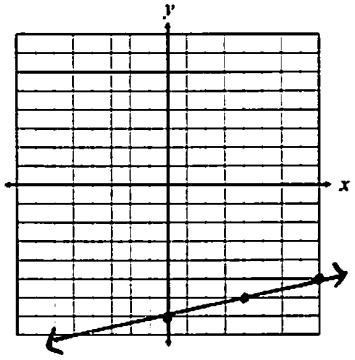
$b =$ 8



7. $y = \frac{1}{4}x - 7$

$m =$ 1/4

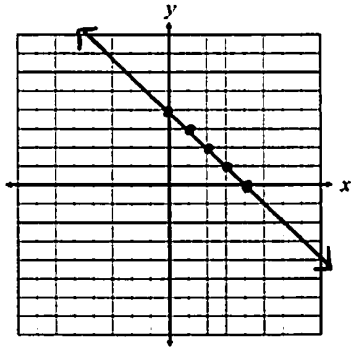
$b =$ -7



8. $y = -x + 4$

$m =$ -1

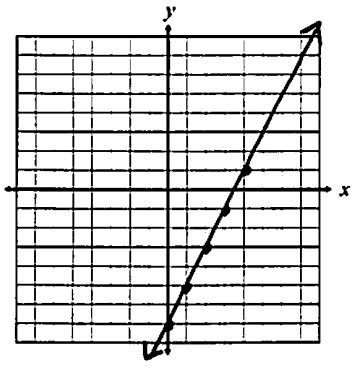
$b =$ 4



9. $y = -7 + 2x$

$m =$ 2

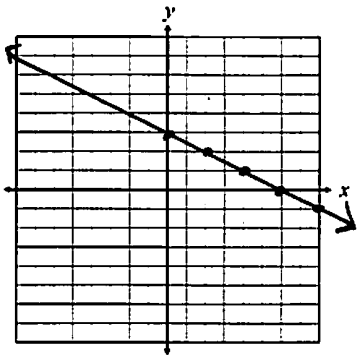
$b =$ -7



10. $y = 3 - \frac{1}{2}x$

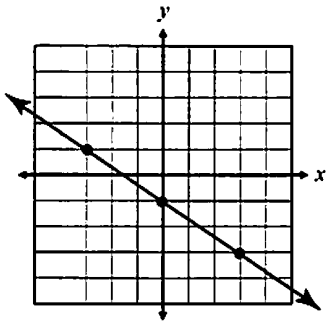
$m =$ -1/2

$b =$ 3



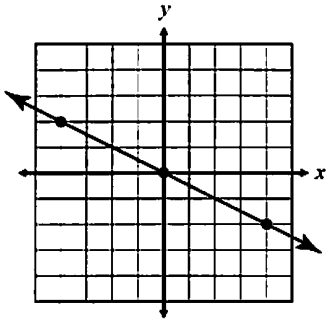
Directions: Write the equation of the line shown on the graph.

11.



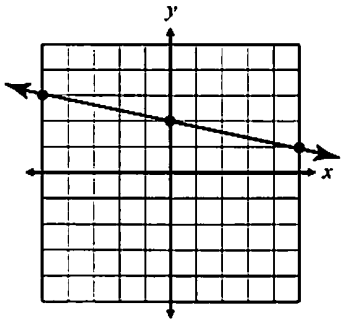
Equation: $y = -2/3\,x - 1$

12.



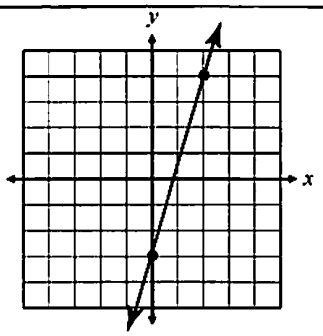
Equation: $y = -1/2\,x$

13.



Equation: $y = -1/5\,x + 2$

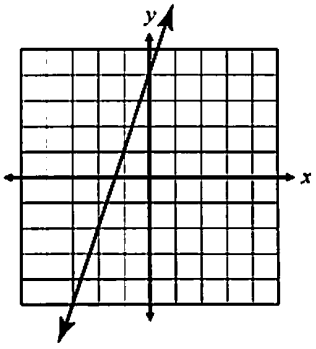
14.



Equation: $y = 7/2\,x - 3$

Directions: Chose the equation that best matches the line on the graph.

15.



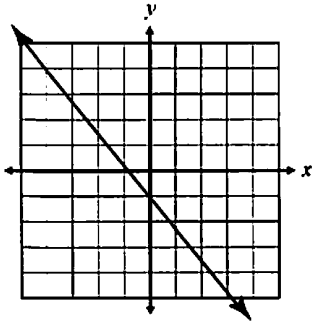
(A.) $y = 3x + 4$

B. $y = \frac{1}{3}x + 4$

C. $y = -3x + 4$

D. $y = -\frac{1}{3}x - 4$

16.



A. $y = \frac{4}{5}x - 1$

B. $y = -\frac{4}{5}x - 1$

C. $y = \frac{5}{4}x - 1$

(D.) $y = -\frac{5}{4}x - 1$

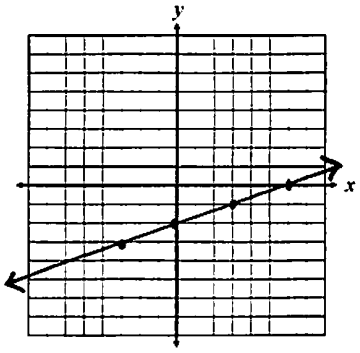
Methods for Graphing Linear Equations

Directions: Graph each equation by completing the function table, then identifying its slope and y-intercept. Compare your graphs to check your work!

Method 1: Function Tables

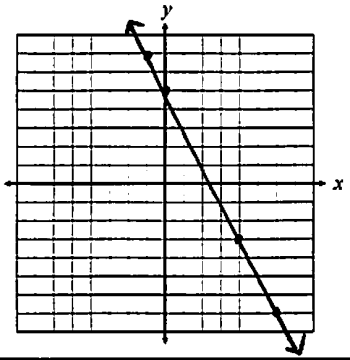
1 $y = \frac{1}{3}x - 2$

x	y
-3	-3
0	-2
3	-1
6	0



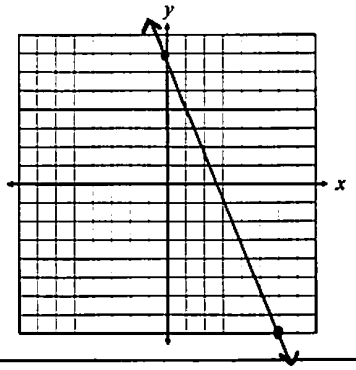
2 $y = -2x + 5$

x	y
-1	7
0	5
4	-3
6	-7



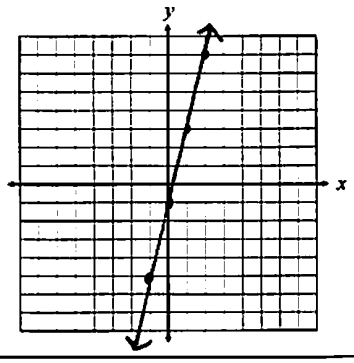
3 $y = -\frac{5}{2}x + 7$

x	y
-4	17
-2	12
0	7
6	-8



4 $y = 4x - 1$

x	y
-1	-5
0	-1
1	3
2	7

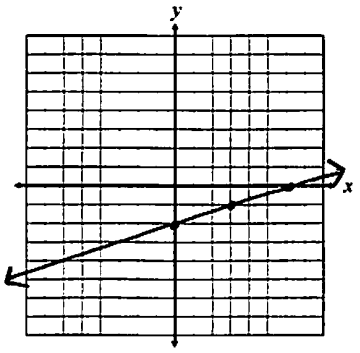


Method 2: Slope-Intercept Form

1 $y = \frac{1}{3}x - 2$

$m = 1/3$

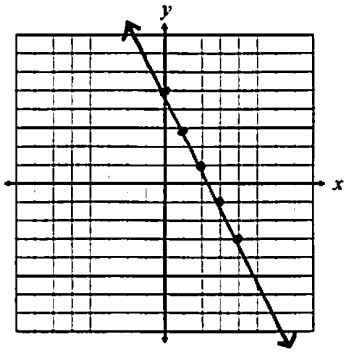
$b = -2$



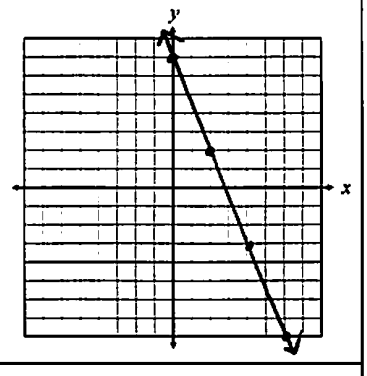
2 $y = -2x + 5$

$m = -2$

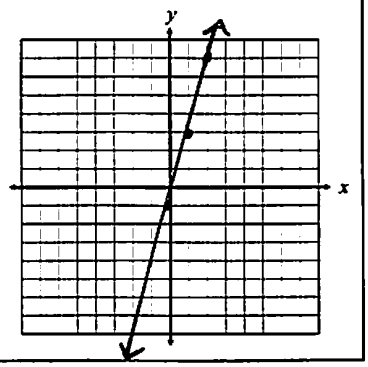
$b = 5$



3 $y = -\frac{5}{2}x + 7$

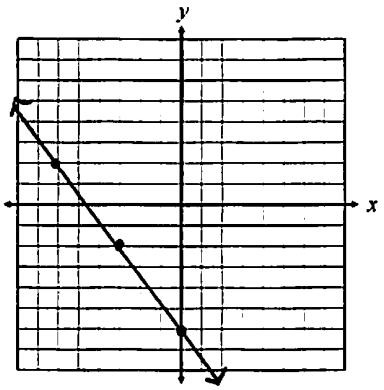


4 $y = 4x - 1$

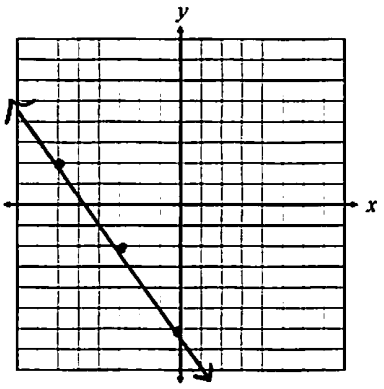


5 $y = -\frac{4}{3}x - 6$

x	y
-6	2
-3	-2
0	-6
3	-10

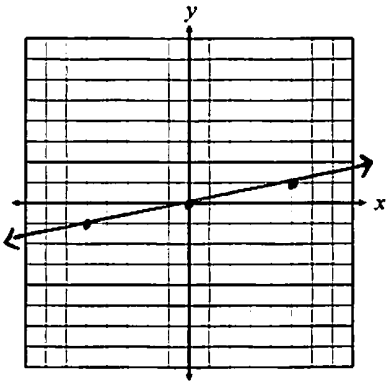


$y = -\frac{4}{3}x - 6$

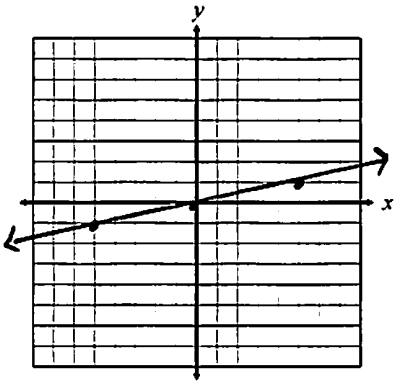


6 $y = \frac{1}{5}x$

x	y
-10	-2
-5	-1
0	0
5	1

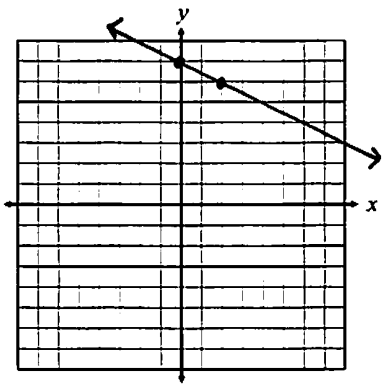


$y = \frac{1}{5}x$

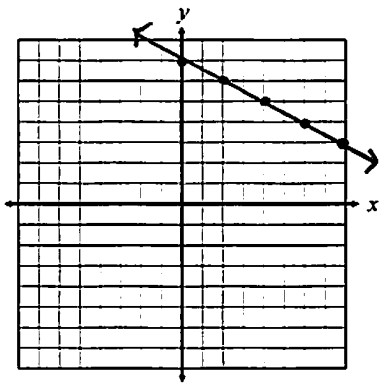


7 $y = 7 - \frac{1}{2}x$

x	y
-8	11
-4	9
0	7
2	6

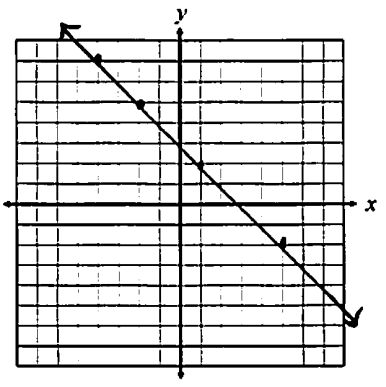


$y = 7 - \frac{1}{2}x$

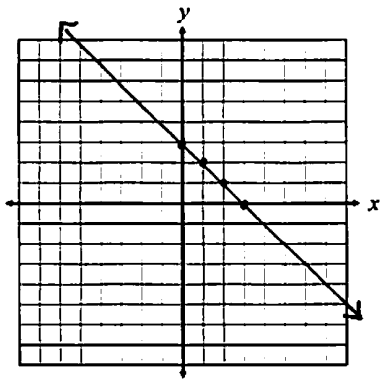


8 $y = 3 - x$

x	y
-4	7
-2	5
1	2
5	-2



$y = 3 - x$



Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 5:** Functions & Linear Relationships

Quiz 5-2: Slope Formula and Slope-Intercept Form

Find the slope of the line that passes through the given points.

1. (7, 3) and (13, 8)

$m = \frac{8-3}{13-7} = \frac{5}{6}$

2. (-5, 2) and (-1, -6)

$m = \frac{-6-2}{-1-(-5)} = \frac{-8}{4}$

3. (9, -3) and (9, 4)

$m = \frac{4-(-3)}{9-9} = \frac{7}{0}$

4. (-2, -4) and (-11, -7)

$m = \frac{-7-(-4)}{-11-(-2)} = \frac{-3}{-9}$

1. $m = 5/6$
2. $m = -2$
3. undef.
4. $m = 1/3$

Find the slope of the line that passes through the points given in the table.

5.

x	y
-4	6
0	-1
4	-8
8	-15

$m = \frac{-1-6}{0-(-4)} = \frac{-7}{4}$

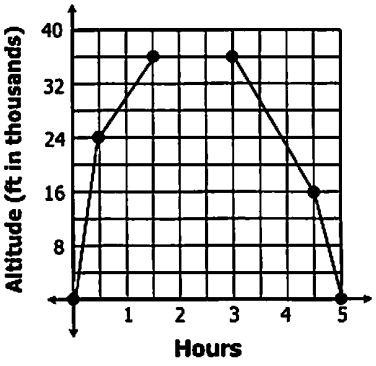
6.

x	y
-9	-2
-2	-2
3	-2
7	-2

$m = \frac{-2-(-2)}{7-3} = \frac{0}{4}$

5. $m = -7/4$
6. $m = 0$

The graph below shows the altitude of an airplane during a 5-hour flight.



7. Find the rate of change in the first 30 minutes after take off.

$m = \frac{24-0}{0.5-0} = \frac{24}{0.5}$

8. Find the rate of change from one hour and thirty minutes to three hours.

$m = \frac{36-36}{3-1.5} = \frac{0}{1.5}$

9. Find the rate of change from four hours and thirty minutes to when the plane landed.

$m = \frac{0-16}{5-4.5} = \frac{-16}{.5}$

7. 48,000 ft/hr
8. 0 ft/hr
9. -32,000 ft/hr
10. 2.25 deg/hr

10. At 6:00 a.m., the temperature is 58°. At 2:00 p.m., the temperature is 76°. Find the rate of change in degrees per hour during this time.

(0, 58)
(8, 76)

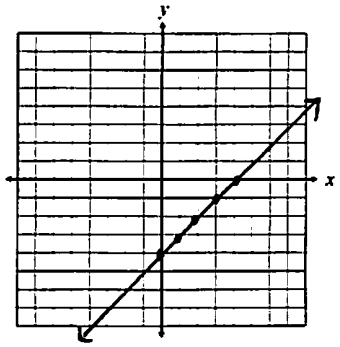
$m = \frac{76-58}{8-0} = \frac{18}{8} = 2.25$

Identify the slope and y-intercept of the line, then graph the equation.

11. $y = x - 4$

$m =$ 1

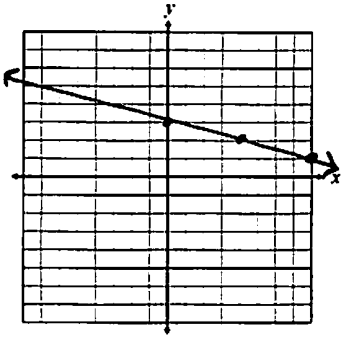
$b =$ -4



12. $y = -\frac{1}{4}x + 3$

$m =$ -1/4

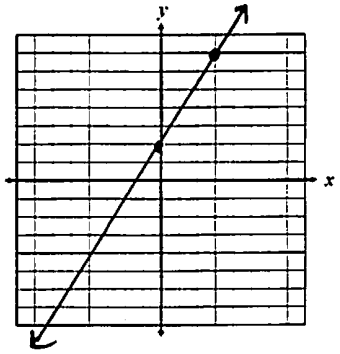
$b =$ 3



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

$m =$ 5/3

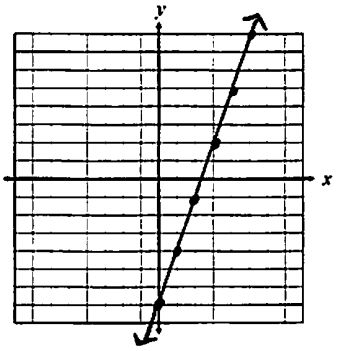
$b =$ 2



14. $y = 3x - 7$

$m =$ 3

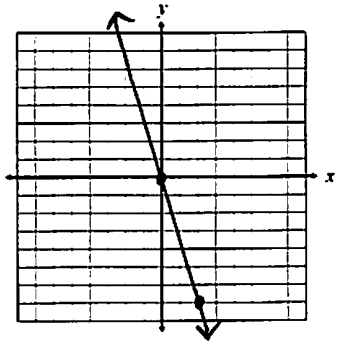
$b =$ -7



15. $y = -\frac{7}{2}x$

$m =$ -7/2

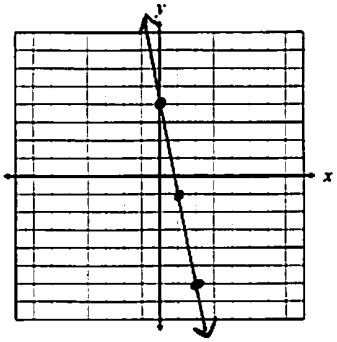
$b =$ 0



16. $y = 4 - 5x$

$m =$ -5

$b =$ 4

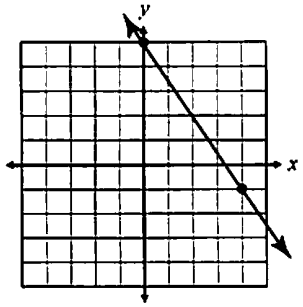


17. Write the equation of the line shown on the graph.

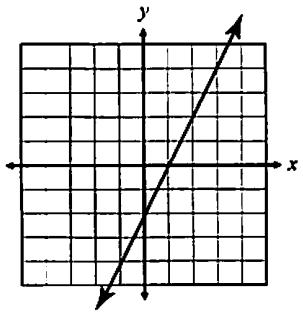
$m = -6/4 = -3/2$

$b = 5$

Equation: $y = -3/2x + 5$



18. Choose the equation that best fits the line shown on the graph.



A. $y = 2x + 1$

B. $y = -2x + 1$

C. $y = 2x - 2$

D. $y = -2x - 2$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Standard Form	Linear equations are also frequently written in **standard form**: **$Ax + By = C$** We will convert these equations to **slope-intercept form** in order to graph. To do this, you must solve the equation for y.
Steps to Convert	1 Add/subtract Ax to move it to the other side 2 Divide all terms by B
Examples	**Directions:** Rewrite each equation in slope-intercept form.

1. $x + y = -2$

$-x \quad -x$

$y = -x - 2$

2. $-4x + y = 5$

$+4x \quad +4x$

$y = 4x + 5$

3. $5x + 6y = 12$

$-5x \quad -5x$

$\frac{6y}{6} = \frac{-5x}{6} + \frac{12}{6}$

$y = -\frac{5}{6}x + 2$

4. $-2x + 6y = -24$

$+2x \quad +2x$

$\frac{6y}{6} = \frac{2x}{6} - \frac{24}{6}$

$y = \frac{1}{3}x - 4$

5. $3x - 5y = 5$

$-3x \quad -3x$

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

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

6. $x - 2y = 16$

$-x \quad -x$

$\frac{-2y}{-2} = \frac{-x}{-2} + \frac{16}{-2}$

$y = \frac{1}{2}x - 8$

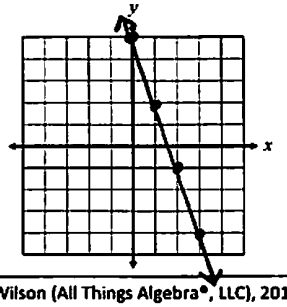
Graphing Practice	**Directions:** Rewrite each equation in slope-intercept form, then graph.	
	Convert	**Graph**

7. $3x + y = 5$

$-3x \quad -3x$

$y = -3x + 5$

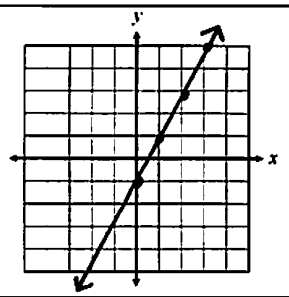
$m = -3, b = 5$



8. $-2x + y = -1$

$+2x \quad +2x$

$y = 2x - 1$

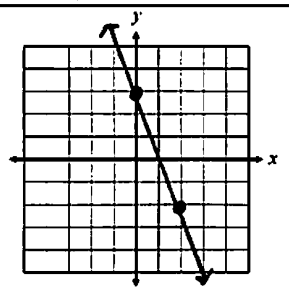


9. $5x + 2y = 6$

$-5x \quad -5x$

$\frac{2y}{2} = \frac{-5x}{2} + \frac{6}{2}$

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

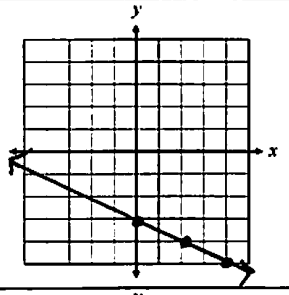


10. $x + 2y = -6$

$-x \quad -x$

$\frac{2y}{2} = \frac{-x}{2} - \frac{6}{2}$

$y = -\frac{1}{2}x - 3$

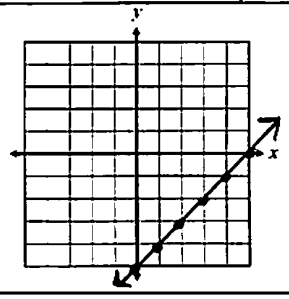


11. $x - y = 5$

$-x \quad -x$

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

$y = x - 5$

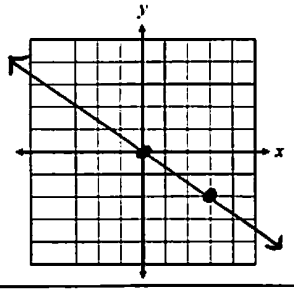


12. $-8x - 12y = 0$

$+8x \quad +8x$

$\frac{-12y}{-12} = \frac{8x}{-12}$

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

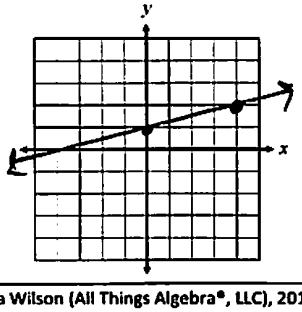


13. $x - 4y = -4$

$-x \quad -x$

$\frac{-4y}{-4} = \frac{-x}{-4} - \frac{4}{-4}$

$y = \frac{1}{4}x + 1$

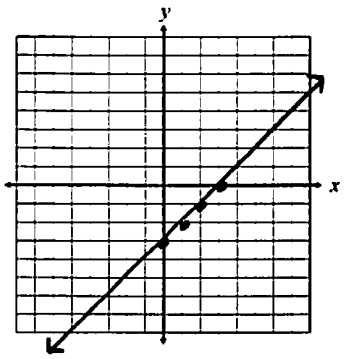
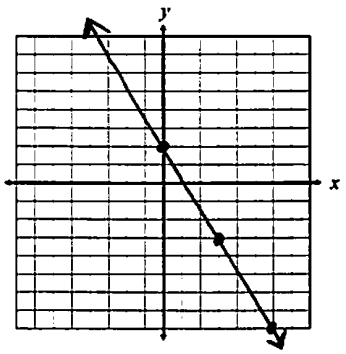
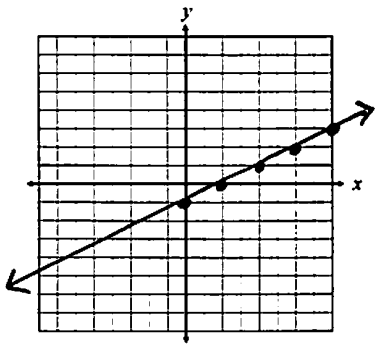
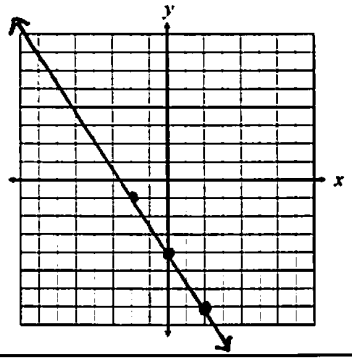


Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 7:** Standard Form

**** This is a 2-page document! ****

Directions: Write each equation in slope-intercept form, then graph.

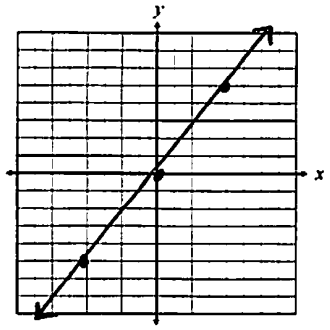
Convert	Graph
1. $x - y = 3$ $-x \quad -x$ $\frac{-y}{-1} = \frac{-x}{-1} + \frac{3}{-1}$ **Slope-Intercept Form:** $y = x - 3$	
2. $5x + 3y = 6$ $-5x \quad -5x$ $\frac{3y}{3} = \frac{-5x}{3} + \frac{6}{3}$ **Slope-Intercept Form:** $y = -\frac{5}{3}x + 2$	
3. $x - 2y = 2$ $-x \quad -x$ $\frac{-2y}{-2} = \frac{-x}{-2} + \frac{2}{-2}$ **Slope-Intercept Form:** $y = \frac{1}{2}x - 1$	
4. $3x + 2y = -8$ $-3x \quad -3x$ $\frac{2y}{2} = \frac{-3x}{2} - \frac{8}{2}$ **Slope-Intercept Form:** $y = -\frac{3}{2}x - 4$	

5. $-5x + 4y = 0$

$+5x \quad +5x$

$\frac{4y}{4} = \frac{5x}{4}$

Slope-Intercept Form: $y = \frac{5}{4}x$

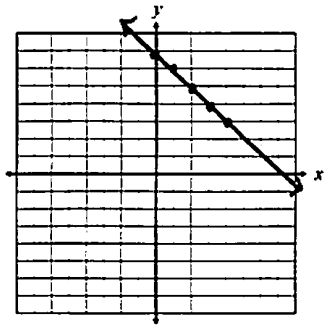


6. $3x + 3y = 21$

$-3x \quad -3x$

$\frac{3y}{3} = \frac{-3x}{3} + \frac{21}{3}$

Slope-Intercept Form: $y = -x + 7$

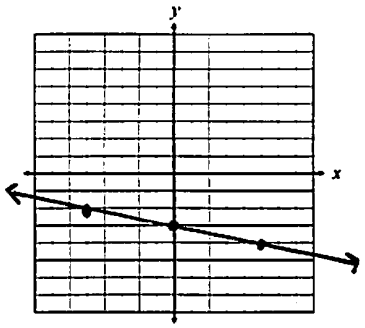


7. $x + 5y = -15$

$-x \quad -x$

$\frac{5y}{5} = \frac{-x}{5} \frac{-15}{5}$

Slope-Intercept Form: $y = -\frac{1}{5}x - 3$

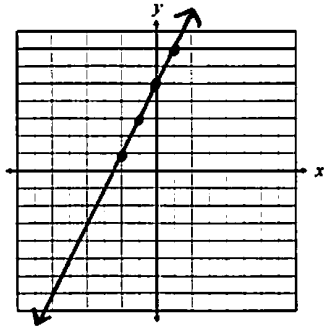


8. $2x - y = -5$

$-2x \quad -2x$

$\frac{-y}{-1} = \frac{-2x}{-1} \frac{-5}{-1}$

Slope-Intercept Form: $y = 2x + 5$

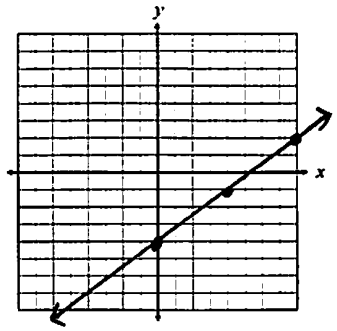


9. $6x - 8y = 32$

$-6x \quad -6x$

$\frac{-8y}{-8} = \frac{-6x}{-8} + \frac{32}{-8}$

Slope-Intercept Form: $y = \frac{3}{4}x - 4$



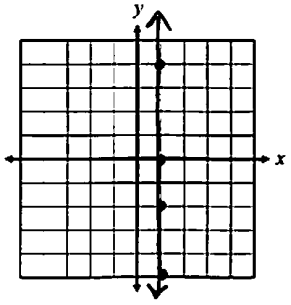
Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

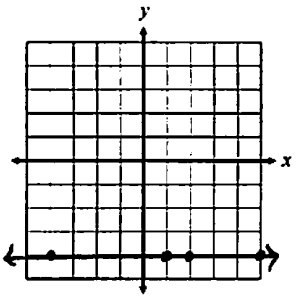
Vertical & Horizontal Lines

Graph the points in the table and connect them to form a line.

x	y
1	-5
1	-2
1	0
1	4



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



Equations of Vertical & Horizontal Lines

Vertical Lines

A **vertical line** is written in the form $x = a$, where a represents the line's x-intercept.

The equation of the **vertical** line graphed above is

$x = 1$

Horizontal Lines

A **horizontal line** is written in the form $y = a$, where a represents the line's y-intercept.

The equation of the **horizontal** line graphed above is

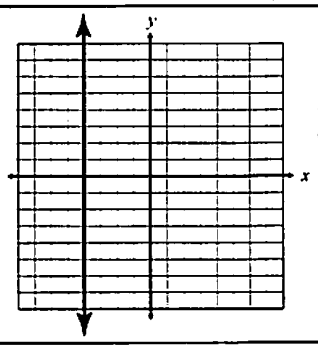
$y = -4$

Remember, if the line intersects the **x-axis, it's $x = a$, if a line intersects the **y**-axis, it's $y = a$.**

Examples

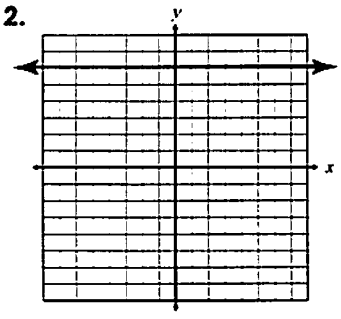
Directions: Write the equation of the line shown on the graph.

1.



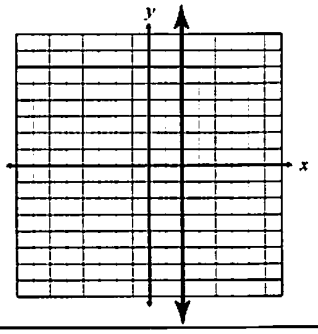
$x = -4$

2.



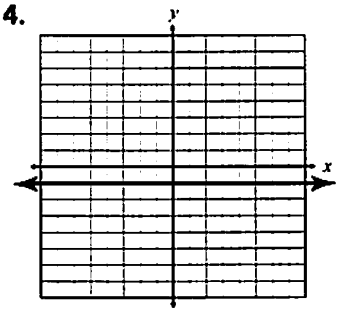
$y = 6$

3.



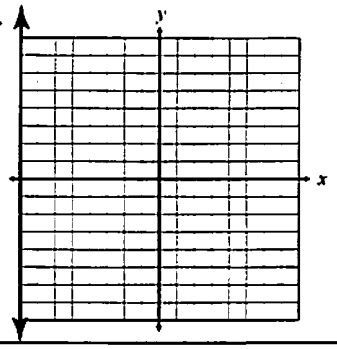
$x = 2$

4.



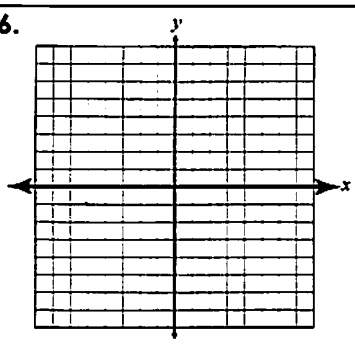
$y = -1$

5.



$x=-8$

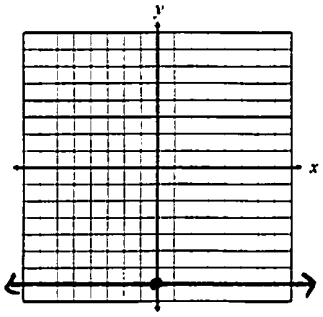
6.



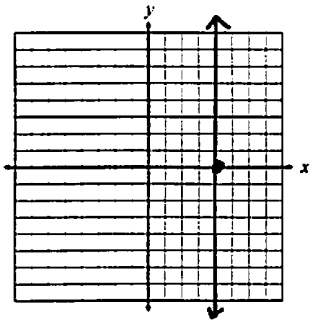
$y=0$

Directions: Graph each equation.

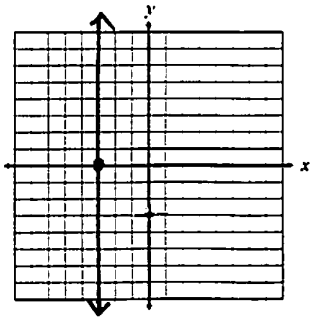
7. $y = -7$



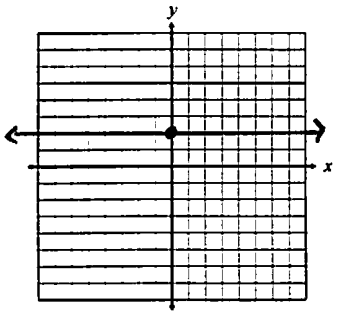
8. $x = 4$



9. $x = -3$



10. $y = 2$



Questions

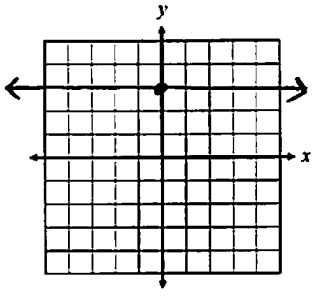
11. What is the slope of the line $y = 5$? 0

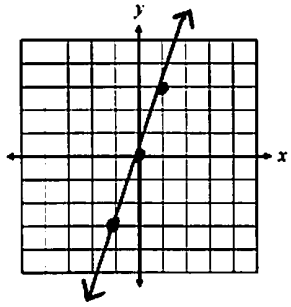
12. What is the slope of the line $x = -2$? undef

13. What is the slope of the line $x = 0$? undef

14. Which axis is $y = -1$ parallel to? x-axis

15. How does the graph of $y = 3$ differ from $y = 3x$? Graph both and explain.





$y=3$ has zero slope, while $y=3x$ has a slope of 3.

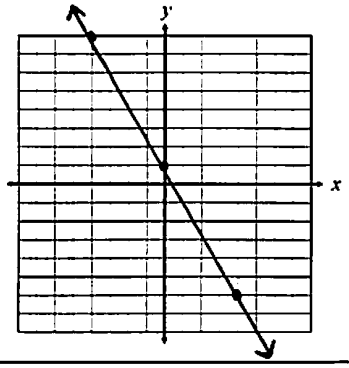
Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 8:** Graphing Lines Review

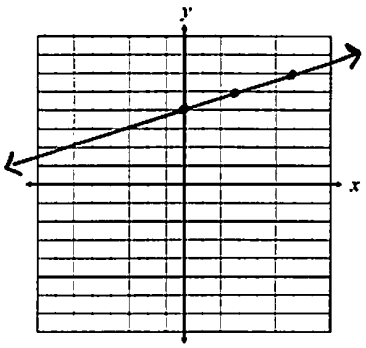
**** This is a 2-page document! ****

Directions: Graph each equation. Show all work for standard form to slope-intercept form conversions.

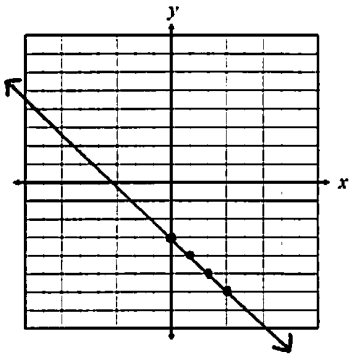
1. $y = -\frac{7}{4}x + 1$



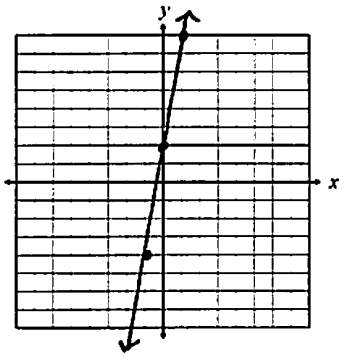
2. $y = \frac{1}{3}x + 4$



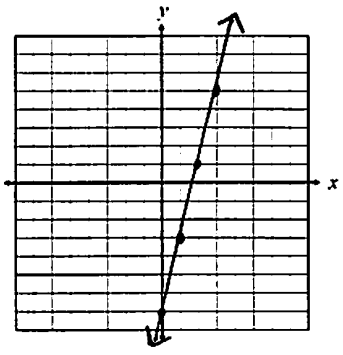
3. $y = -x - 3$



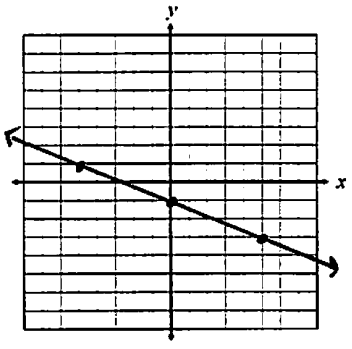
4. $y = 6x + 2$



5. $y = -7 + 4x$

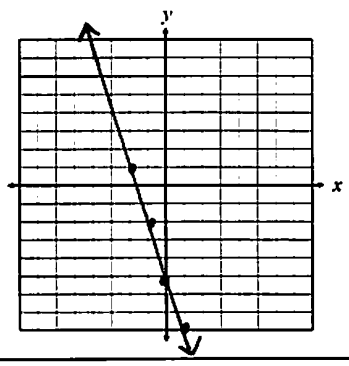


6. $y = -1 - \frac{2}{5}x$



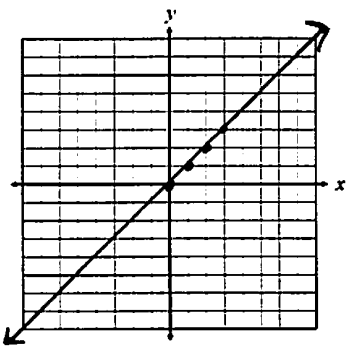
7. $3x + y = -5$

$y = -3x - 5$



8. $x - y = 0$

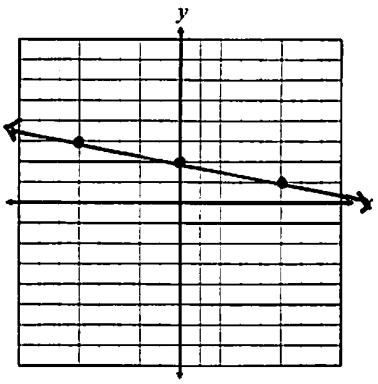
$y = x$



9. $x + 5y = 10$

$5y = -x + 10$

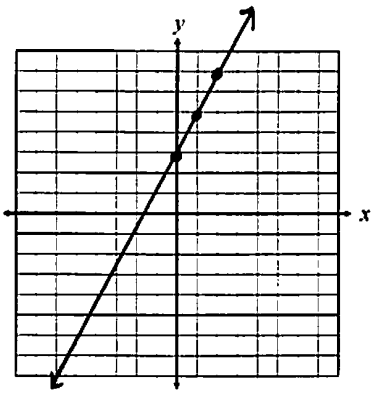
$y = -\frac{1}{5}x + 2$



10. $2x - y = -3$

$-y = -2x - 3$

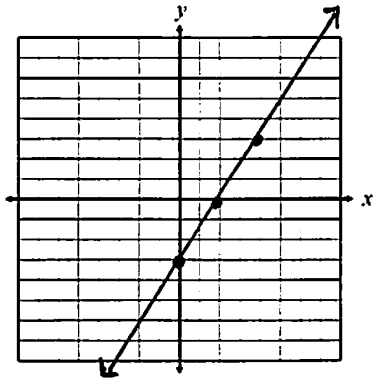
$y = 2x + 3$



11. $3x - 2y = 6$

$-2y = -3x + 6$

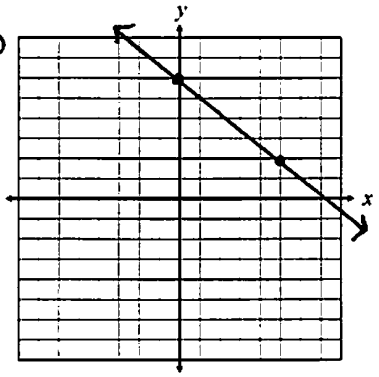
$y = \frac{3}{2}x - 3$



12. $4x + 5y = 30$

$5y = -4x + 30$

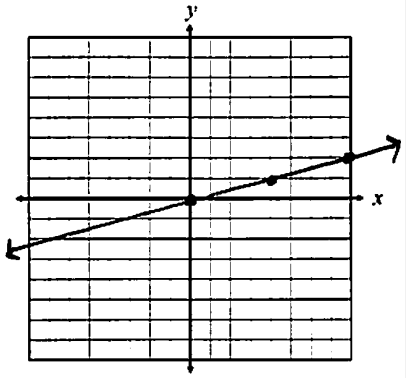
$y = -\frac{4}{5}x + 6$



13. $x - 4y = 0$

$-4y = -x$

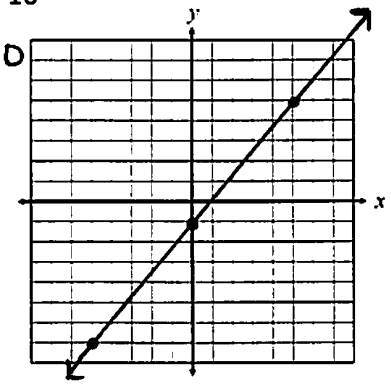
$y = \frac{1}{4}x$



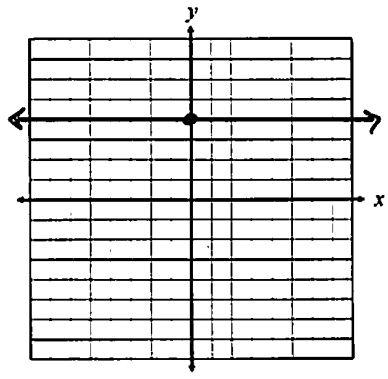
14. $-12x + 10y = -10$

$10y = 12x - 10$

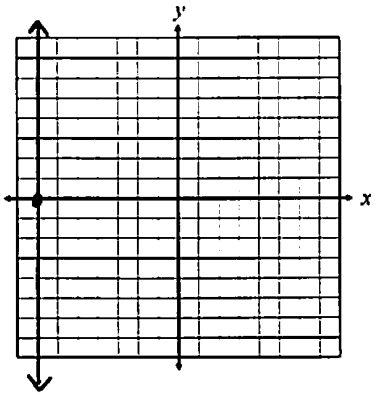
$y = \frac{6}{5}x - 1$



15. $y = 4$

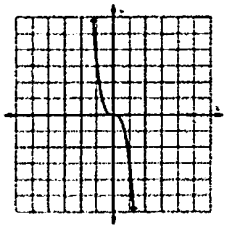


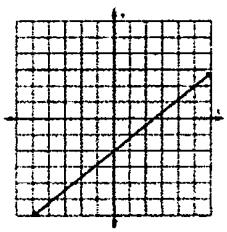
16. $x = -7$

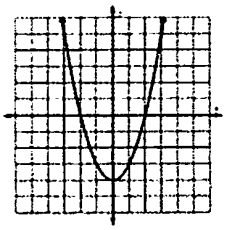


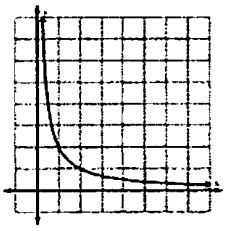
Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Linear Function	A function that creates a straight line; a function with a constant slope.
Nonlinear Function	A function that does not create a straight line; often graphed as a curve.
Given Graphs	**Determine whether each graph represents a linear or nonlinear function.**

1.  Non-linear

2.  Linear

3.  Non-linear

4.  Non-linear

Given Equations

Equations of linear functions are or can be written in **slope-intercept form** ($y = mx + b$)

Both the x and y variables have an exponent of 1.

Determine whether the equation represents a linear or nonlinear function.

5. $y = \frac{1}{4}x - 1$ — linear

6. $y = x^2$ — non-linear

7. $2x + y = -5$ — linear

8. $xy = 10$ — non-linear

9. $x = y - 8$ — linear

10. $y = 3^x$ — non-linear

11. $\frac{y}{x} = 2$ → $y = 2x$

linear

12. $3x - 2y = 14$

linear

13. $y = 1 - x$

linear

14. $y = \frac{x}{3}$

linear

15. $y = 2x^3 - 1$

non-linear

16. $\frac{5}{x} = \frac{2}{y}$ → $5y = 2x$

linear

17. Is $y = -2$ a linear function? Explain why or why not.

linear; horizontal line

18. Is $x = 6$ a linear function? Explain why or why not.

linear but not a function because it does not pass the vert. line test.

Given Tables

Check to make sure the variables increase or decrease at the same rate!

Linear Function

	x	y	
	1	1	
+1 <	2	4	> +3
+1 <	3	7	> +3
+1 <	4	10	> +3

Nonlinear Function

	x	y	
	2	1	
+2 <	4	4	> +3
+1 <	5	9	> +5
+3 <	8	16	> +7

Determine whether the table represents a linear or nonlinear function.

19.

x	5	9	13	17
y	3	2	1	0

linear

20.

x	-1	0	1	2
y	1	0	1	4

non-linear

21.

x	-4	0	4	8
y	6	-4	-14	-24

linear

22.

x	-5	-4	-3	-2
y	7	9	12	16

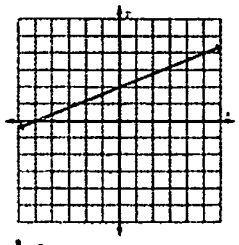
non-linear

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 9:** Linear and Nonlinear Functions

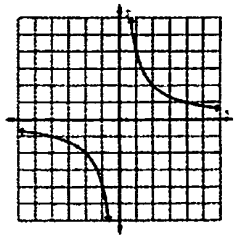
Directions: Determine whether each graph, equation, or table represents a linear or nonlinear function.

1.



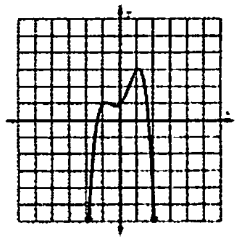
linear

2.



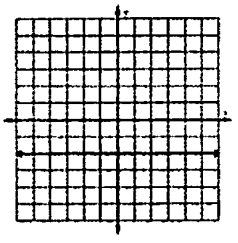
non-linear

3.



non-linear

4.



linear

5. $y = x^3 + 7$

non-linear

6. $y = -\frac{5}{4}x$

linear

7. $xy = 12$

non-linear

8. $y = -1$

linear

9. $x^2 + y^2 = 9$

non-linear

10. $4x + 3y = 9$

linear

11. $y^2 = 2x - 4$

non-linear

12. $x - 4y = 20$

linear

13. $y = 1 - 5x$

linear

14.

x	y
3	10
6	6
9	2
12	-2

linear

15.

x	y
1	1
2	8
3	27
4	64

non-linear

16.

x	y
-5	-7
0	-4
5	-1
10	2

linear

17.

x	y
1	1
3	2
5	8
7	16

non-linear

18.

x	y
-6	8
-5	10
-4	12
-3	14

linear

19.

x	y
-5	-4
-2	-11
1	-18
4	-25

linear

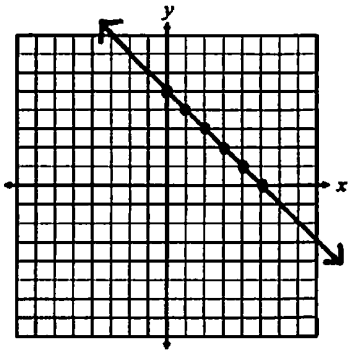
Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 5:** Functions & Linear Relationships

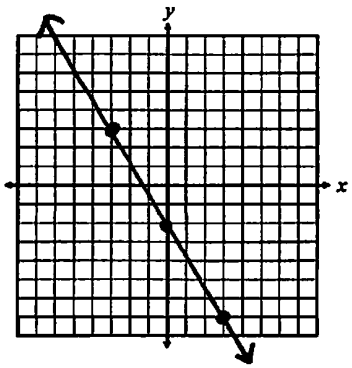
Quiz 5-3: Graphing Review & Linear vs. Nonlinear Functions

Graph each equation. Convert all standard form equations to slope-intercept form.

1. $y = -x + 5$

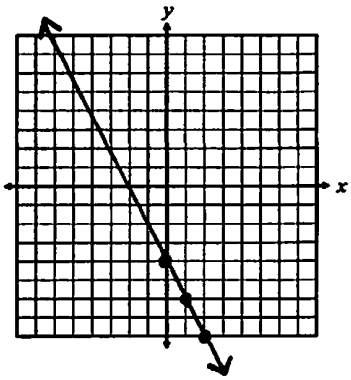


2. $y = -\frac{5}{3}x - 2$



3. $2x + y = -4$

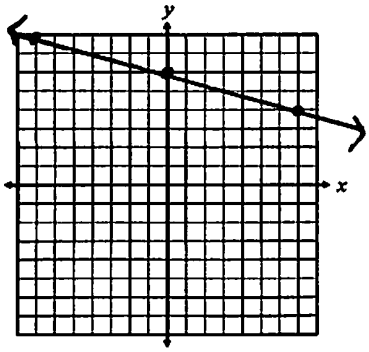
$y = -2x - 4$



4. $2x + 7y = 42$

$7y = -2x + 42$

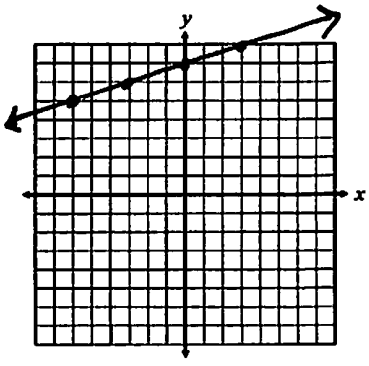
$y = \frac{-2}{7}x + 6$



5. $x - 3y = -21$

$-3y = -x - 21$

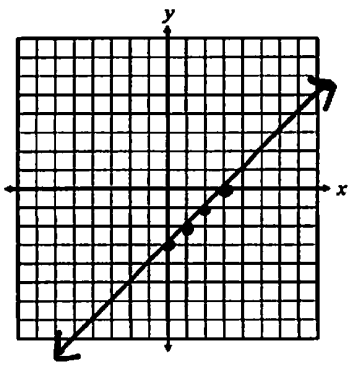
$y = \frac{1}{3}x + 7$



6. $x - y = 3$

$-y = -x + 3$

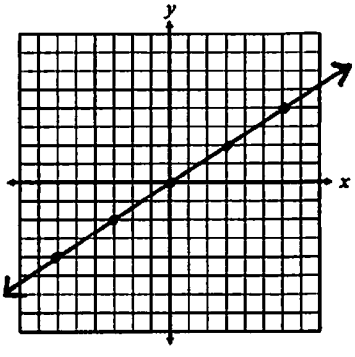
$y = x - 3$



7. $-4x + 6y = 0$

$6y = 4x$

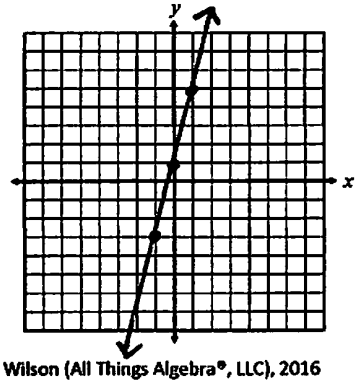
$y = \frac{2}{3}x$



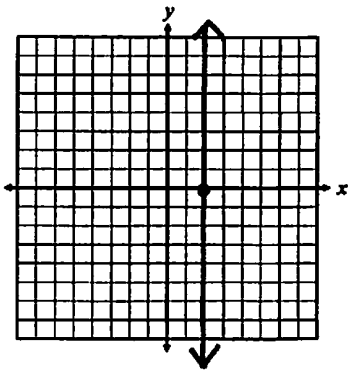
8. $4x - y = -1$

$-y = -4x - 1$

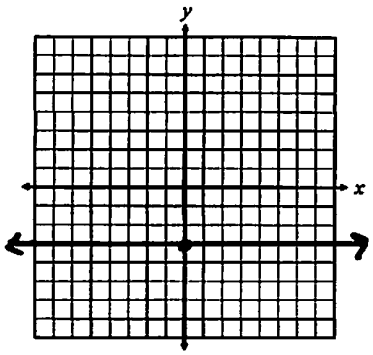
$y = 4x + 1$



9. $x = 2$

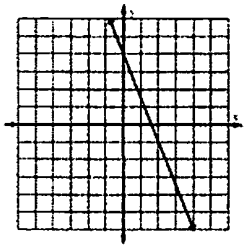


10. $y = -3$

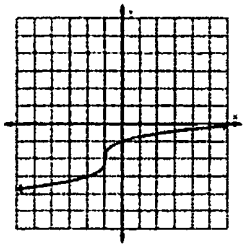


Determine whether each graph, equation, or table represents a linear or nonlinear function.

11.



12.



13. $y^2 = x - 1$

14. $x + 4y = 12$

15. $\frac{y}{x} = -3$ → $y = -3x$

16. $xy = 8$

17.

x	y
1	-2
2	-7
3	-12
4	-17

18.

x	y
-8	0
-5	4
-2	8
1	12

19.

x	y
0	0
2	1
4	3
6	6

20.

x	y
-3	-1
0	0
3	4
6	13

11. linear
12. non-linear
13. non-linear
14. linear
15. linear
16. non-linear
17. linear
18. linear
19. non-linear
20. non-linear

Slope-Intercept Form *Applications*

Problems that involve an initial starting value and a constant rate of change can be modeled using a linear equation written in slope-intercept form ($y = mx + b$).

Important Parts!	*Rate of change* = m *Initial Value* = b *Independent Variable* = x *Dependent Variable* = y

1 A computer repair shop charges a $25 fee in addition to $40 per hour to service a computer. Write an equation to represent the total cost to service a computer. Identify your variables.

let x = # hours
let y = total cost

$y = 40x + 25$

a) What is the rate of change?
$40/hr

b) What is the initial value?
$25

c) What is the independent variable?
hours

d) What is the dependent variable?
cost

2 An online photo printing shop charges $0.15 per print in addition to a $2.95 shipping charge. Write an equation to model the total cost for printing pictures. Identify your variables.

let x = # prints
let y = total cost

$y = 0.15x + 2.95$

a) What is the rate of change?
$0.15/print

b) What is the initial value?
$2.95

c) What is the independent variable?
prints

d) What is the dependent variable?
cost

3 Mark bought a season ticket to the ski resort for $395, however, he must pay $25 to rent skis each time he goes skiing. Write an equation to model the total cost that Mark will pay for skiing this season.

let x = # visits
let y = total cost

$y = 25x + 395$

a) What is the rate of change?
$25/visit

b) What is the initial value?
$395

c) What is the independent variable?
visits

d) What is the dependent variable?
cost

4 Jane bought a car with 23,000 miles on it. She determined that she typically drives 12,000 miles per year. Write an equation to show the number of miles on Jane's car after each year she drives it.

let x = # years
let y = total mileage

$y = 12000x + 23000$

a) What is the rate of change?
12000 mi/yr

b) What is the initial value?
23000 mi

c) What is the independent variable?
years

d) What is the dependent variable?
mileage

Directions: Read each problem, write an equation, then solve using your equation.

5. A truck rental company charges $19.95 to rent a truck plus $0.24 per mile driven. Find the cost to rent a truck and drive 188 miles.

let x = # miles
let y = total cost

$y = 0.24x + 19.95$

$y = 0.24(188) + 19.95$
$y = 45.12 + 19.95$
$\boxed{y = \$65.07}$

6. Eva started a savings account with $500. If she plans to save $75 each month, find the total balance after 2 years. → 24 mo.

let x = # months
let y = total saved

$y = 75x + 500$

$y = 75(24) + 500$
$y = 1800 + 500$
$\boxed{y = \$2300}$

7. At the beginning of Jack's diet, he was 257 pounds. If he lost 3 pounds per week, find his weight after 12 weeks.

let x = # weeks
let y = weight

$y = -3x + 257$

$y = -3(12) + 257$
$y = -36 + 257$
$\boxed{y = 221 \text{ lb}}$

8. It costs $5 for a membership to Top Golf, then $35 per hour to golf. If Max paid $127.50 during his first trip to Top Golf, how many hours did he play?

let x = # hours
let y = total cost

$y = 35x + 5$

$127.5 = 35x + 5$
$122.5 = 35x$
$\boxed{3.5 \text{ hr} = x}$

9. A hot-air balloon at 1,400 feet descends at a rate of 75 feet per minute. Find the time it will take the hot-air balloon to reach the ground.

let x = # minutes
let y = height

$y = -75x + 1400$

$0 = -75x + 1400$
$-1400 = -75x$
$18.\bar{6} = x$
$\boxed{18\frac{2}{3} \text{ min} \;/\; 18 \text{ min } 40 \text{ sec}}$

10. It costs $25 to rent a kayak in addition to $7.50 per hour. Logan rented the kayak at 11:00 a.m. then returned it later that evening. If he paid $70, what time did he return the kayak?

let x = # hours
let y = cost

$y = 7.5x + 25$

$70 = 7.5x + 25$
$45 = 7.5x$
$6 = x$
6 hrs = $\boxed{5:00 \text{ PM}}$

Name: _____ Bell: _____

Find the Better Deal!

Charlie would like to change cell phone companies.
He found the following ads in the newspaper:

Answer the following questions to help Charlie:

1. Write an equation for each companies pay plan:

2. If Charlie would like to spend $90 per month on his cell phone plan, how many minutes will he get from each plan?

3. Which cell phone company should Charlie pick and why?

_____

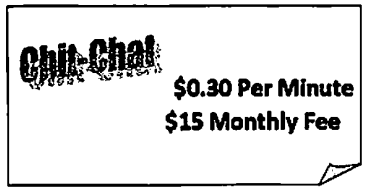
_____

_____

Name: _____ Bell: _____

Find the Better Deal!

Charlie would like to change cell phone companies.
He found the following ads in the newspaper:



Answer the following questions to help Charlie:

1. Write an equation for each companies pay plan:

$y = 0.3x + 15$	$y = 0.45x$

2. If Charlie would like to spend $90 per month on his cell phone plan, how many minutes will he get from each plan?

$90 = 0.3x + 15$ $75 = 0.3x$ $250 = x$ 250min.	$90 = 0.45x$ $200 = x$ 200 min

3. Which cell phone company should Charlie pick and why?

Chit Chat will be a better choice because he will get more minutes for the same price.

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 10:** Slope-Intercept Form Applications

**** This is a 2-page document! ****

1. The enrollment of a school in 2000 was 1200. Since then, it has increased at a rate of 35 students per year. Write an equation to represent the enrollment of the school each year after 2000. Identify your variables.

let x = # years after 2000
let y = total enrollment

$y = 35x + 1200$

a) What is the rate of change?
35 students/year

b) What is the initial value?
1200 students

c) What is the independent variable?
years

d) What is the dependent variable?
enrollment

2. The registration at a preschool is $125. Then, parents must also pay $475 per month for tuition. Write an equation to represent the total cost after each month. Identify your variables.

let x = # months
let y = total cost

$y = 475x + 125$

a) What is the rate of change?
$475/mo

b) What is the initial value?
$125

c) What is the independent variable?
months

d) What is the dependent variable?
cost

3. There are 18 gallons of gas in a car at the beginning of a trip. Each hour into the trip, 2.5 gallons are used. Write an equation to represent the gas left in the car after each hour into the trip. Identify your variables.

let x = # hours
let y = total gallons

$y = -2.5x + 18$

a) What is the rate of change?
-2.5 gal/hr

b) What is the initial value?
18 gal

c) What is the independent variable?
hours

d) What is the dependent variable?
gallons left

4. The taxi company charges $0.75 per mile driven in addition to a flat fee of $3.00. Write an equation to represent the total cost for a taxi cab trip. Identify your variables.

let x = # miles
let y = total cost

$y = 0.75x + 3$

a) What is the rate of change?
$0.75/mi

b) What is the initial value?
$3

c) What is the independent variable?
miles

d) What is the dependent variable?
total cost

Directions: Write and solve an equation to solve each problem.

5. Elijah's workout at the gym consists of just the elliptical and treadmill. After burning 450 miles on the elliptical machine, Elijah switched to the treadmill. If he is burning 12.5 calories per minute on the treadmill, find the total number of calories he will have burned during his workout if he spends 30 minutes on the treadmill.

let x = # min
let y = cal burned

$y = 12.5x + 450$

$y = 12.5(30) + 450$
$y = 375 + 450$
$\boxed{y = 825 \text{ cal}}$

6. A candle that is 8 inches tall burns at a rate of ¾ inches per hour. Find the height of the candle after 4 hours.

let x = # hours
let y = height

$y = -\frac{3}{4}x + 8$

$y = -\frac{3}{4}(4) + 8$
$y = -3 + 8$
$\boxed{y = 5 \text{ in}}$

7. A car that was originally worth $29,500 depreciates at a rate of $2,500 per year. Find the value of the car after six years.

let x = # years
let y = price

$y = -2500x + 29500$

$y = -2500(6) + 29500$
$y = -15000 + 29500$
$\boxed{y = \$14500}$

8. For signing up for the rewards program at the pizzeria, Haley got a card with 15 points. For each pizza she orders, she earns 8 points. Once she hits 175 points, she gets a free pizza. How many pizzas will she need to order to get a free one?

let x = # pizzas
let y = total points

$y = 8x + 15$

$175 = 8x + 15$
$160 = 8x$
$20 = x$
$\boxed{20 \text{ pizzas}}$

9. An airplane at an altitude of 35,000 feet begins descending at a rate of 2,000 feet per minute. How long will it take the airplane to reach the ground?

let x = # min
let y = height

$y = -2000x + 35000$

$0 = -2000x + 35000$
$-35000 = -2000x$
$17.5 = x$
$\boxed{17.5 \text{ min}}$

10. The water level of a certain lake is at 35 feet. Due to recent storms, the water level is rising at a rate of 3 inches per day. How many days will it take the lake to reach a level of 40 feet?

let x = # days
let y = height

$3 \text{ in} = 0.25 \text{ ft}$

$y = .25x + 35$

$40 = .25x + 35$
$5 = .25x$
$20 = x$
$\boxed{20 \text{ days}}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

PROPORTIONAL & NONPROPORTIONAL RELATIONSHIPS

- Quantities are **proportional** if they have a constant rate or ratio.
- Quantities are **nonproportional** if they do not have a constant rate or ratio.

Examples: Determine if the data shown in the table represents a proportional relationship. If yes, give the constant rate.

1.

Pounds	Cost ($)
1	6
2	12
3	18
4	24

yes; $6/lb

2.

Miles	Fare ($)
4	5.95
8	9.15
12	12.35
16	15.55

no

3.

Minutes	Words
3	114
8	304
15	570
24	912

yes; 38 words/min

DIRECT VARIATION

A proportional relationship is also referred to as a **direct variation.**

PROPORTIONAL RELATIONSHP ⟷ DIRECT VARIATION

DIRECT VARIATION EQUATION

When two variables vary directly, their relationship can be expressed through the following equation:

$$y = kx$$

- The equation is read as y varies directly as x
- k is the ratio of y to x ($k = y/x$) and is referred to as the constant of variation.

EXAMPLES

Directions: Determine whether the values in the table represent a direct variation. If yes, **(a)** give the constant and **(b)** write an equation to represent the relationship.

4.

Bicycles	Tires
1	2
2	4
3	6
4	8

yes; 2 tires/bike

$y = 2x$

5.

Minutes	Altitude (ft)
0	0
3	1,140
7	2,660
10	3,800

yes; 380 ft/min

$y = 380x$

6.

Hours	Miles
0	0
2	110
4	214
6	325

no

7. The total cost for tickets to the dance varies directly to the number of tickets purchased. If five tickets cost $15, identify the constant of variation and write an equation to represent the relationship.

let y = cost
let x = #tickets

$\frac{15}{5} = \$3/\text{ticket}$

$\boxed{y = 3x}$

8. The number of teachers varies directly to the number of students. If there is one teacher per every 20 students, identify the constant of variation and write an equation to represent the relationship.

let y = teachers
let x = # students

$\frac{1}{20} = 0.05$ teachers/student

$\boxed{y = 0.05x}$

9. In a car wash fundraiser, the money earned varies directly with the number of cars washed. If four cars are washed, $14 is made. Determine how much money is made when 15 cars are washed.

let y = earnings
let x = # cars

$\frac{14}{4} = \$3.50/\text{car}$

$y = 3.50x$
$y = 3.50(15)$
$\boxed{y = \$52.50}$

10. The cost of apples is directly proportional to the number of apples purchased. If eight apples cost $2.00, determine how many apples were purchased if the total cost was $4.50.

let y = cost
let x = # apples

$\frac{2}{8} = \$0.25/\text{apple}$

$y = 0.25x$
$\frac{4.50}{0.25} = \frac{0.25x}{0.25}$

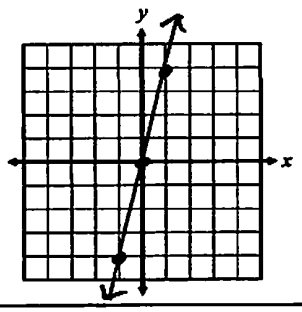
$\boxed{x = 18 \text{ apples}}$

DIRECT VARIATION GRAPH

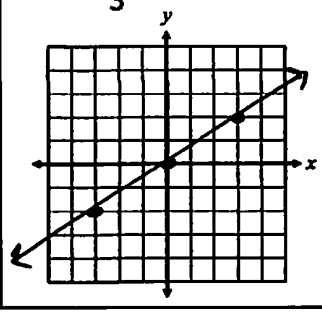
- It's important to understand that a **direct variation equation** ($y = kx$) is a special type of **linear equation** ($y = mx + b$).
- The y-intercept is always 0.
- The slope is k.

Directions: Graph each equation.

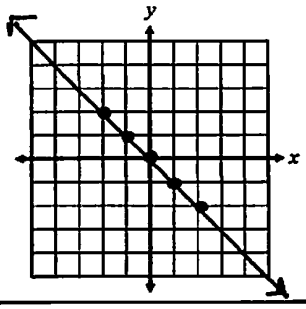
11. $y = 4x$



12. $y = \frac{2}{3}x$



13. $y = -x$



DIRECT or NOT DIRECT?

Set 1: Tables — Given the table, determine whether a direct variation exists. If yes, identify the constant of variation and write the equation that represents the relationship.

1.

x	y
1	4
2	8
3	12
4	16

yes; $k=4$

$y=4x$

2.

x	y
2	1
4	3
6	5
8	7

no

3.

x	y
3	-6
4	-8
5	-10
6	-12

yes; $k=-2$

$y=-2x$

4.

x	y
0	0
3	1
6	2
9	3

yes; $k=\frac{1}{3}$

$y=\frac{1}{3}x$

5.

x	y
0	1
1	3
2	5
3	7

no

6.

x	y
0	0
3	2
6	4
12	8

yes; $k=\frac{2}{3}$

$y=\frac{2}{3}x$

Set 2: Equations — Given the equation, determine whether a direct variation exists. If yes, identify the constant of variation.

7. $y=3x+1$

no

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

yes; $k=\frac{1}{2}$

9. $y=-x$

yes; $k=-1$

10. $y=\frac{5}{4}x+2$

no

11. $y=3$

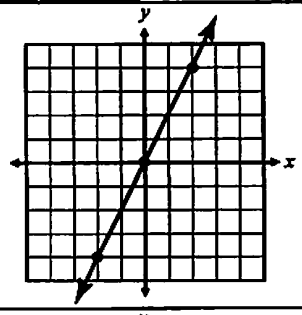
no

12. $4x+3y=0 \rightarrow y=-\frac{4}{3}x$

yes; $k=-\frac{4}{3}$

Set 3: Graphs — Given the graph, determine whether a direct variation exists. If yes, identify the constant of variation and write the equation that represents the relationship.

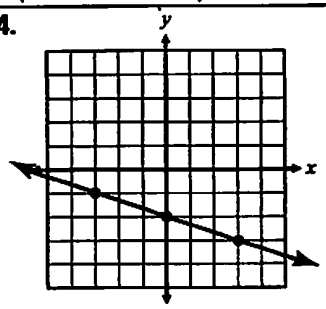
13.



yes; $k=2$

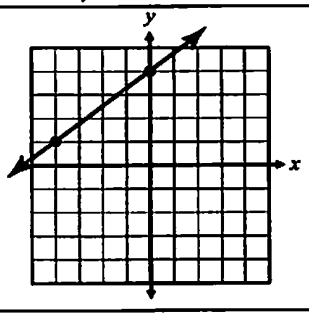
$y=2x$

14.



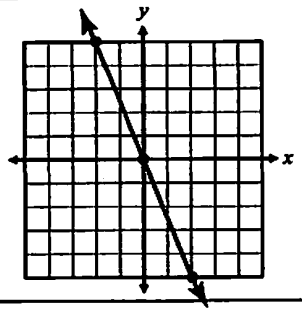
no

15.



no

16.



yes; $k=-\frac{5}{2}$

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

Name: _____ **Unit 5:** Functions & Linear Relationships

Date: _____ **Per:** _____ **Homework 11:** Direct Variation

**** This is a 2-page document! ****

Directions: Determine if the values in table represents a direct variation. If yes, **(a)** identify the constant of variation and **(b)** write an equation to represent the relationship.

1.

x	y
3	9
4	12
5	15
6	18

yes; $k=3$

$y=3x$

2.

x	y
-2	-7
0	-6
2	-5
4	-4

no

3.

x	y
4	3
5	4
6	5
7	6

no

4.

x	y
-6	3
-2	1
0	0
4	-2

yes; $k=-\frac{1}{2}$

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

5.

x	y
-3	-5
0	1
3	7
6	13

no

6.

x	y
0	0
2	5
4	10
6	15

yes; $k=\frac{5}{2}$

$y=\frac{5}{2}x$

7.

Gallons	Miles
1	21
2	42
3	63
4	84

yes; $k=21$ mi/gal

$y=21x$

8.

Seconds	Feet
5	6
10	12
15	18
20	24

yes; 1.2 ft/sec

$y=1.2x$

9.

Text Messages	Cost ($)
50	6.50
95	7.85
160	9.80
200	11

no

Directions: Determine if the equation represents a direct variation. If yes, identify the constant of variation.

10. $y=2x-3$

no

11. $y=-\frac{7}{4}x$

yes; $k=-\frac{7}{4}$

12. $x+y=9 \rightarrow y=-x+9$

no

13. $\frac{y}{7}=x \rightarrow y=7x$

yes; $k=7$

14. $3x+y=0 \rightarrow y=-3x$

yes; $k=-3$

15. $\frac{y}{x}=-5 \rightarrow y=-5x$

yes; $k=-5$

16. $5x-6y=12 \rightarrow y=\frac{5}{6}x-2$

no

17. $4y=x \rightarrow y=\frac{1}{4}x$

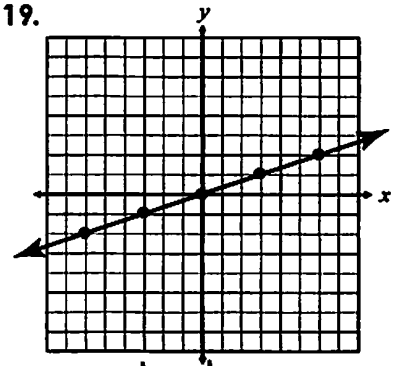
yes; $k=\frac{1}{4}$

18. $xy=20 \rightarrow y=\frac{20}{x}$

no

Directions: Determine if the graph represents a direct variation. If yes, identify the constant of variation and write an equation to represent the relationship.

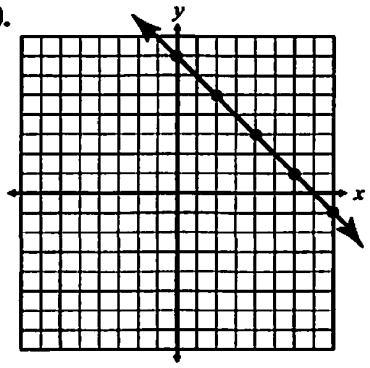
19.



yes; $k=\frac{1}{3}$

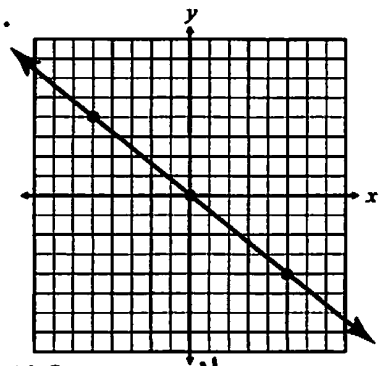
$y=\frac{1}{3}x$

20.



no

21.



yes; $k=-\frac{4}{5}$

$y=-\frac{4}{5}x$

22. Hannah's pay varies directly to the number of hours she works. If she made \$231 for 28 hours of work, identify the constant of variation and write an equation to represent the relationship.

let y = pay
let x = hours

$\frac{231}{28}=\$8.25/hr$

$y=8.25x$

23. The length of an object's shadow is directly proportional to the height of the object. If a 40-foot tall tree casts a 16-foot shadow, identify the constant of variation and write an equation to represent the relationship.

let y = shadow
let x = height

$\frac{16}{40}=0.4$

$y=0.4x$

24. The cost to board a dog at a kennel varies directly to the number of nights in which the dog will stay. If four nights cost \$96, identify the constant of variation and write an equation to represent the relationship.

let y = cost
let x = nights

$\frac{96}{4}=\$24/night$

$y=24x$

25. The number of calories in a bag of cookies varies directly to the number of cookies in the bag. If a bag with sixteen cookies has 1,120 contains calories, determine how many calories are in five cookies.

let y = calories
let x = cookies

$\frac{1120}{16}=70cal/cookie$

$y=70x$
$y=70(5)$
$y=350cal$

26. The cost to download songs on a music app varies directly to the number of songs downloaded. If it costs \$5.95 to download 7 songs, find the cost to download 20 songs.

let y = cost
let x = songs

$\frac{5.95}{7}=\$0.85/song$

$y=0.85x$
$y=0.85(20)$
$y=\$17$

27. The cost to mail a package varies directly to the weight of the package. If a 14-ounce package costs \$4.48 to mail, find the weight of a package that cost \$8 to mail.

let y = cost
let x = weight

$\frac{4.48}{14}=\$0.32/oz$

$y=0.32x$
$\frac{8}{0.32}=\frac{0.32x}{0.32}$
$x=25\ oz$

Unit 5 Test Study Guide
(Functions & Linear Relationships)

Name: _____

Date: _____ Per: _____

Topic 1: Relations & Functions

Directions: Identify the domain and range of each relation, then determine if the relation is a function.

1.

{(-2, 6), (-5, -1), (3, 7), (-5, 0)}

Domain: {-5, -2, 3}

Range: {-1, 0, 6, 7}

Function? no

2.

x	0	4	7	10	13
y	-5	-5	-5	-5	-5

Domain: {0, 4, 7, 10, 13}

Range: {-5}

Function? yes

3.

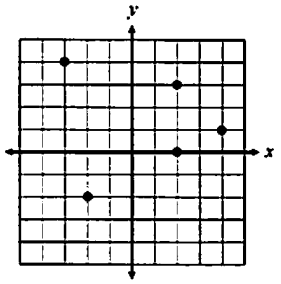
x	-3	-2	-1	0	1
y	-27	-8	-1	0	1

Domain: {-3, -2, -1, 0, 1}

Range: {-27, -8, -1, 0, 1}

Function? yes

4.

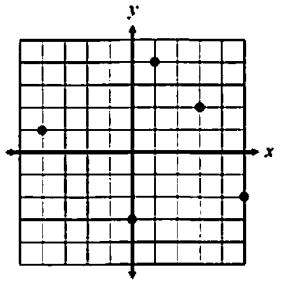


Domain: {-3, -2, 2, 4}

Range: {-2, 0, 1, 3, 4}

Function? no

5.

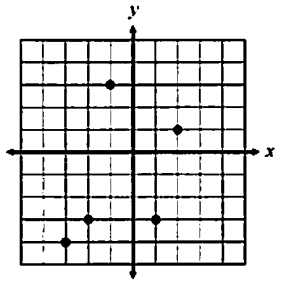


Domain: {-4, 0, 1, 3, 5}

Range: {-3, -2, 1, 2, 4}

Function? yes

6.



Domain: {-3, -2, -1, 1, 2}

Range: {-4, -3, 1, 3}

Function? yes

Topic 2: Equations as Functions

Directions: Given the function and its domain, find the range.

7. $y = 5x + 11$; domain = {-4, -1, 0}

$y = 5(-4) + 11$
$y = -9$

$y = 5(-1) + 11$
$y = 6$

$y = 5(0) + 11$
$y = 11$

range: {-9, 6, 11}

8. $y = 9 - \frac{1}{2}x$; domain = {-6, -2, 8}

$y = 9 - \frac{1}{2}(-6)$
$y = 12$

$y = 9 - \frac{1}{2}(-2)$
$y = 10$

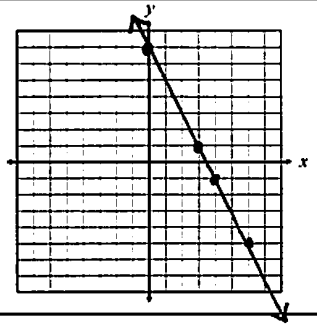
$y = 9 - \frac{1}{2}(8)$
$y = 5$

range: {5, 10, 12}

Directions: Complete each function table, then graph.

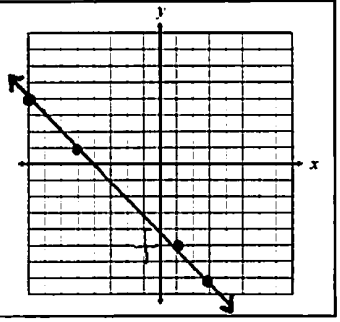
9. $y = -2x + 7$

x	y
0	7
3	1
4	-1
6	-5



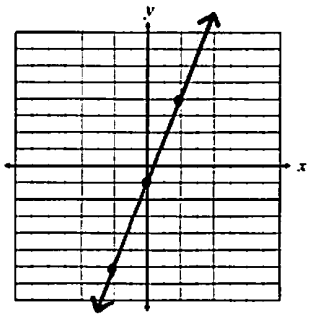
10. $y = -x - 4$

x	y
-8	4
-5	1
1	-5
3	-7



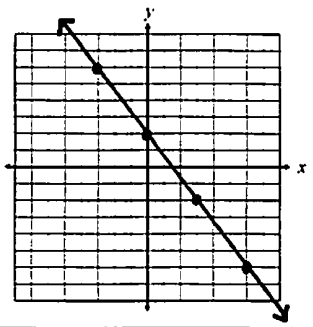
11. $y = \frac{5}{2}x - 1$

x	y
-2	-6
0	-1
2	4
4	9



12. $y = 2 - \frac{4}{3}x$

x	y
-3	6
0	2
3	-2
6	-6



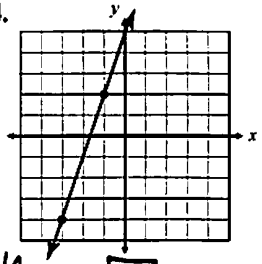
Topic 3: Slope

13. Identify and draw pictures the four types of slope.

Positive ↗ Negative ↘ Zero → Undefined ↕

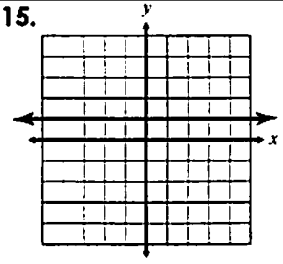
Directions: Find the slope of the line given the graph.

14.



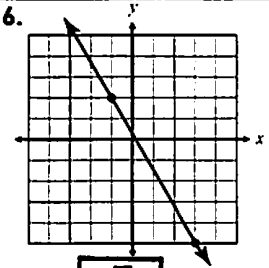
$\frac{6}{2} = \boxed{3}$

15.



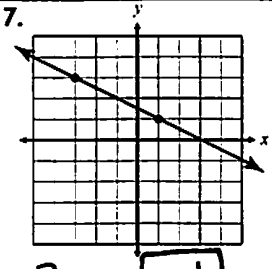
$\boxed{0}$

16.



$\boxed{-\frac{7}{4}}$

17.



$-\frac{2}{4} = \boxed{-\frac{1}{2}}$

Given any two points (x_1, y_1) and (x_2, y_2), you can find the slope of the line that passes through the points using the **slope formula.**

SLOPE FORMULA

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Directions: Find the slope of the line that passes through the given points.

18. (-2, 4) and (-3, 9)

$m = \frac{9-4}{-3-(-2)} = \frac{5}{-1}$

$= \boxed{-5}$

19. (7, -5) and (1, -13)

$m = \frac{-13-(-5)}{1-7} = \frac{-8}{-6}$

$= \boxed{\frac{4}{3}}$

20. (4, -9) and (4, 1)

$m = \frac{1-(-9)}{4-4} = \frac{10}{0}$

$= \boxed{\text{undef.}}$

21. (7, -3) and (-9, 5)

$m = \frac{5-(-3)}{-9-7} = \frac{8}{-16}$

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

Topic 4: Slope Applications (Rate of Change)

22. The table below shows the balance of a checking account on certain dates during the month of February.

Date	1	7	15	24
Balance ($)	443	872	610	1,050

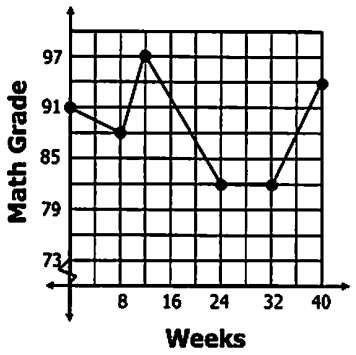
a) Find the rate of change from February 1st to February 7th. (1,443) (7,872)

$m = \frac{872-443}{7-1} = \frac{429}{6} = \boxed{\$71.5/\text{day}}$

b) Find the rate of change from February 7st to February 15th.

$m = \frac{610-872}{15-7} = \frac{-262}{8} = \boxed{\$-32.75}$

23. The graph below shows Noah's math grade during certain weeks of the school year.



a) Find the rate of change in Noah's grade from week 12 to week 24. (12, 97) (24, 82)

$m = \frac{82-97}{24-12} = \frac{-15}{12} =$ **-1.25 pts/wk**

b) Find the rate of change in Noah's grade from week 24 to week 32.

0 pts/wk

c) Find the rate of change in Noah's grade from week 32 to week 40. (32, 82) (40, 94)

$m = \frac{94-82}{40-32} = \frac{12}{8} =$ **1.5 pts/wk**

24. Mikayla went on a road trip. Two hours into the trip, she had 15 gallons of gas in her tank. Seven hours into her trip, she had 3 gallons of gas in her tank. Find the rate of change.

(2, 15) (7, 3)

$m = \frac{3-15}{7-2} = \frac{-12}{5} =$ **-2.4 gal/hr**

25. In 2006, the average NFL ticket price was \$62. If the average ticket price in 2015 was \$86, find the rate of change.

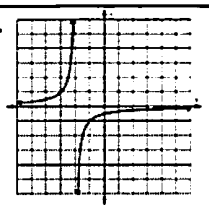
(06, 62) (15, 86)

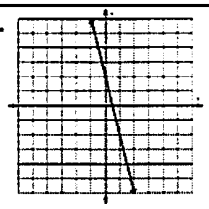
$m = \frac{86-62}{15-6} = \frac{24}{9} \approx$ **\$2.67/year**

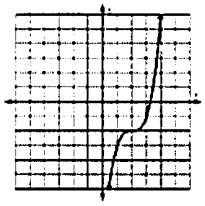
Topic 5: Linear vs. Nonlinear Functions

Slope-Intercept Form	Standard Form
$y = mx + b$	$Ax + By = C$

Directions: Determine if each graph, equation, or table represents a linear or nonlinear function.

26.  non-linear

27.  linear

28.  non-linear

29. $y = 1 - 3x$

linear

30. $y = \frac{-6}{x}$

non-linear

31. $2x - 3y = 15$

linear

32. $x^2 + y^2 = 9$

non-linear

33. $y = \frac{x}{-2} - 7$

linear

34. $y = x^3 + 4$

non-linear

35.

x	y
0	2
1	4
2	8
3	16

non-linear

36.

x	y
-5	-8
-3	-9
-1	-10
1	-11

linear

37.

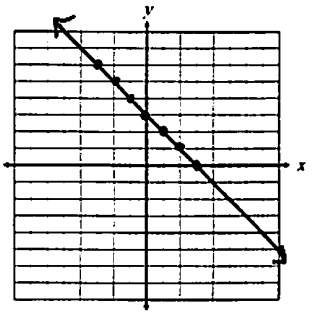
x	y
3	-5
8	-1
13	3
18	7

linear

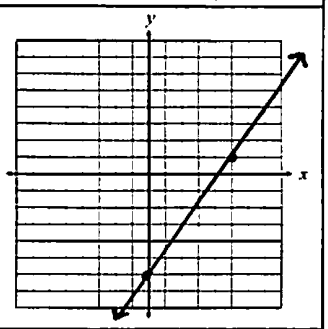
Topic 6: Graphing Linear Equations

Directions: Graph each equation. Show all work for converting standard form to slope-intercept form.

38. $y = -x + 3$



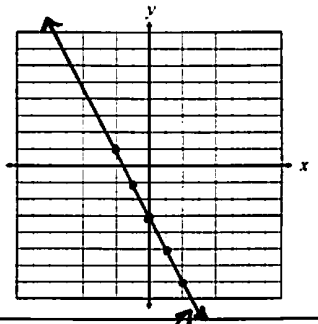
39. $y = \frac{7}{5}x - 6$



40. $2x + y = -3$

$-2x \quad -2x$

$y = -2x - 3$

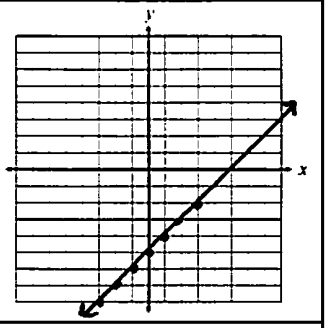


41. $x - y = 5$

$-x \quad -x$

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

$y = x - 5$

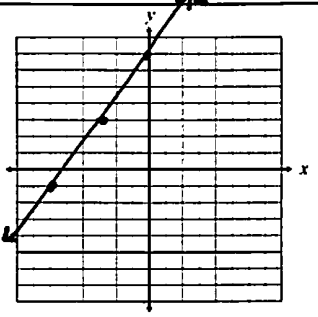


42. $4x - 3y = -21$

$-4x \quad -4x$

$\frac{-3y}{-3} = \frac{-4x}{-3} - \frac{21}{-3}$

$y = \frac{4}{3}x + 7$

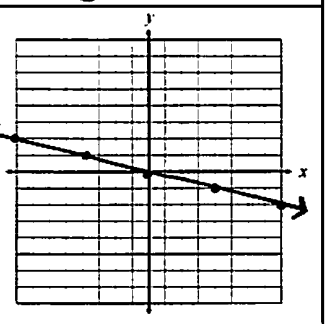


43. $-x - 4y = 0$

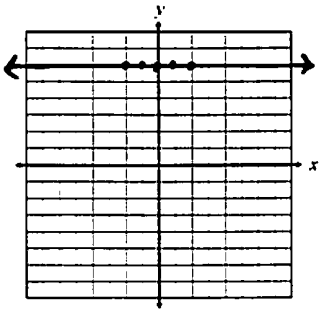
$+x \quad +x$

$\frac{-4y}{-4} = \frac{x}{-4}$

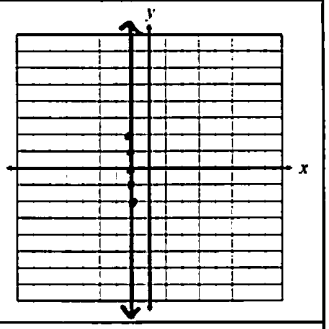
$y = -\frac{1}{4}x$



44. $y = 6$

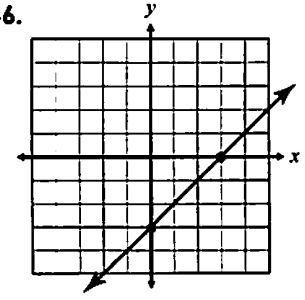


45. $x = -1$



Directions: Write the equation of the line shown on the graph in slope-intercept form.

46.

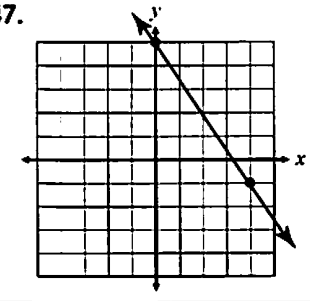


$b = -3$

$m = \frac{3}{3} = 1$

$y = x - 3$

47.



$b = 5$

$m = \frac{-6}{4} = -\frac{3}{2}$

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

Topic 6: Slope-Intercept Form Applications

48. Brynn has $1,200 in her savings account and plans to save an additional $350 each month in order to purchase a car. Write an equation to represent the total amount she has saved each month. Identify your variables.

let y = total saved
let x = months

$y = 350x + 1200$

a) What is the rate of change?

$350 / month

b) What is the initial value?

$1200

c) What is the independent variable?

months

d) What is the dependent variable?

savings

49. A long distance phone call costs $1.75 plus $0.30 for each minute of the call. Write and solve a linear equation to find the length of a phone call that cost $7.45.

let x = minutes
let y = total cost

$y = 0.30x + 1.75$

$7.45 = 0.3x + 1.75$
$-1.75 \quad -1.75$
$5.70 = 0.3x$
$\frac{5.70}{0.3} = \frac{0.3x}{0.3}$
$x = 19$ min

50. On October 1st, the high temperature was 72° F. Each day after that, the high temperature decreased by 0.4° F. Write and solve an equation to find the high temperature on October 20th.

let x = days
let y = temp

$y = -0.4x + 72$

$y = -0.4(19) + 72$
$y = -7.6 + 72$
$y = 64.4°$

Topic 7: Direct Variation

A **direct variation** is a special type of linear function in which there is a constant rate of change between the variables ($k = \frac{y}{x}$) and the y-intercept is always 0.

DIRECT VARIATION

$y = kx$

Directions: Determine if the values in table represents a direct variation. If yes, identify the constant of variation and write an equation to represent the relationship.

51.

x	y
-3	9
0	0
2	-6
4	-12

yes; $k = -3$

$y = -3x$

52.

x	y
1	2
2	6
3	10
4	14

no

53.

Miles	Toll ($)
20	1.80
28	$2.45
45	$3.85
72	$5.76

no

54.

Gallons	Miles
1	21
2	42
3	63
4	84

yes; $k = 21$

$y = 21x$

Directions: Determine if the equation represents a direct variation. If yes, identify the constant of variation.

55. $y = 7x$

yes; $k=7$

56. $y = \frac{9}{x}$

no

57. $\frac{y}{x} = \frac{1}{3}$ → $y = \frac{1}{3}x$

yes; $k = \frac{1}{3}$

58. $x + 3y = 0$ → $y = \frac{-1}{3}x$

yes; $k = \frac{-1}{3}$

59. $5x + 2y = 10$ → $y = \frac{-5}{2}x + 5$

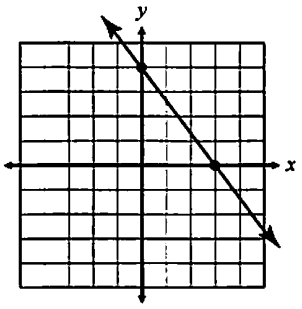
no

60. $4y = -5x$ → $y = \frac{-5}{4}x$

yes; $k = -\frac{5}{4}$

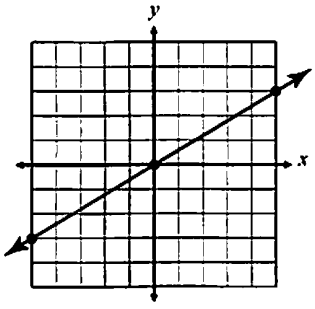
Directions: Determine if the graph represents a direct variation. If yes, identify the constant of variation and write an equation to represent the relationship.

61.



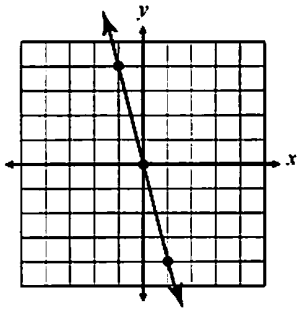
no

62.



yes; $k = \frac{3}{5}$

63.



yes; $k = -4$

64. The amount of interest earned on a savings account varies directly with the amount of money saved. If \$34 is earned on a balance of \$850, identify the constant of variation and write an equation to represent the relationship.

let y = interest
let x = savings

$\frac{34}{850} = \$0.04$/dollar

$y = 0.04x$

65. The distance traveled by a bus is directly proportional to the length of time it travels. If it took the bus 3 hours to drive 156 miles, identify the constant of variation and write an equation to represent the relationship.

let y = distance
let x = time

$\frac{156}{3} = 52$ mi/hr

$y = 52x$

66. The number of gallons needed to paint a house varies directly to the square feet the paint will cover. If two gallons of paint covers 700 square feet, find the number of gallons needed to cover 2,000 square feet.

let y = gallons
let x = coverage

$\frac{2}{700} = \frac{1}{350}$

$y = \frac{1}{350}x$

$y = \frac{1}{350}(2000)$

$y \approx 5.71$ → 6 gal

67. The depth of a diver is directly proportional to the time since the diver entered the water. If it took the diver 45 minutes to reach a depth of 80 feet, find the time it will take to reach a depth of 200 feet.

let y = depth
let x = time

$\frac{80}{45} = \frac{16}{9}$

$y = \frac{16}{9}x$

$\left(\frac{9}{16}\right)200 = \frac{16}{9}x\left(\frac{9}{16}\right)$

$x = 112.5$ min

Name: _____

Date: _____ **Per:** _____

Unit 5 Test

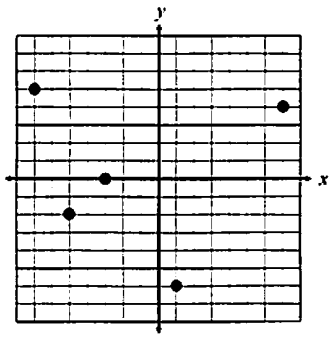
Functions & Linear Relationships

1. What is the domain of the relation given below?

{(2, -5), (4, 7), (0, 2), (9, -1)}

{0, 2, 4, 9}

2. What is the range of the relation shown on the graph?



{-6, -2, 0, 4, 5}

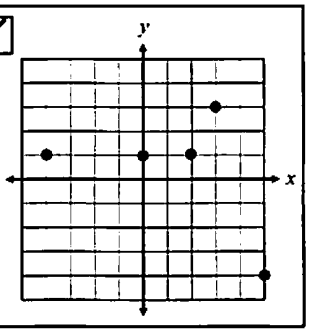
3. Which relations represent a function? Check all that apply.

☑ **{(-9, 2), (4, -5), (-2, 0), (0, 2)}**

☑

x	y
1	1
2	2
3	3
4	4

☑



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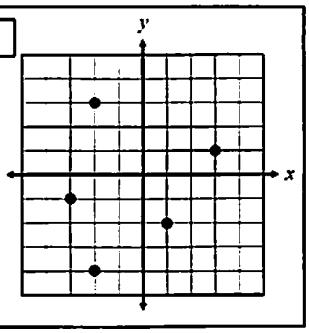


4. Which relation is a function with range of {-1, 0, 1, 4}?

A. {(1, 5), (-1, -2), (0, 3), (4, -7}

B. {(5, 1), (-2, 0), (5, 4), (0, -1}

C. {(-8, 0), (3, 4), (0, -1), (-2, 1}

D. {(-1, -2), (0, -1), (1, 0), (4, 3}

C

5. Which ordered pair could be added to the relation below to ensure to continues to be a function?

(-7, 9), (4, -1), (0, 5), (-2, -2)

A. (4, -4) **C.** (0, -3)

B. (5, 0) **D.** (-7, -1)

B

6. What is the range of the function $y = 4x - 7$ when the domain is {-2, -1, 3}?

$y = 4(-2) - 7$ $y = -15$

$y = 4(-1) - 7$ $y = -11$

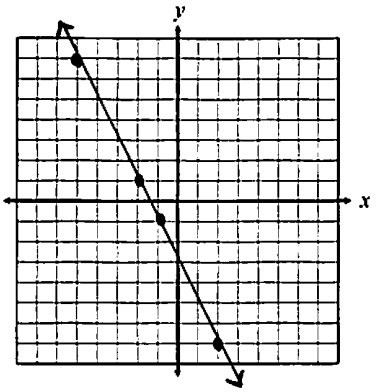
$y = 4(3) - 7$ $y = 5$

{-15, -11, 5}

For questions 7-8, complete the table and graph the function.

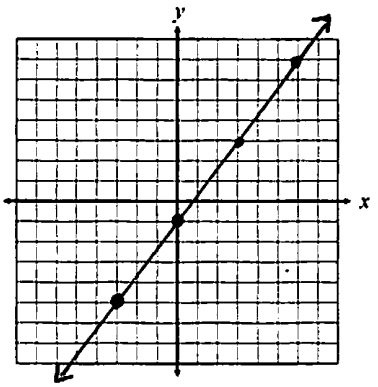
7. $y = -3 - 2x$

x	y
-5	7
-2	1
-1	-1
2	-7

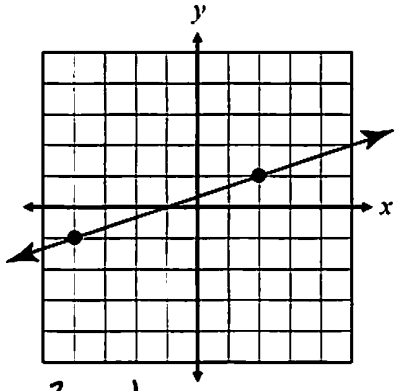


8. $y = \frac{4}{3}x - 1$

x	y
-3	-5
0	-1
3	3
6	7



9. What is the slope of the line graphed below?



$\frac{2}{6} = \frac{1}{3}$

A. 3

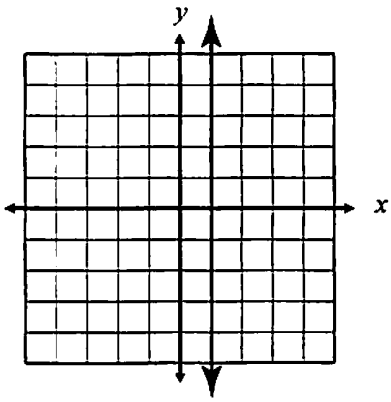
B. -3

C. $\frac{1}{3}$

D. $-\frac{1}{3}$

C

10. What is the slope of the line graphed below?



A. 1

B. -1

C. 0

D. undefined

D

11. Find the slope of the line that passes through the points (-1, -3) and (-9, 7).

$m = \frac{7-(-3)}{-9-(-1)} = \frac{10}{-8} = -\frac{5}{4}$

$m = -\frac{5}{4}$

12. Find the slope of the line that passes through the points (-6, -2) and (-7, -2)

$m = \frac{-2-(-2)}{-7-(-6)} = \frac{0}{-1} = 0$

0

The table below shows the age of a tree along with its height. Use the table to answer questions 13-14.

Age (years)	Height (feet)
0	0
2	4
7	10
9	15
13	24

> 2 ft/yr
> 1.2 ft/yr
> 2.5 ft/yr
> 2.25 ft/yr

13. What is the rate of change from year 2 to year 7?

$\frac{10-4}{7-2} = \frac{6}{5}$

1.2 ft/yr

14. During which interval is the rate of change the greatest?

A. year 0 to year 2

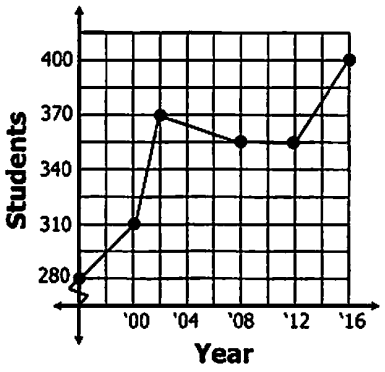
B. year 2 to year 7

C. year 7 to year 9

D. year 9 to year 13

C

The graph below shows the number of students in the 8th grade class. Use the graph to answer questions 15-16.



15. Find the rate of change from 2002 to 2008.

$\frac{355-370}{08-02} = \frac{-15}{6}$

A. -2.5 students per year
B. 2.5 students per year
C. -3 students per year
D. 3 students per year

A

16. Find the rate of change from 2012 to 2016.

$\frac{400-355}{16-12} = \frac{45}{4}$

A. -10.5 students per year
B. 10.5 students per year
C. -11.25 students per year
D. 11.25 students per year

D

17. Allie bought a used car in 2011 with 19,800 miles on it. In 2016, she had 500 more than four times the number of miles that were on it when she purchased it. Find the rate of change in miles from 2011 to 2016.

$\frac{79700-19800}{16-11} = \frac{59900}{5} = 11980$

A. 9,980 miles per year
B. 10,175 miles per year
C. 10,760 miles per year
D. 11,980 miles per year

D

18. Which equations represent linear functions? Check all that apply.

- ☐ $y = -x^2 + 4$
- ☑ $y = 5 - \frac{x}{2}$
- ☑ $x - 3y = 3$
- ☑ $8y = 6x$
- ☐ $y = \frac{6}{x}$

19. Which table of values represents a nonlinear function?

A.

x	y
0	-2
1	1
2	4
3	7

B.

x	y
3	1
6	3
9	9
12	27

C.

x	y
-4	7
-2	6
0	5
2	4

D.

x	y
5	-2
9	-4
13	-6
17	-8

B

20. Which equation has a slope of 3?

A. $y = 3$
B. $y = 3 - x$
C. $y = 3x - 1$
D. $y = x + 3$

C

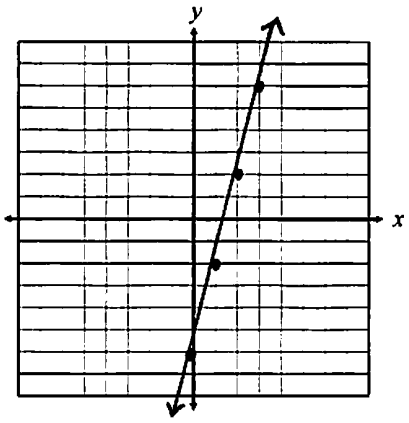
21. Which equation has a slope of $\frac{1}{2}$ and a y-intercept of -5?

A. $2x + y = -5 \rightarrow y = -2x - 5$
B. $2x - y = 5 \rightarrow y = 2x - 5$
C. $x + 2y = -10 \rightarrow y = -\frac{1}{2}x - 5$
D. $x - 2y = 10 \rightarrow y = \frac{1}{2}x - 5$

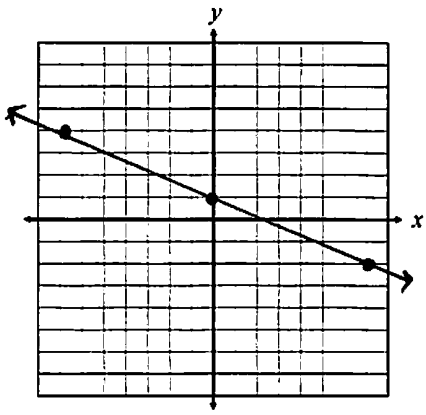
D

Graph each line. Give the slope-intercept form for all standard form equations.

22. $y = 4x - 6$



23. $y = -\frac{3}{7}x + 1$



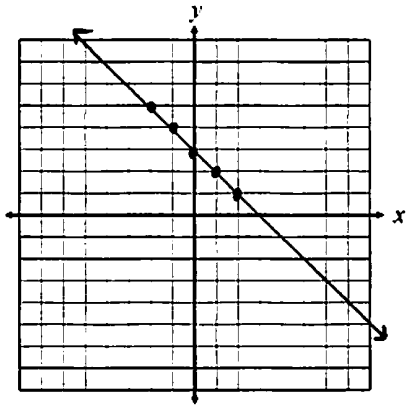
24. $x + y = 3$

$-x \quad -x$

$y = -x + 3$

Slope-Intercept Form

$y = -x + 3$



25. $-x + 3y = 15$

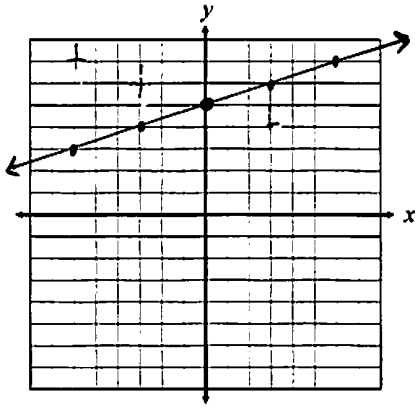
$+x \quad +x$

$\frac{3y}{3} = \frac{x}{3} + \frac{15}{3}$

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

Slope-Intercept Form

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



26. $5x + 2y = -14$

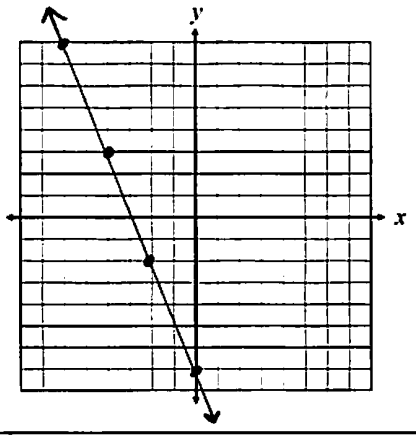
$-5x \quad -5x$

$\frac{2y}{2} = \frac{-5x}{2} - \frac{14}{2}$

$y = -\frac{5}{2}x - 7$

Slope-Intercept Form

$y = -\frac{5}{2}x - 7$



27. $2x - y = 0$

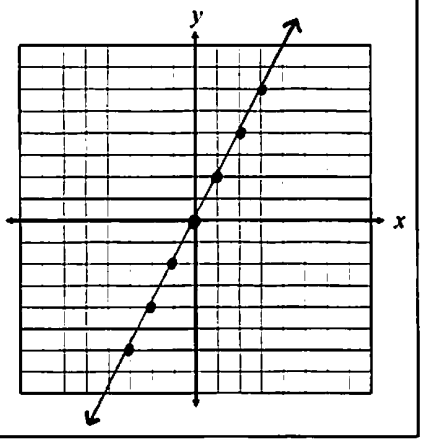
$-2x \quad -2x$

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

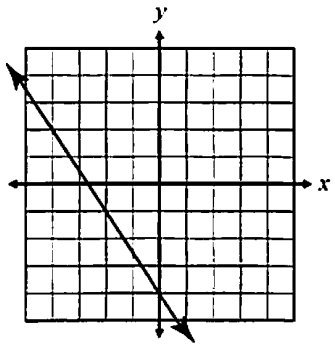
$y = 2x$

Slope-Intercept Form

$y = 2x$



28. Which equation best represents the line on the graph?



A. $y = -\frac{3}{2}x - 4$

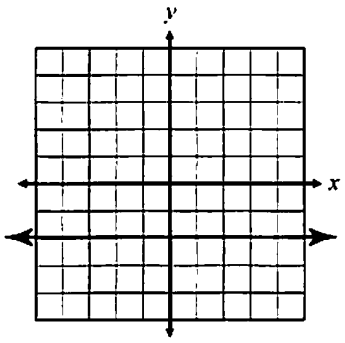
B. $y = \frac{3}{2}x - 4$

C. $y = -\frac{2}{3}x - 4$

D. $y = -\frac{2}{3}x + 4$

A

29. Which equation best represents the line on the graph?



A. $x = 0$

B. $y = 0$

C. $x = -2$

D. $y = -2$

D

Use for questions 30-31: The cost to rent a boat can be modeled by the equation $C = 18h + 35$ where C is the total cost in dollars and h is the number of hours in which the boat is rented.

30. What is the rate of change?

$18/hr

31. What is the dependent variable?

A. h **C.** 18

B. C **D.** 35

B

32. A smartphone originally worth \$790 loses value at a rate of \$175 each year. Write an equation to represent the value of the phone, then find the value of the phone after 4 years. Identify your variables.

let x = years
let y = value

$y = -175x + 790$

$y = -175(4) + 790$
$y = -700 + 790$
$y = 90$

Equation: $y = -175x + 790$

Solution: \$90

33. An amusement park charges \$8 for parking in addition to \$1.25 per ride ticket. Write an equation to represent the total cost to visit the amusement park, then find the number of rides a person can go in they have \$30. Identify your variables.

let x = tickets
let y = cost

$y = 1.25x + 8$

$30 = 1.25x + 8$
$22 = 1.25x$
$x = 17.6$

Equation: $y = 1.25x + 8$

Solution: 17 rides

34. Which of the following represent a direct variation? Check all that apply.

☑ $y = -5x$

x	y
1	0
2	3
3	5
4	7

☐ $y = 2 - x$

x	y
-2	2
-1	1
0	0
1	-1

☑ $4x - 7y = 0$

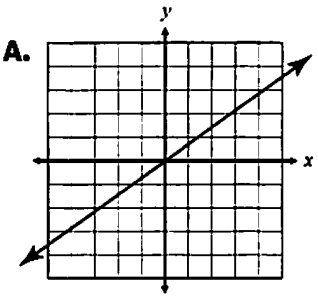
x	y
4	5
8	10
12	15
16	20

☑ $y = \frac{x}{3}$

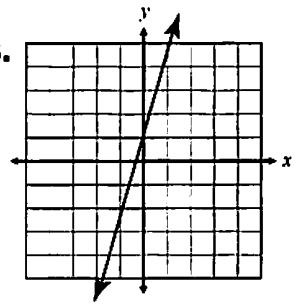
x	y
3	6
4	2
5	-2
6	-6

35. Which graph does not represent a direct variation? B

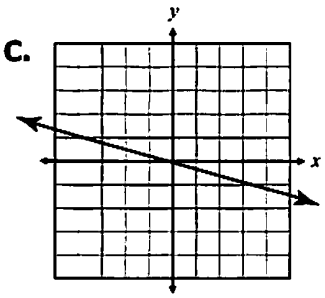
A.



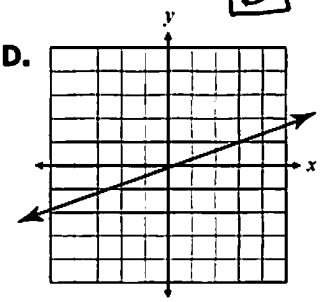
B.



C.



D.



For questions 36-37, determine whether the values in the table represent a direct variation. If yes, write an equation to represent the relationship.

36.

Seconds, x	12	20	36	52
Feet, y	6	10	18	26

Direct Variation? ☑ Yes ☐ No

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

37.

Buses, x	2	5	8	12
Students, y	62	140	256	348

Direct Variation? ☐ Yes ☑ No

Equation: N/A

Use for questions 38-40: The property taxes on a home varies directly with the value of the home. Jack currently lives in a home worth \$172,000 and pays \$13,760 in taxes. y = taxes x = value

38. Identify the constant.

$\frac{13760}{172000}$

\$0.08 / dollar

39. Write an equation to represent the relationship.

$y = 0.08x$

40. How much would someone pay in property taxes if they live in a \$329,000 home in the same area?

$y = 0.08(329000)$

$y = 26320$

\$26,320

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