

objective  
you will write  
equations parallel  
or perpendicular  
to another line

# Writing Equations of Parallel and Perpendicular Lines

## Agenda

Warm-Up  
HW Check  
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## Warm-Up

The number of songs,  $s$ , you buy on iTunes determines the amount of money,  $m$ , you have in your wallet. The table below represents the amount of money left after a different number of songs are purchased.

Number of songs bought ( $s$ )	Money left ( $m$ )
2	\$21.00
5	\$18.75
7	\$17.25

- Write the equation of the line that represents the money left ( $m$ ) as a function of the number of song bought ( $s$ ).
- What is a reasonable domain and range for this situation?

$$y = -0.75x + 22.5$$

$m$   $s$

$D: 0 \leq s \leq 30$

$R: 0 \leq m \leq 22.5$

Answers:

1.  $y = 5x - 2$

2. A

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

4.  $x + 2y = 1$

$$\left\{ \begin{array}{l} p = -4.5w + 268 \\ 5. \quad D: 0 \leq w \leq 16 \\ \quad R: 196 \leq p \leq 268 \end{array} \right.$$

6.  $y = 6x + 11$

7.  $y = 2x + 10$

8.  $y = -2x$

9.  $x = 6$

10.  $w = 2.5n$

11. D

## Algebra I - Unit 4: Topic 1 - Writing Equations of Lines from a 2 points or a Table

## Practice – Writing Equations Given Two Points or a Table

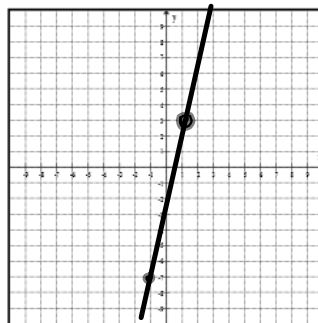
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Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

1. Write an equation of the line containing the points  $(-1, -7)$  and  $(1, 3)$  in slope-intercept form, then graph.

$$\begin{array}{r|l} x & y \\ -1 & -7 \\ 1 & 3 \end{array}$$

$$y = 5x - 2$$



2. Which function represents the line that contains the points  $(4, -1)$  and  $(-4, 6)$ ?

A  $f(x) = \frac{-7}{8}x + \frac{5}{2}$

B  $f(x) = \frac{-7}{8}x - \frac{9}{2}$

C  $f(x) = \frac{-8}{7}x + \frac{30}{7}$

D  $f(x) = \frac{-8}{7}x - \frac{5}{7}$

$$\begin{array}{r|l} x & y \\ 4 & -1 \\ -4 & 6 \end{array}$$

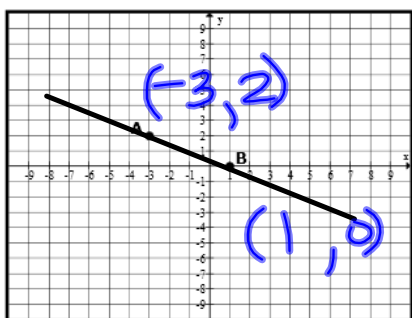
$$y = -.875x + 2.5$$

$$-\frac{7}{8}$$

3. Write an equation that describes the line containing the points  $(-5, 1)$  and  $(0, -2)$  in point-slope form.

$$\begin{array}{r|l} x & y \\ -5 & 1 \\ 0 & -2 \end{array} \quad m = -\frac{3}{5} \quad y - 1 = -\frac{3}{5}(x + 5)$$

4. Write the linear equation of the line passing through points A and B in standard form.



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

$$\begin{aligned} &+\frac{1}{2}x \quad +\frac{1}{2}x \\ 2 \left( \frac{1}{2}x + y = \frac{1}{2} \right) \\ &\boxed{1x + 2y = 1} \end{aligned}$$

5. Bill began his diet when he weighed 268 pounds. After 4 weeks he weighed 250 pounds. Write an equation in slope-intercept form of the line if  $w$  represents weeks and  $p$  represents pounds? What is the domain and range of this situation?

## Algebra I - Unit 4: Topic 1 - Writing Equations of Lines from a 2 points or a Table

Write the equation of each line in slope-intercept form given the table or data set.

6.

$x$	$y$
0	11
2	23
4	35

7.  $\{(-3, 4), (0, 10), (3, 16)\}$ 

8.

$x$	$y$
-7	14
-5	10
-3	6

9.

$x$	$y$
6	0
6	8
6	10

undefined  
vertical

$$x = 6$$

Answer the following questions.

10. The weight,  $w$ , in pounds, of a stack of books is dependent on the number of books,  $n$ , in the stack. This table represents the weight of four different stacks of books. Write an equation in terms of  $n$  and  $w$  that represents the data in the table.

Number of books ( $n$ )	Weight in pounds ( $w$ )
4	10
6	15
10	25
16	40

$$y = 2.5x$$

$$w = 2.5n$$

11. The table below lists corresponding  $x$  and  $y$  values of a linear function. Which equation best represents this function?

- A  $y = x + 1$   
 B  $y = 4x - 1$   
 C  $y = x + 4$   
 D  $y = 4x + 1$

$x$	$y$
-3	-11
-1	-3
0	1
2	9
3	13
5	21

## PARALLEL &amp; PERP. LINES

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Graph the following equations using the Square Window setting in your graphing calculator (Zoom 5)

$$1. \ y = 2x \text{ and } y = -\frac{1}{2}x$$

$$m=2$$

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

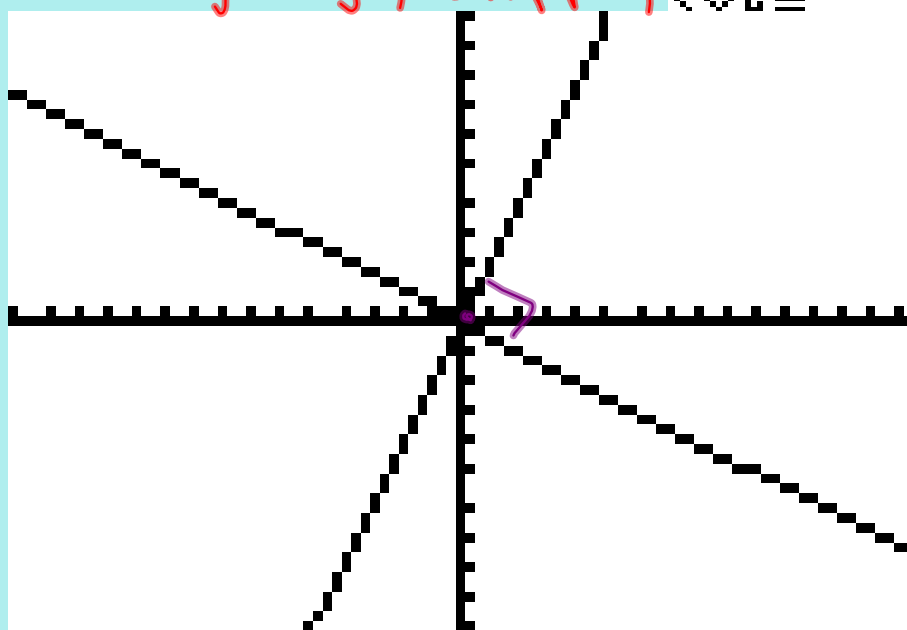
- What do you notice about these two lines?

perpendicular

- How do the slopes of the lines compare?

changed sign, flipped

Plot1	Plot2	Plot3
$Y_1 = 2X$		
$Y_2 = -\frac{1}{2}X$		
$Y_3 =$		
$Y_4 =$		



$$2 \quad \frac{1}{2}$$

Parallel Lines

slopes are  
SAME

//

⊥

Perpendicular Lines

slopes that are  
flipping opposites  
(flip fraction,  
switch sign)

Write the slope of a line that is parallel to and perpendicular to the given line.

3.  $y = -6x - 3$   $m = -6$   $b = -3$

Parallel:  $\parallel m = -6$  Perpendicular:  $\perp m = +\frac{1}{6}$

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

Parallel:  $\parallel m = \frac{4}{3}$  Perpendicular:  $\perp m = -\frac{3}{4}$

5. Identify which lines are parallel and perpendicular:

A.  $y = 3x + 3$

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

C.  $y - 5 = 3(x - 1)$

D.  $2y = -x - 4$

E.  $y - 2x = 1$

- ★ 6. Write an equation in slope-intercept form for a line passing through the point  $(4, -8)$  and parallel to  $y = 4x + 5$ .

$$m = 4 \quad // m = 4$$

$$y + 8 = 4(x - 4)$$

$$y + 8 = 4x - 16$$

$$y = 4x - 24$$

- 1) Find  $m$ .  
(solve for  $y$ )
- 2)  $//$  or  $\perp$ ?
- 3)  $y - y_1 = m(x - x_1)$
- 4) solve for  $y$

- ★ 7. Write an equation in slope-intercept form for a line passing through the point  $(-3, 1)$  and perpendicular to  $y = \frac{1}{3}x + 2$ .

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

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

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

$$y - 1 = -3x - 9$$

$$y = -3x - 8$$

8. Write an equation in slope-intercept form of the line that passes through  $(-2, 3)$  and is perpendicular to  $y = -5$ .

$$m = 0$$

h.z.  $\frac{0}{1}$

$$\perp m = -\frac{1}{0}$$

undefined  
vertical

$$x = -2$$

9. Write an equation in slope-intercept form of the line that passes through  $(4, -2)$ , and parallel to  $y = -7$ .

// horizontal

$$y = -2$$

Horizontal  $\perp$  Vertical Lines  $\perp$   
 $y = \#$   $x = \#$



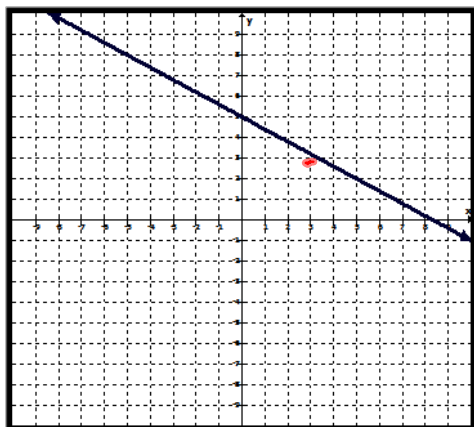
10. Which of the following describes a line passing through  $(3, 3)$  that is ~~perpendicular~~ to the line described by

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

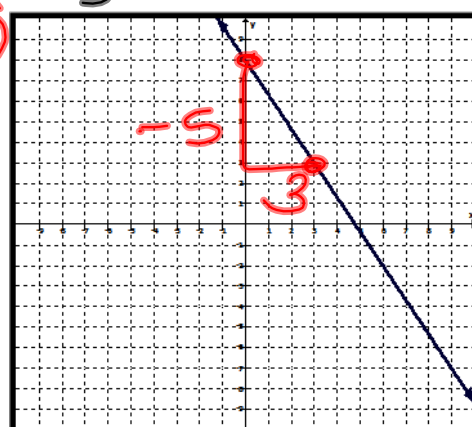
$$m = \frac{3}{5}$$

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

A.



B.



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

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



~~D.  $y = \frac{3}{5}x + \frac{6}{5}$~~

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



#3-11

## Algebra I - Unit 4: Topic 1 – Writing Equations of Parallel and Perpendicular Lines

**Practice - Equations of Parallel and Perpendicular Lines****pp 353-355**

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

**Identify which lines are parallel.**

1. a.  $y = -3x + 2$

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

c.  $-x + 2y = 17$

d.  $3x + y = 27$

**Identify which lines are perpendicular.**

2. a.  $y - 9 = 3(x + 1)$

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

c.  $y = 0$

d.  $x = 6$

**Tell whether each pair of lines are parallel, perpendicular, or neither.**

3.  $y = -7x$  and  $y - 28 = -7(x - 4)$

4.  $y - 3 = 4(x - 3)$  and  $-y + 13 = \frac{1}{4}(x + 1)$

**Write an equation in slope-intercept form for the line that is parallel to the given line and that passes through the given point.**

5.  $y = 3x - 7$ ;  $(0, 4)$

6.  $5x - 2y = 10$ ;  $(4, -5)$

7.  $x = 4$ ;  $(3, -2)$

## Algebra I - Unit 4: Topic 1 – Writing Equations of Parallel and Perpendicular Lines

Write an equation in slope-intercept form for the lines that is perpendicular to the given line and that passes through the given point.

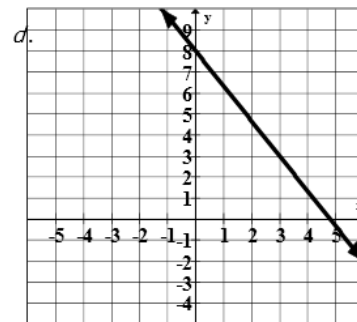
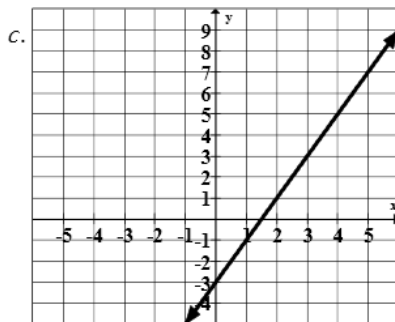
8.  $y = -3x + 4$ ;  $(6, -2)$

9.  $3x - 4y = 8$ ;  $(-6, 5)$

10.  $x = -3$ ;  $(2, -4)$

11. Which describes a line passing through  $(3, 3)$  that is perpendicular to the line described by  $y = \frac{3}{5}x + 2$  ?

a.  $y = \frac{5}{3}x - 2$     b.  $y = -\frac{3}{5}x + \frac{6}{5}$



12. Write an equation in slope-intercept form for the line that passes through  $(1, 1)$  and is perpendicular to the line graphed below.

