

## 5.3 GRAPHING LINEAR RELATIONS

Name: \_\_\_\_\_

Block \_\_\_\_\_

### Review

Relation –

*Example:*

### A) GRAPHING LINEAR EQUATIONS: METHOD 1-TABLE OF VALUES

You can **graph a linear relation** by building a table of values and graphing the ordered pairs from the table. It helps to know the “rate of change” (*or the slope*).

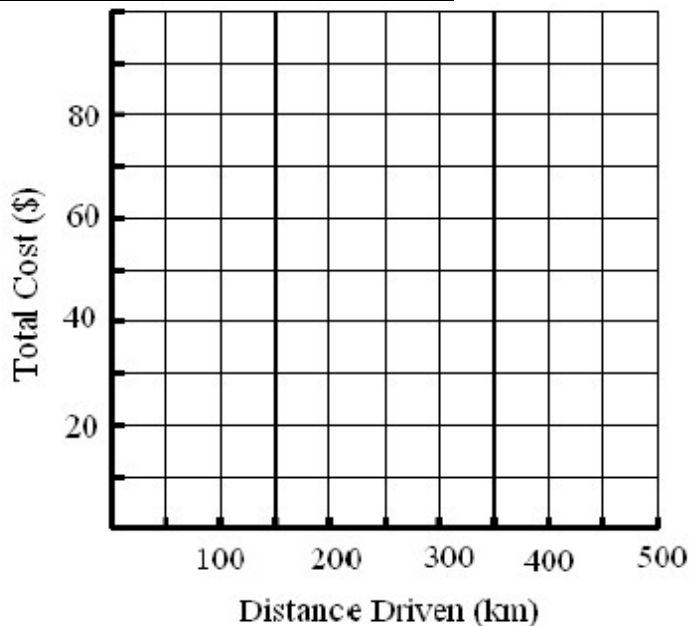
**Example #1:** Crothall Car Rental charges customers \$20 per day, plus \$0.10 for each kilometre driven.

a) Complete the table of values.

Number of kilometres driven(n)	Total Cost (C)
0	
100	
200	
300	

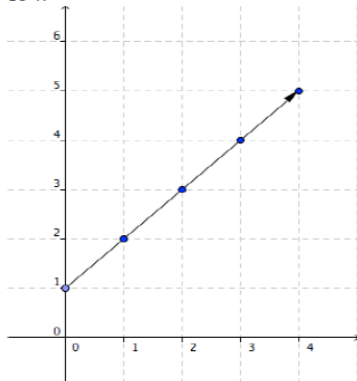
b) Write an equation for cost:

$$C = \underline{\hspace{2cm}}$$



Complete the table of values from the given linear relation.

154.



A. Complete the table of values.

x	y
0	1
1	2
2	3
3	4

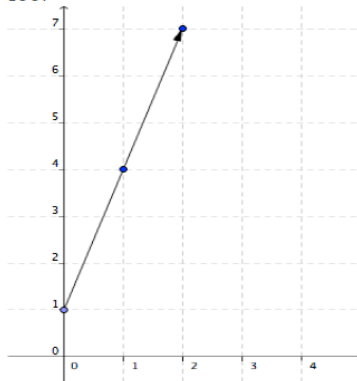
B. Write an equation to represent the table of values?

Y is one more than x. Therefore  $y=x+1$

C. How can the equation be used to determine where the line crosses the y-axis(y-intercept)?

The 1 from  $y=x+1$  is where it the graph crosses the y-axis.

155.



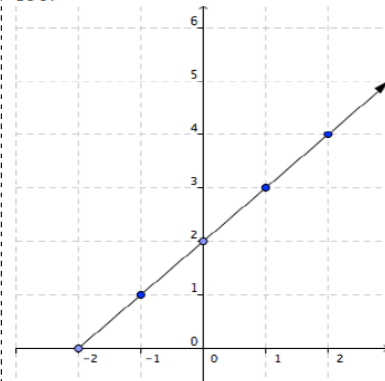
A. Complete the table of values.

x	y
0	
1	
2	
3	

B. Write an equation to represent the table of values?

C. How can the equation be used to determine the y-intercept?

156.



A. Complete the table of values.

x	y
0	
1	
2	
3	

B. Write an equation to represent the table of values?

C. How can the equation be used to determine the rate of change?

**Complete the following table of values:** use the formula provided, and substitute x-values

1)  $y = 6x$

x	y
2	
7	
-2	
-8	
0	

5)  $y = -5x + 8$

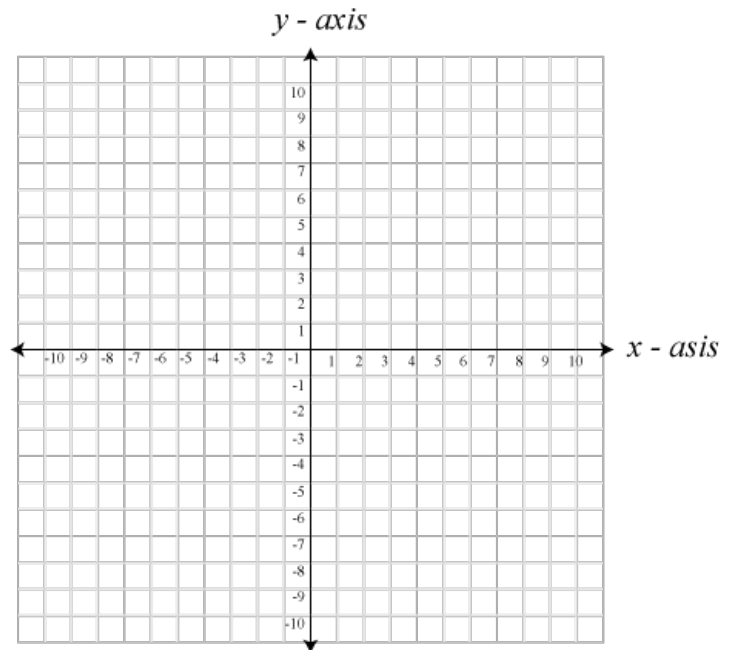
x	y
-5	
-8	
4	
0	
2	

2)  $y = -4x$

x	y
1	
5	
8	
-8	
0	

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

x	y
6	
-5	
-3	
1	
7	



# Remember!

## Linear Relation

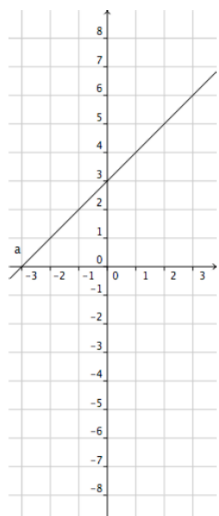
- A linear relation when graphed forms a straight line.
- Or a straight line can be drawn through every point of the graph.
- A linear relation has a constant rate of change.

Which of the following are linear relations?

80.  $y = x + 3$

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

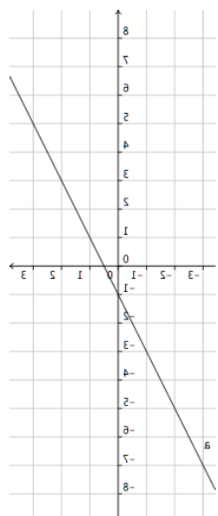
Rate of change?



81.  $y = 2x - 1$

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

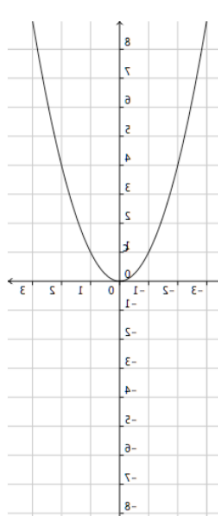
Rate of change?



82.  $y = x^2$

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

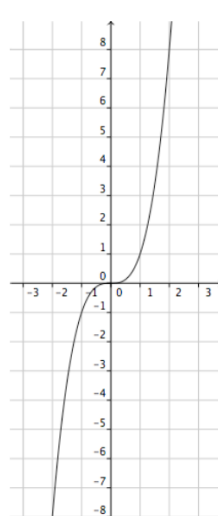
Rate of change?



83.  $y = x^3$

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

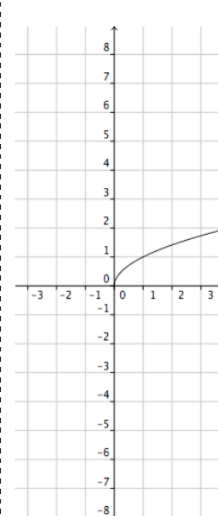
Rate of change?



84.  $y = \sqrt{x}$

x	y
4	2
1	1
0	0
-1	∅
-2	∅

Rate of change?

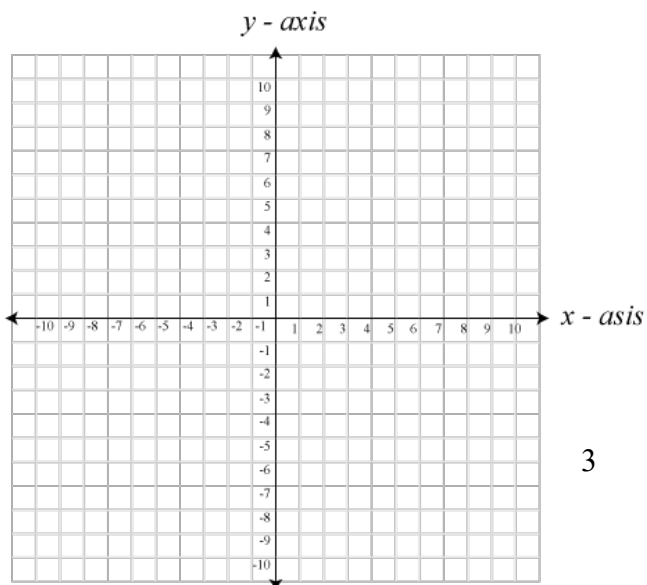


"Rate of Change" and "the Slope of a line" mean the same thing

## B) SLOPE OF A LINE

Determine the "Rate of Change" for the following table of values:

x	y
5	5
7	3
9	1
11	-1



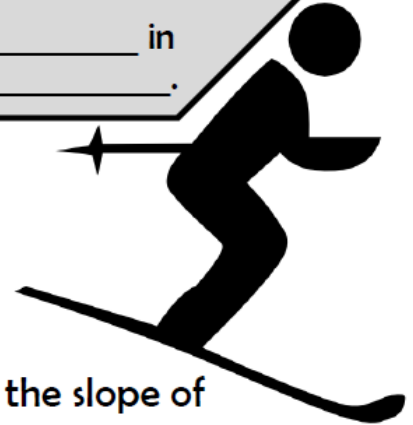
Name: \_\_\_\_\_

Slope (vertical change over horizontal change) is represented by the letter "m."

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

$$m = \underline{\hspace{2cm}}$$

Slope represents the **rate of change**.  
Slope should be written as a \_\_\_\_\_ in \_\_\_\_\_.



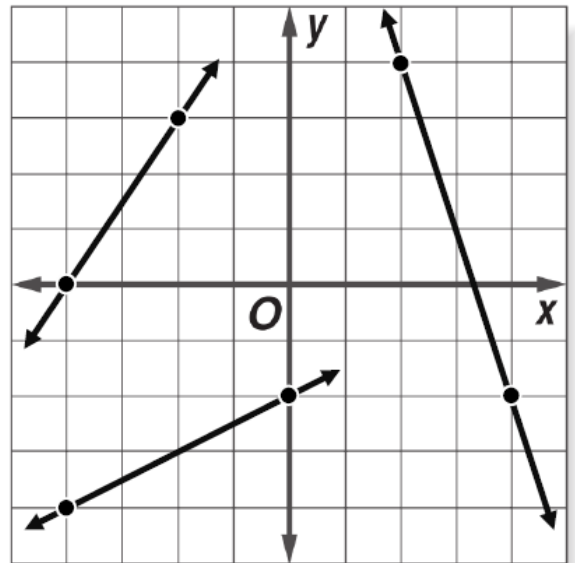
Find the slope of each line below.

The slope of a line can be determined from a table, by \_\_\_\_\_ units on a coordinate plane, or by \_\_\_\_\_ coordinates.

Find the slope between the two points.

1. (3, -2) and (4, 4)

2. (6, 0) and (-8, -1)

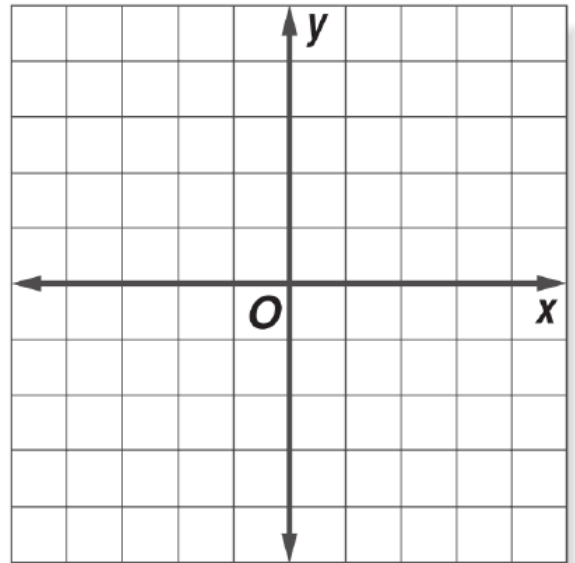


The slope of a horizontal line is \_\_\_\_\_.

The slope of a vertical line is \_\_\_\_\_.

Plot a line that starts at the origin and has a slope of -3. Label it "a."

Plot a line that starts at (0, 4) and has a slope of  $-\frac{3}{4}$ . Label it "b."



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# SLOPE

Remember:

UP and RIGHT are \_\_\_\_\_ movements;

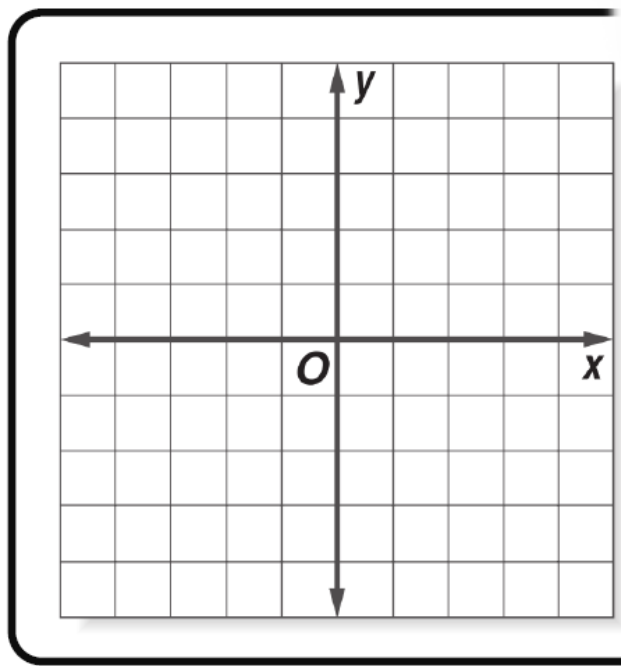
DOWN and LEFT are \_\_\_\_\_ movements.

steeper slopes have greater \_\_\_\_\_

# STEEP

Name: \_\_\_\_\_

try-it



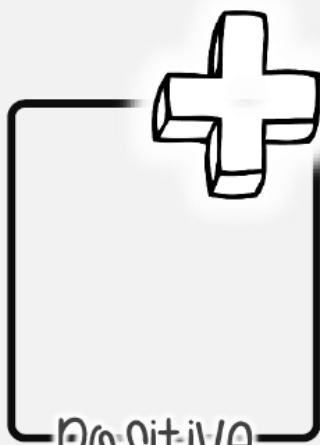
Graph four different lines, all with different negative slopes. Show each slope and compare steepness.

Slopes will be represented with fractions with a greater

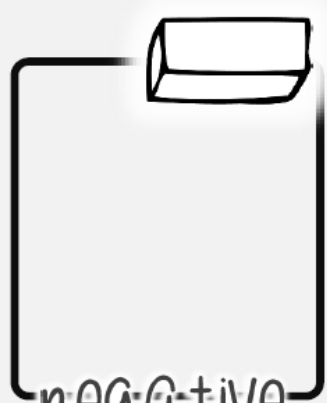


Sketch a sample (or a few) of each type of slope. Add a skier if you want! It may help you remember the direction and whether the values are increasing or decreasing.

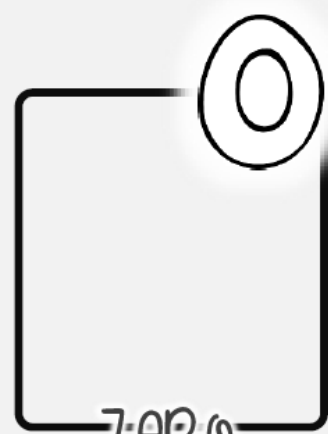
Sketch it



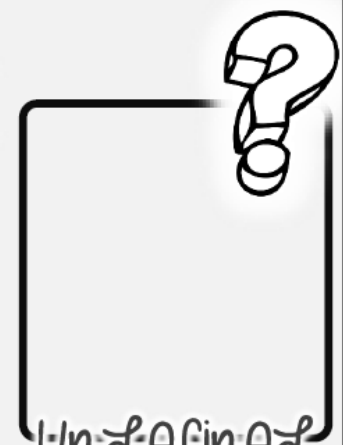
positive slope



negative slope



zero slope



undefined slope

Order from steepest to least steep:  $1/3$ ,  $3$ ,  $3/2$ ,  $3/4$

Name \_\_\_\_\_

Date \_\_\_\_\_

# EXTREME SPORTS

## FINDING SLOPE



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

Directions: Find the slope of the line given a pair of points, a table, a graph or a verbal situation. Write your answer in the box below the problem number.

1	(20, -3), (19, -20)			
	A. 17	B. $\frac{1}{17}$	C. -17	D. $-\frac{1}{17}$

2	(-5, 11), (0, 7)			
	A. $-\frac{5}{4}$	B. $\frac{5}{4}$	C. $-\frac{4}{5}$	D. $\frac{4}{5}$

3	(-20, 9), (14, 9)			
	A. undefined	B. 3	C. -3	D. 0

4	(12, -1), (-2, -3)			
	A. -7	B. $\frac{1}{7}$	C. $-\frac{1}{7}$	D. 7

5	(-3, 15), (9, 17)			
	A. 6	B. $\frac{1}{6}$	C. $-\frac{1}{6}$	D. -6

6	(7, -11), (16, 7)			
	A. $\frac{1}{2}$	B. $-\frac{1}{2}$	C. -2	D. 2

7	(-1, -16), (-1, 11)			
	A. undefined	B. 1	C. -1	D. 0

8	(-2, -7), (3, -10)			
	A. -3	B. $-\frac{3}{5}$	C. $\frac{3}{5}$	D. 5

9	<table border="1"> <tr> <td>x</td> <td>-8</td> <td>0</td> <td>4</td> <td>8</td> </tr> <tr> <td>y</td> <td>-7</td> <td>-1</td> <td>2</td> <td>5</td> </tr> </table>				x	-8	0	4	8	y	-7	-1	2	5
	x	-8	0	4	8									
y	-7	-1	2	5										

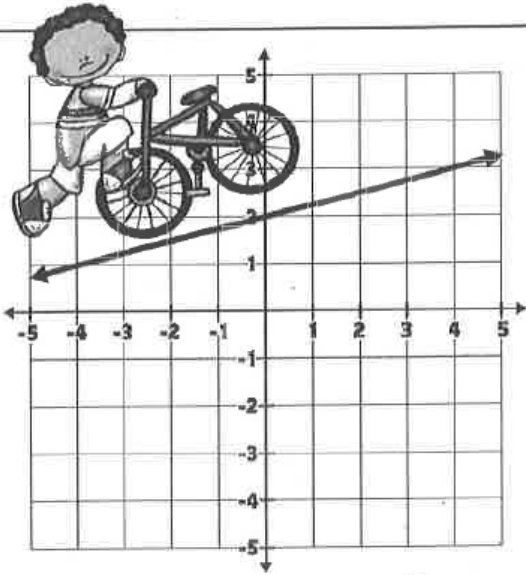
10	<table border="1"> <tr> <td>x</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>19</td> <td>17</td> <td>15</td> <td>13</td> </tr> </table>				x	-1	0	1	2	y	19	17	15	13
	x	-1	0	1	2									
y	19	17	15	13										

11	<table border="1"> <tr> <td>x</td> <td>y</td> </tr> <tr> <td>0</td> <td>6</td> </tr> <tr> <td>5</td> <td>5</td> </tr> <tr> <td>10</td> <td>4</td> </tr> <tr> <td>15</td> <td>3</td> </tr> </table>		x	y	0	6	5	5	10	4	15	3
	x	y										
	0	6										
	5	5										
	10	4										
	15	3										

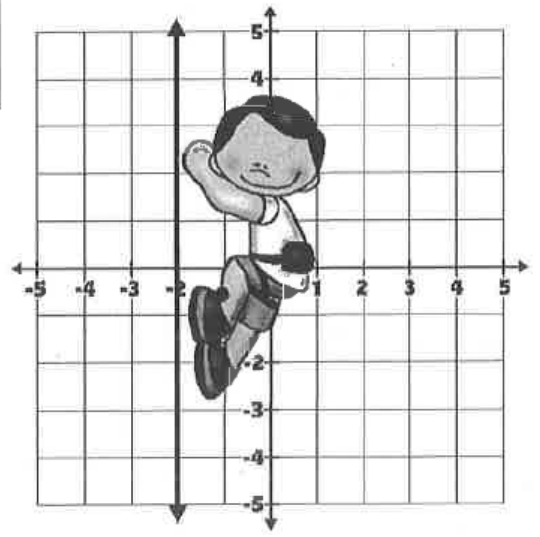
12	<table border="1"> <tr> <td>x</td> <td>y</td> </tr> <tr> <td>-6</td> <td>-27</td> </tr> <tr> <td>-5</td> <td>-23</td> </tr> <tr> <td>-1</td> <td>-7</td> </tr> <tr> <td>0</td> <td>-3</td> </tr> </table>		x	y	-6	-27	-5	-23	-1	-7	0	-3
	x	y										
	-6	-27										
	-5	-23										
	-1	-7										
	0	-3										



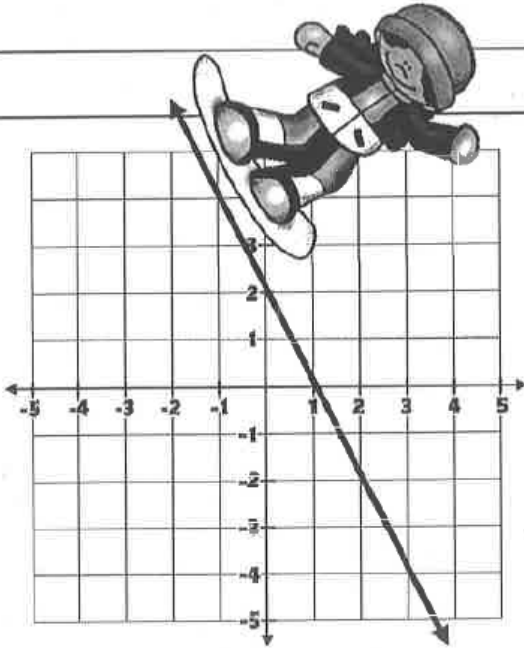
13



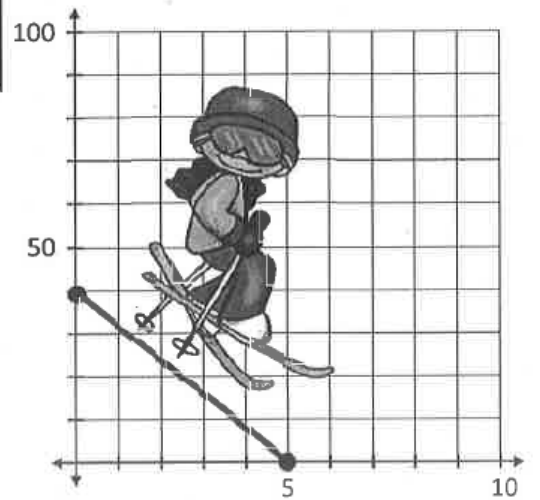
14



15



16



17

The water level in Noah's water tank is 72 inches high. Noah begins to drain a water tank by opening a valve. The water drains at the speed of 5 inches per minute.

18

A pet store is selling puppies for \$50 each plus a \$14.99 transfer fee.

19

A small bookstore is selling copies of the book *To Kill a Mockingbird* for \$6.99 each plus \$0.99 for shipping and handling.

20

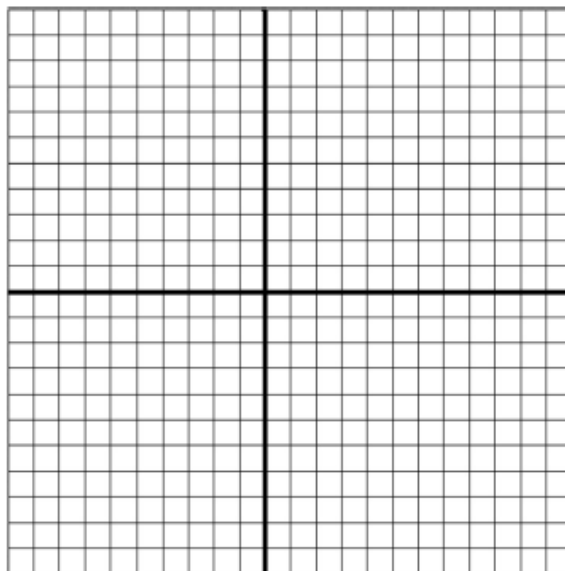
To rent movies from the store, a person has to pay an annual membership fee of \$20 plus \$2.50 for each movie rented.

**Example #2:** Graph the linear relation  $y = 2x - 4$  using a table of values.

e) In this example, the \_\_\_\_\_ depends on the \_\_\_\_\_

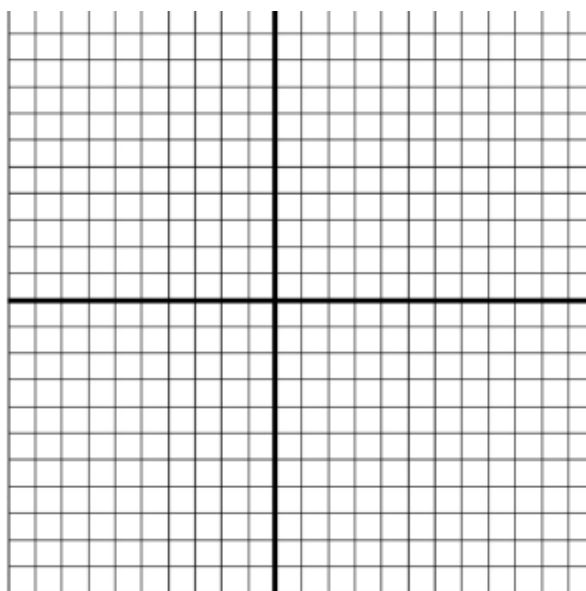


$x$	$y$
-1	
0	
1	
2	
3	



Graph  $y = 6 - 3x$  using a table of values.

$x$	$y$



Using your graph estimate the value of  $y$  if  $x = 4$ : \_\_\_\_\_ value of  $x$  if  $y = 3$ : \_\_\_\_\_



**Example #3:** The Reynolds student council is planning to hold a dance. The profit in dollars is four times the number of students who attend, minus \$200 for the cost of the DJ.

a) Write an equation that relates the profit ( $P$ ) to the number of students ( $n$ ) who attend.

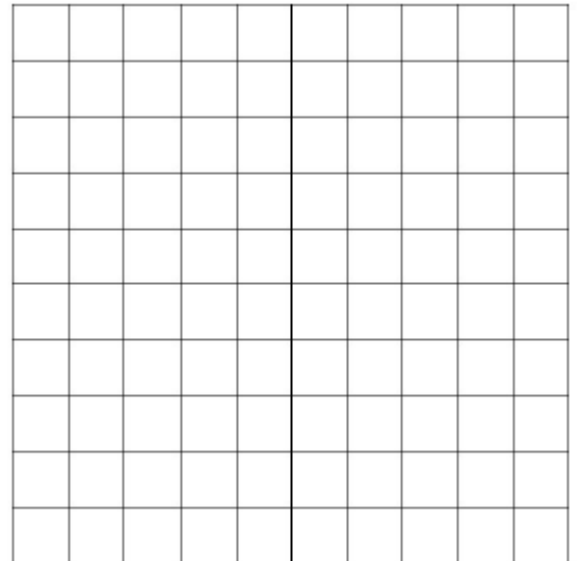
\_\_\_\_\_

b) What is the lowest value of  $n$  that we can include in the table of values?

c) Create a table of values for this relation

$n$	$P$

d) Graph the relation using your table of values.



e) Does it make sense to join the points? Explain.

f) The independent variable is \_\_\_\_\_;  
the dependent variable is \_\_\_\_\_.

g) How many students have to attend to make a profit?

Where did you look to find this?

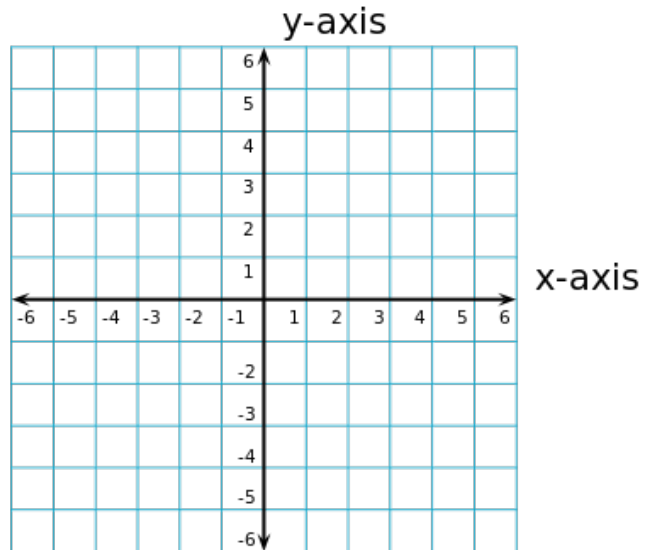
h) How would the graph be different if the DJ was free?

### C) GRAPHING HORIZONTAL & VERTICAL LINES

Create a graph for each of the following relations:

a)  $y = 4$

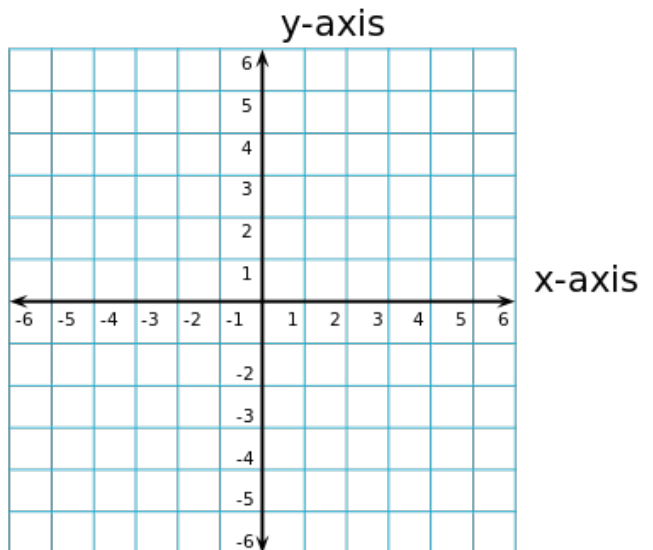
$x$	$y$



The equation of a **horizontal line** has the form \_\_\_\_\_.

b)  $x = 3$

$x$	$y$



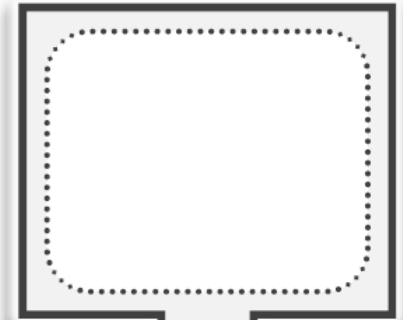
The equation of a **vertical line** has the form \_\_\_\_\_.

The SLOPE is...

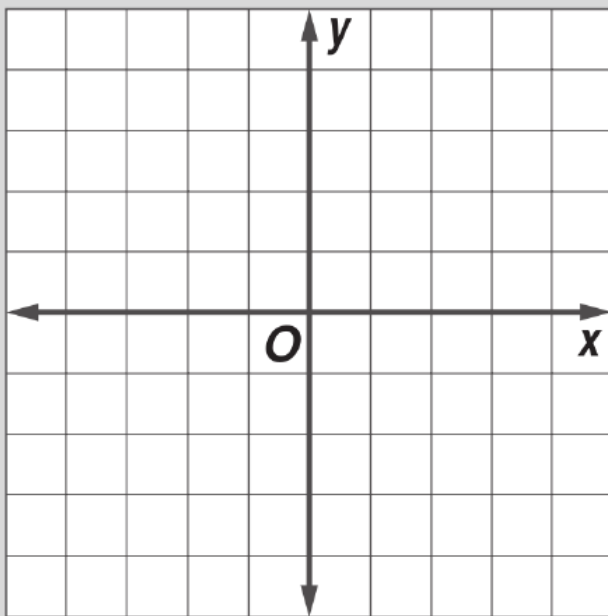
A Y-INTERCEPT is...

# Slope-Intercept Form

a formula for the equation of a line using its **SLOPE** and its **Y-INTERCEPT**



$$y = mx + b$$



## Steps for graphing

Try graphing the line  $y = -3x + 2$ .

1

Start by placing a point at the



2

From that point, count out the **rise** to find the next point.

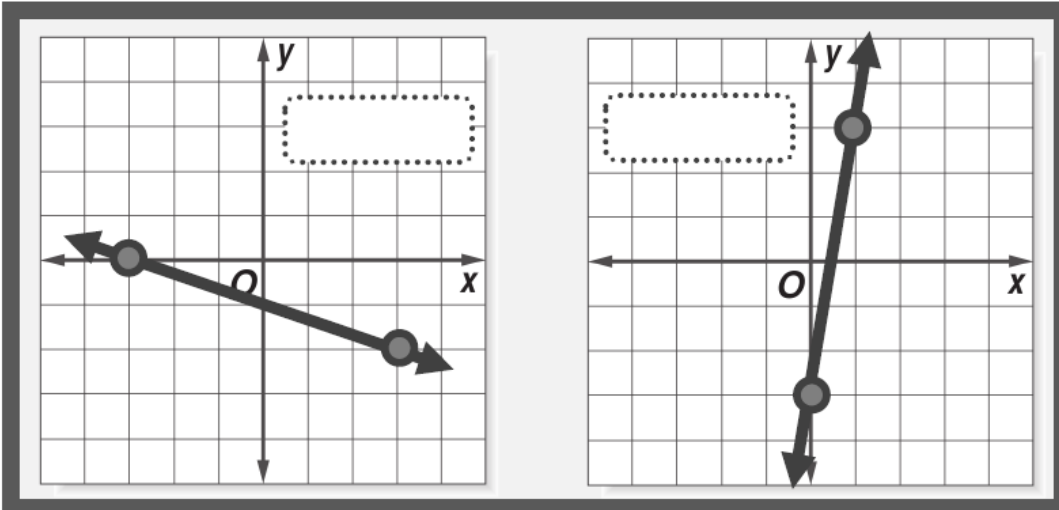
3



# Practice

# Using Slope-Intercept Form

Write an equation for each line in slope-intercept form.



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## SPECIAL CASES

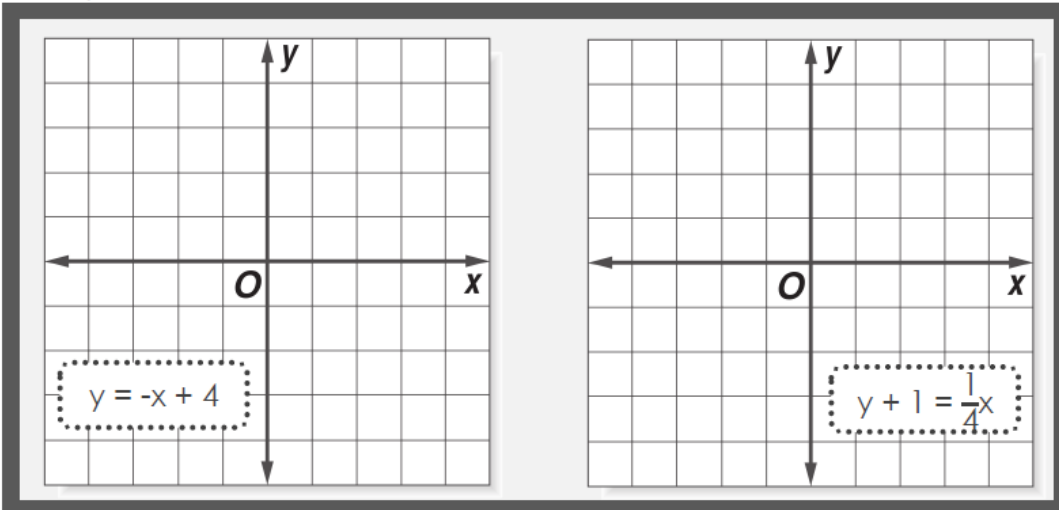
$$y = 2x$$

$$y = 4$$

## EXTRA WORK

$$3y + 5 = 6x$$

Graph each line.



Identify the slope and y-intercept for each.

A.  $4y - 2x = 8$

B.  $7 = y - x$

C.

x	-2	2	6
y	5	-3	-11

D. the line that passes through (3, 3) and (-6, 0)

Name: \_\_\_\_\_

## D) GRAPHING: METHOD 2-SLOPE INTERCEPT FORM

You can graph a linear relation represented using the equation of the line in SLOPE-INTERCEPT FORM:

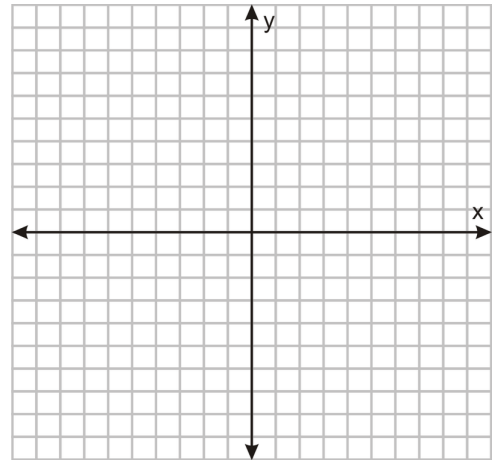
$$y = mx + b$$

### Example #5:

Without using a table of values graph the following relation:

$$y = 3x + 2$$

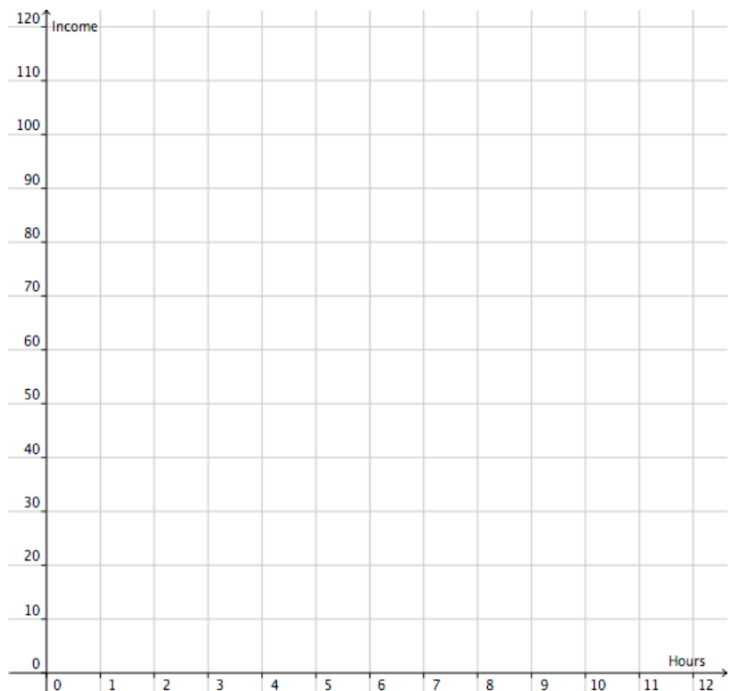
- What is the fixed term?
- What is the rate of change?



### Challenge #9: Write an equation, graph a linear relation and solve a problem.

200. Daniel works at a restaurant and currently makes \$10/h. The general manager has just asked him if he would like to take a salary job for \$110 per day.

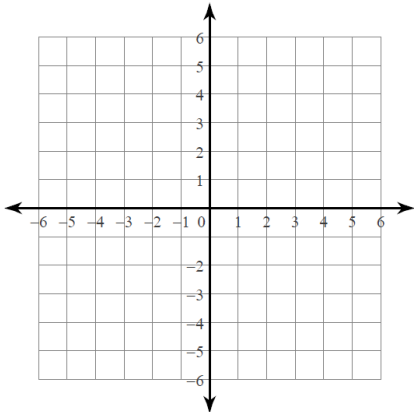
- Write an equation to represent income in terms of hourly pay.
- Write an equation to represent income in terms of salary.
- Graph a linear relation that compares the two income options.
- He decides against the salary position. Was this wise? Explain.



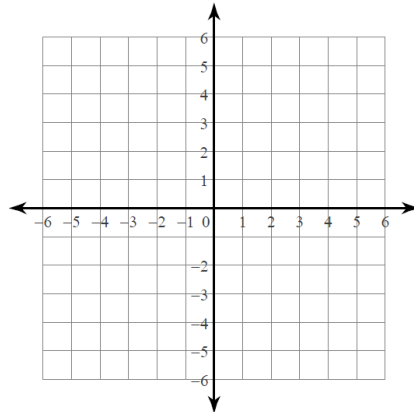


Sketch a graph of each line by identifying the y-intercept & using the slope:

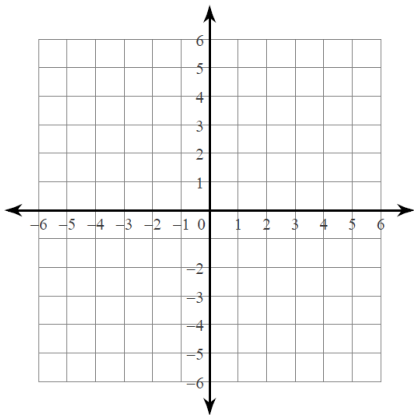
1)  $y = 3x - 4$



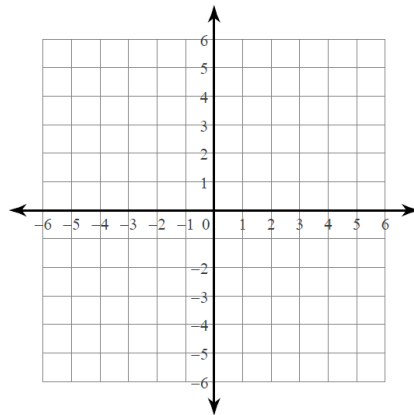
2)  $y = -4x + 1$



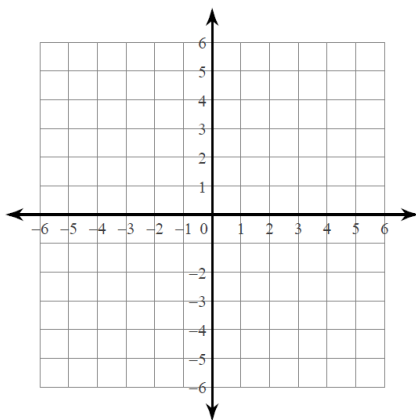
3)  $y = -x$



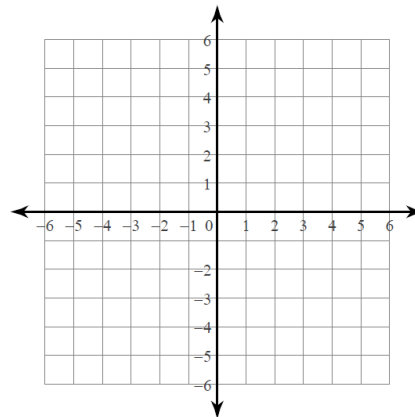
4)  $y = -2x + 2$



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



10)  $y = -x + 3$

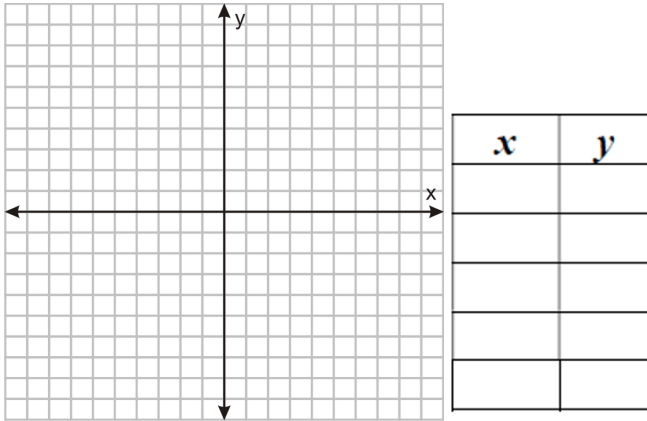




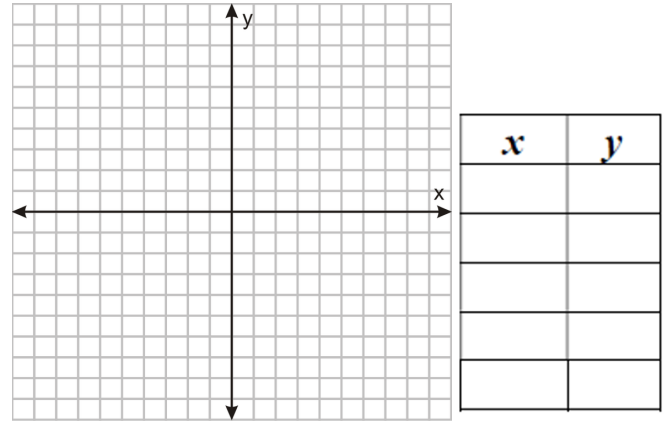
Graph the following relations:

- using the properties of  $y = mx + b$ .
- then check your points with a table of values.

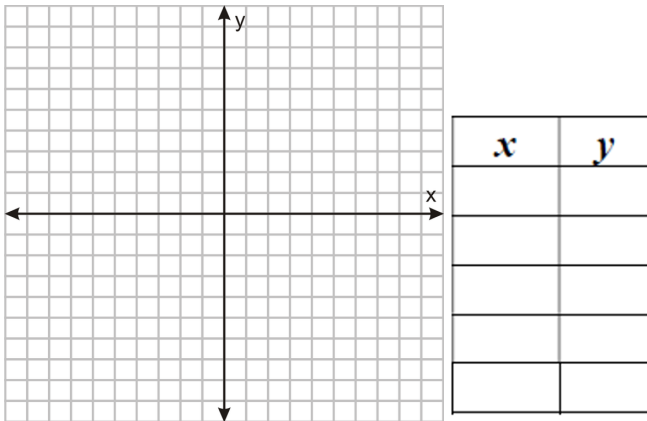
A.  $x = -6$



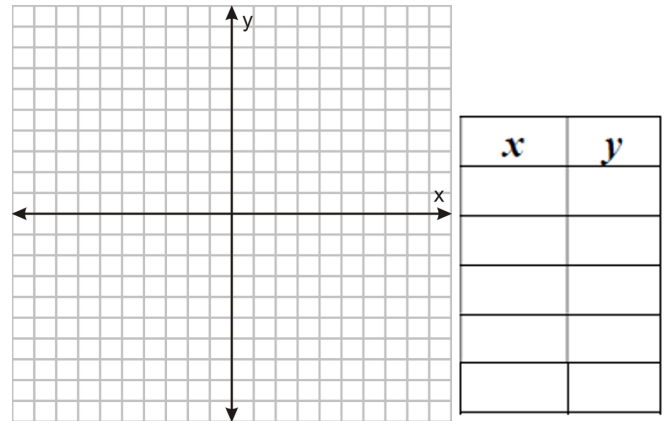
B.  $y = 5x - 2$



C.  $y = -2$



D.  $y = -2x + 4$




Assignment #5.3 pg 185-189

**Required**

1, 2, 3, 4ace, 5ace,  
7, 8ab, 9, 10, 11,  
12, 15, 18

**Extra Practice**

4bdf, 5bdf, 6,  
8cd, 13, 14, 16,  
17, 19

**Extension**

20, 21, 22, 23