

## 9.6 Notes – Writing Linear Equations in Slope-Intercept Form

- Identify** the initial value (y-intercept) from a table, graph, equation, or verbal description.
- Use** the slope and y-intercepts to write a linear function in the form  $y = mx + b$  from any representation (table, graph, or verbal description).
- Graph** a linear equation given an equation.

**SLOPE-INTERCEPT FORM      $y = mx + b$**

m is the \_\_\_\_\_

b is the \_\_\_\_\_

Write the equation of a line given the slope and y-intercept.

Write the equation of the line with the given slope and y-intercept.

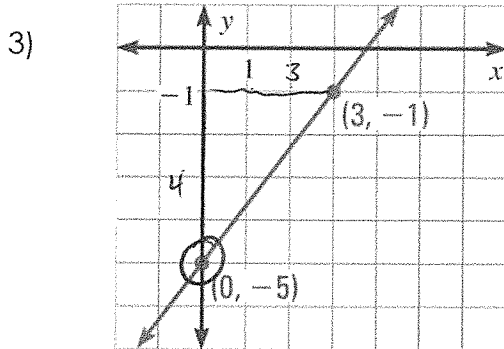
1) Slope is  $-2$  and a y-intercept of  $5$

2) Slope is  $\frac{3}{4}$  and y-intercept is  $-3$

$$y = -2x + 5$$

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

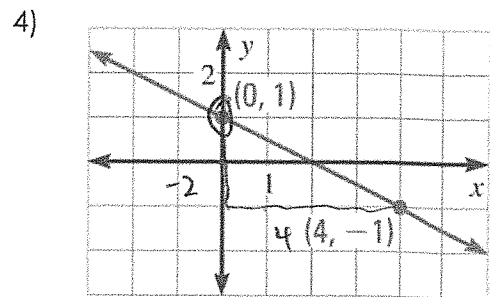
Write the equation of a line in slope intercept form given a graph.



Slope:  $\frac{4}{3}$

Y-Intercept:  $-5$

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



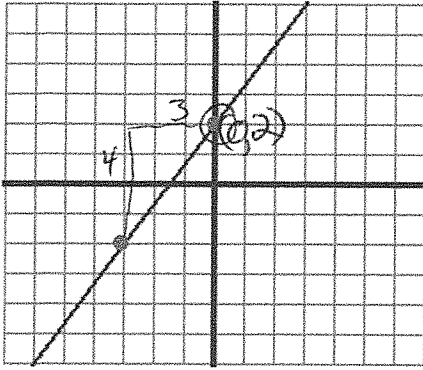
Slope:  $-\frac{2}{4} = -\frac{1}{2}$

Y-Intercept:  $1$

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

Examples: Write the linear equation for the graph shown.

5)

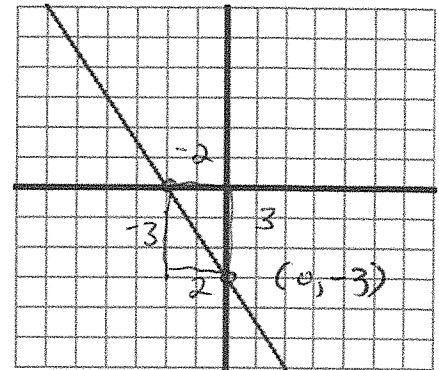


Slope:  $\frac{2}{3}$

Y-Intercept:  $2$

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

6)



Slope:  $-\frac{3}{2}$

Y-Intercept:  $-2$

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

Write the equation of a line in slope intercept form given a table.

1st: find the slope

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

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

Find the slope by:  $\frac{\text{Change in } y}{\text{Change in } x}$

Example:

x	y
-2	4
-1	3.5
0	3
1	2.5
2	2

Slope =  $\frac{-0.5}{1} = -0.5 = -\frac{1}{2}$

Example:

x	y
-5	-16
-2	-7
0	-1
3	8
5	14

Slope =  $\frac{9}{3} = \frac{3}{1} = 3$   
 OR  $\frac{6}{2} = \frac{3}{1} = 3$  } SAME

2<sup>nd</sup>: find the y-intercept

The y-intercept is when  $x = 0$

Example:

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

y-intercept

$b = 1$

Example:

x	y
-2	4
-1	3.5
0	3
1	2.5
2	2

y-intercept

$b = 3$

Example:

x	y
-5	-16
-2	-7
0	-1
3	8
5	14

y-intercept

$b = -1$

### What should you do if 0 is not in the table?

x	y
1	11
2	15
3	19
4	23
5	27

1 < > 4  
1 < > 4  
1 < > 4  
1 < > 4

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

$b =$  \_\_\_\_\_

#### Use the substitution method

1. Find the **slope**  $m = 4$
2. Fill in the  $m$  (slope) into  $y = m x + b$   $y = 4x + b$
3. Choose an ordered pair, then substitute in the  $x$  and  $y$ ... now you have to **solve for  $b$**  (y-intercept), so get your  $b$  alone.

$(1, 11)$

$11 = 4(1) + b$

$11 = 4 + b$

$-4 \quad -4$   
 $7 = b$

$y = 4x + 7$

3<sup>rd</sup>: put it all together

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

1 < > 2  
1 < > 2  
1 < > 2  
1 < > 2

Write a linear equation for the tables shown.  $y = m x + b$

1. Find the  $m$  **slope**  $\frac{2}{1} = 2$
2. Find the  $b$  **y-intercept**  $-4$
3. Plug the  $m$  and  $b$  into your slope intercept form....  $y = m x + b$

Plug in the  $m$  and  $b$   $y = 2x + -4$

Equation  $y = 2x - 4$

x	y
2	5
4	13
7	25
9	33
12	45

$$y = mx + b$$

$$5 = 4(2) + b$$

$$5 = 8 + b$$

$$\begin{array}{r} -8 \\ -8 \end{array}$$

$$\boxed{-3} = b$$

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

OR

$$m = \frac{12}{3} = 4$$

$$\boxed{y = 4x - 3}$$

x	y
-2	10
0	4
3	-5
6	-14
8	-20

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

$$\boxed{y = -3x + 4}$$

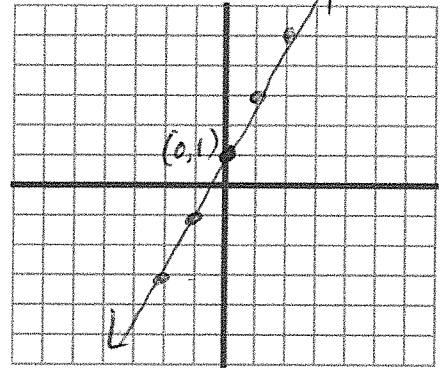
**Graph a linear equation given an equation**

Examples: Graph the equations in **Slope-Intercept Form**....

**GRAPH THE Y-INTERCEPT FIRST!!**

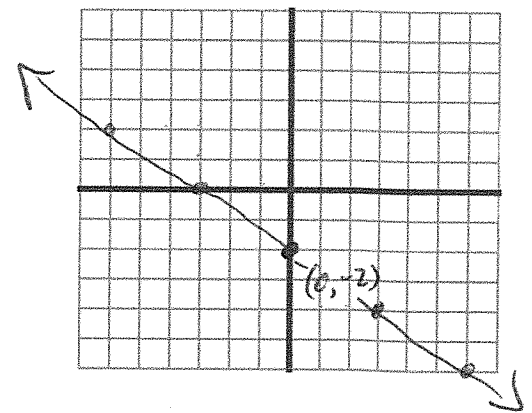
$$y = 2x + 1$$

Slope:  $\frac{2}{1}$  Y-Int: 1



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

Slope:  $-\frac{2}{3}$  Y-Int: -2



$$4y - 8 = 2x$$

REWRITE  
 $y = mx + b$

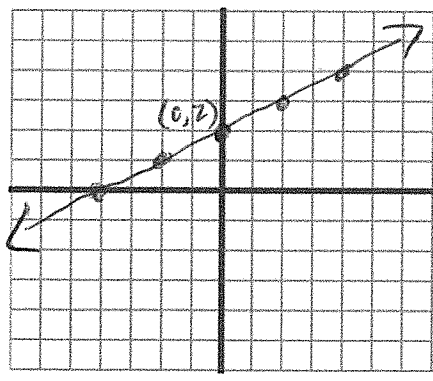
$$\frac{4y}{4} = \frac{8}{4} + \frac{2x}{4}$$

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

OR

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

$$m = \frac{1}{2} \quad b = 2$$



**9.6 HW**

Write the equation of the line with the given slope and y-intercept.

1. Slope is -3 and a y-intercept of 7

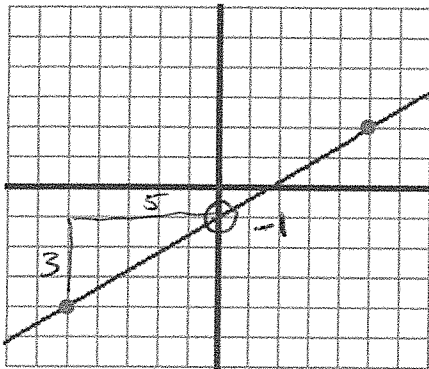
$$y = -3x + 7$$

2. Slope is  $\frac{1}{4}$  and y-intercept is -5

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

Write an equation based on the graph.

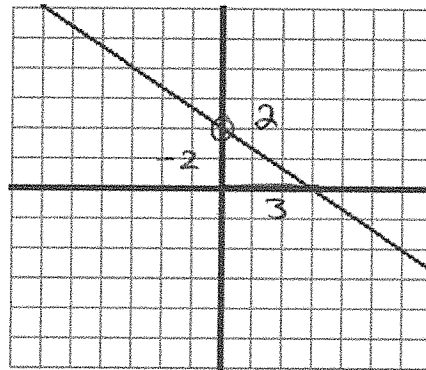
3.



$$m = \frac{3}{5} \quad b = -1$$

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

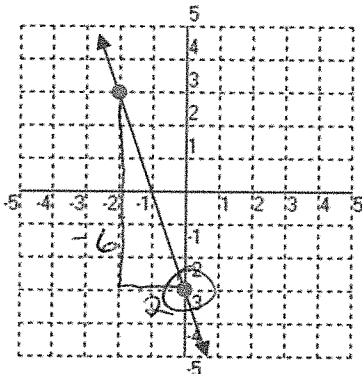
4.



$$m = -\frac{2}{3} \quad b = 2$$

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

5.



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

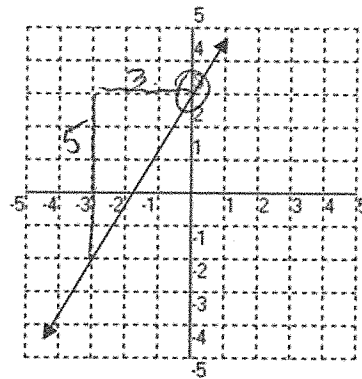
$$b = 3$$

$$y = -3x + 3$$

or

$$y = -3x - 3$$

6.



$$m = \frac{5}{3} \quad b = 3$$

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

Find the slope. Show your work!

7.  $y = 4x + 5$

$m = 4$

$m = 4$

8.  $(-3, -8), (-12, -20)$

$m = \frac{-20 - (-8)}{-12 - (-3)}$

$m = \frac{-20 + 8}{-12 + 3}$

$m = \frac{-12}{-9} = \frac{4}{3}$

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

9.  $(17, 11), (5, 0)$

$m = \frac{0 - 11}{5 - 17}$

$m = \frac{-11}{-12} = \frac{11}{12}$

$m = \frac{11}{12}$

Given the table, find m. Show your work!

10.

x	y
-6	12
-5	14
-4	16
-3	18
-2	20

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

11.

x	y
-14	3
-12	6
-10	9
-8	12
-6	15

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

12.

x	y
-2	3
-1	6
0	9
1	12
2	15

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

Write a linear equation for the tables shown.  $y = mx + b \rightarrow y = \underline{\quad}x + \underline{\quad}$

SHOW YOUR WORK!

13.

x	y
-6	12
-5	14
-4	16
-3	18
-2	20

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

CHOOSE ANY POINT TO USE FOR (x, y)

$y = mx + b$

$16 = 2(-4) + b$

$16 = -8 + b$

$+8 \quad +8$

$24 = b$

$y = 2x + 24$

14.

x	y
-14	3
-12	6
-10	9
-8	12
-6	15

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

$y = mx + b$

$9 = \frac{3}{2}(-10) + b$

$9 = \frac{-30}{2} + b$

$9 = -15 + b$

$+15 \quad +15$

$24 = b$

$y = \frac{3}{2}x + 24$

15.

x	y
2	16
5	10
7	6
11	-2
13	-6

3<  
2<  
4<  
3<

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

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

$$m = \frac{-8}{4} = -2$$

$$y = mx + b$$

$$16 = -2(2) + b$$

$$16 = -4 + b$$

$$b = 20$$

~~Graph~~  $y = -2x + 20$   
Graph the equations in Slope-Intercept form.

16.

x	y
3	2
6	4
9	6
12	8
15	10

3<  
3<  
3<  
3<

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

$$y = mx + b$$

$$2 = \frac{2}{3}(3) + b$$

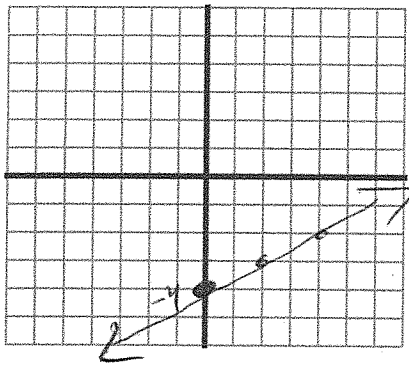
$$2 = \frac{6}{3} + b$$

$$2 = 2 + b$$

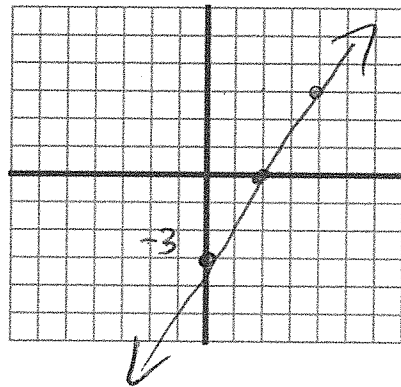
$$0 = b$$

$$y = \frac{2}{3}x + 0$$

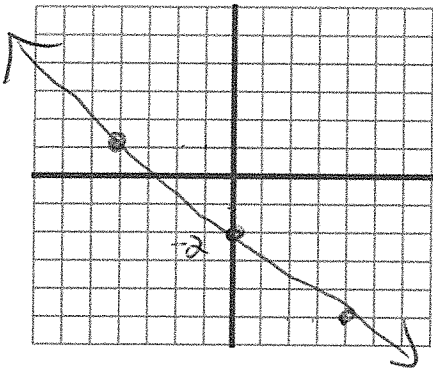
17.  $y = \frac{1}{2}x - 4$   $m = \frac{1}{2}$   $b = -4$



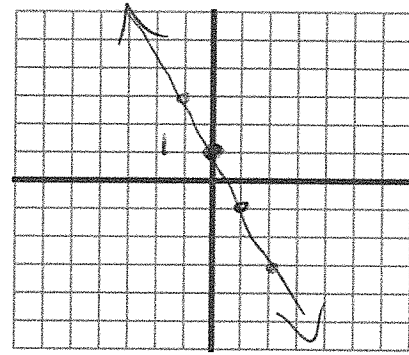
18.  $y = \frac{3}{2}x - 3$   $m = \frac{3}{2}$   $b = -3$



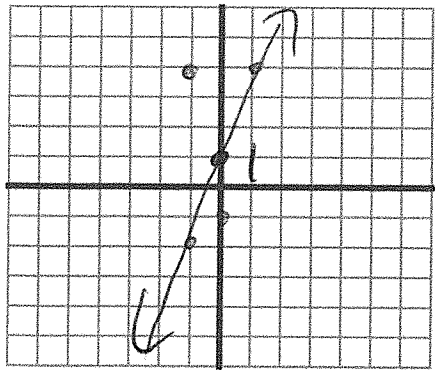
19.  $y = -\frac{3}{4}x - 2$   $m = -\frac{3}{4}$   $b = -2$



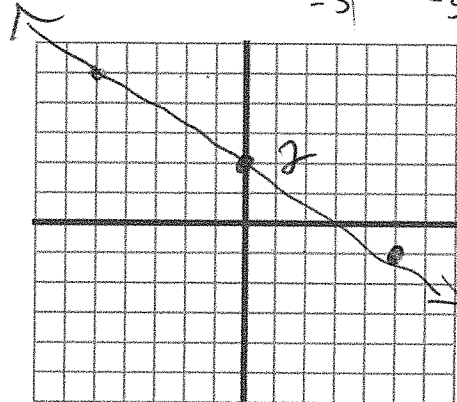
20.  $y = -2x + 1$   $m = -2$   $b = 1$



21.  $y = 3x + 1$   $m = 3$   $b = 1$



22.  $10 - 5y = 3x$   $\frac{-5y}{-5} = \frac{-10 + 3x}{-5}$



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

OR

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

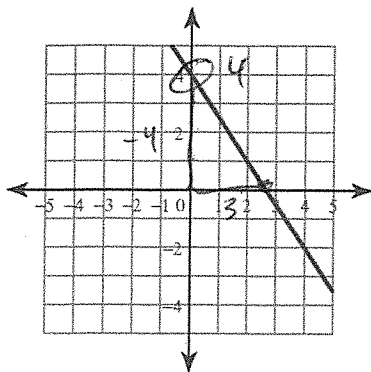
$$m = -\frac{3}{5}$$

$$b = 2$$

## Writing Linear Equations

Write the slope-intercept form of the equation of each line.

1)

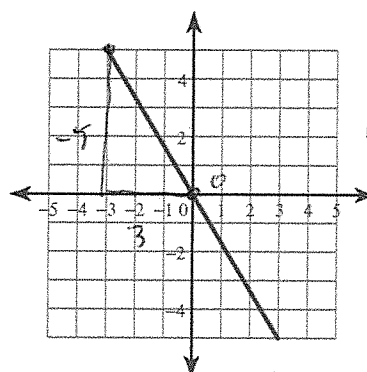


$$m = -\frac{4}{3}$$

$$b = 4$$

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

2)



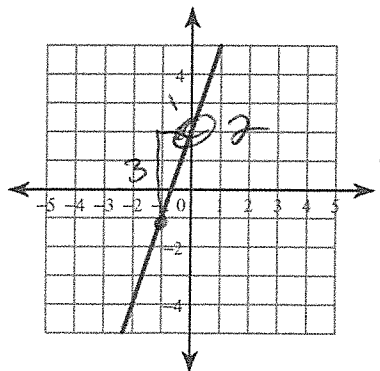
$$m = -\frac{5}{3} \quad b = 0$$

$$y = -\frac{5}{3}x + 0$$

or

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

3)



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

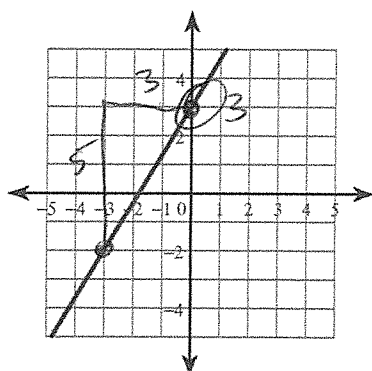
$$b = 2$$

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

or

$$y = 3x + 2$$

4)



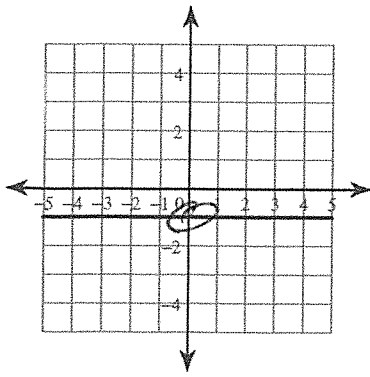
$$m = \frac{5}{3}$$

$$b = 3$$

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



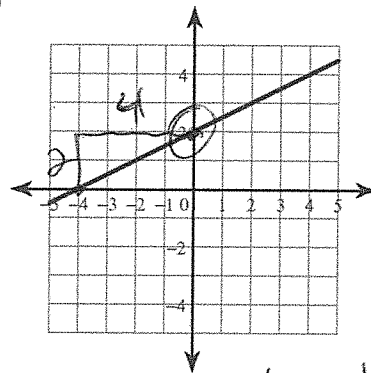
5)



$$y = -1$$

HORIZONTAL  
LINE

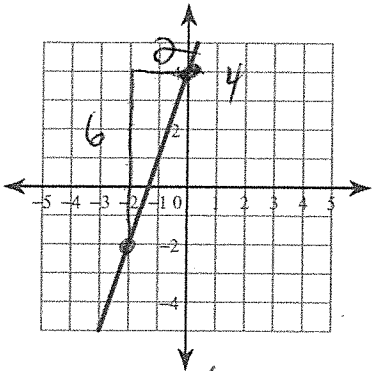
6)



$$m = \frac{2}{4} = \frac{1}{2} \quad b = 4$$

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

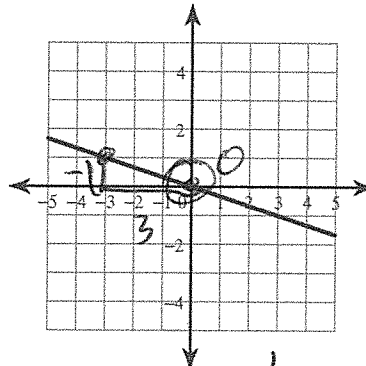
7)



$$m = \frac{6}{2} = 3 \quad b = 4$$

$$y = 3x + 4$$

8)



$$m = -\frac{1}{3} \quad b = 0$$

$$y = -\frac{1}{3}x + 0$$

OR

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