Name: Key

Date: 4/23/18

CC GEOMETRY

TROICI

LESSON #5: PARALLEL AND PERPENDICULAR LINES (DAY 1)

Do Now:

1. Write a linear equation given the two points $(4, 7)$ *and* $(6, 6)$.

x y

① Find slope

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-7}{6-4} = \frac{-1}{2}$

② Find 'b'

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

$6 = -\frac{1}{2}(6) + b$

$6 = -3 + b$

$b = 9$

③ Put it together!

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

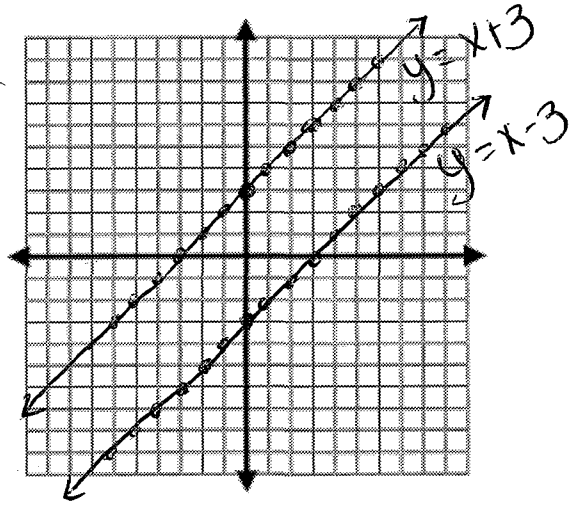
PARALLEL LINES

1. Graph $y = x + 3$

Slope = $\frac{1}{1}$ y-intercept = 3

2. Graph $y = x - 3$

Slope = $\frac{1}{1}$ y-intercept = -3



What do you notice about these lines?!?!?

Parallel lines have EQUAL! **slopes!**

3. Graph $y = 2x + 6$

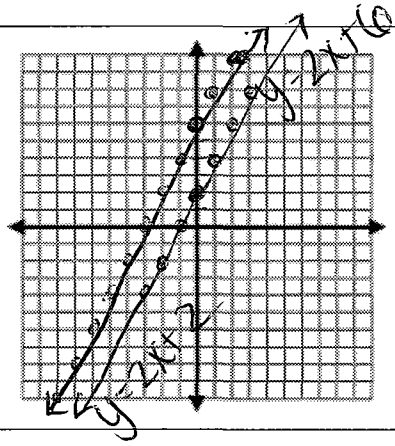
a. What is the slope of the line that is parallel to the given line?

$\frac{2}{1}$

b. Write an equation that is parallel to the given line.

$y = 2x + 2$

same slope, diff. y-intercept



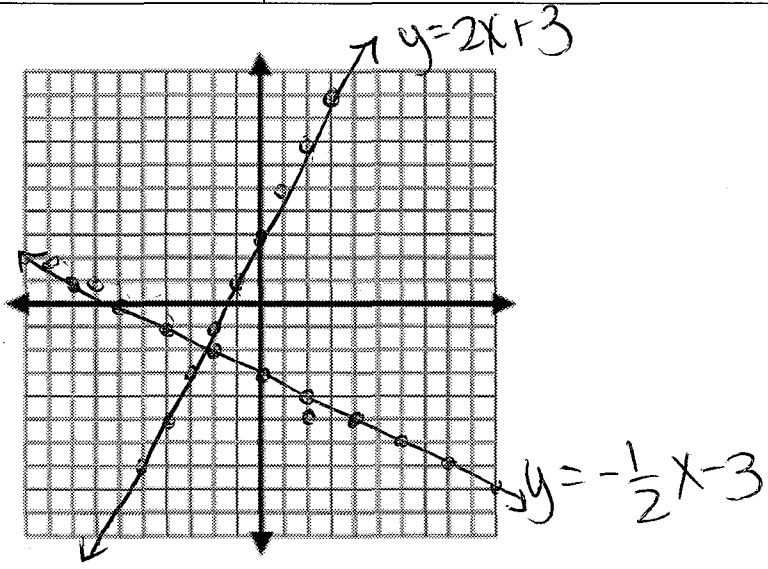
PERPENDICULAR LINES

4. Graph $y = 2x + 3$

Slope = 2 y-intercept = 3

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

Slope = $\frac{-1}{2}$ y-intercept = -3



What do you notice about these lines?

PERPENDICULAR LINES HAVE Opposite Reciprocal **SLOPES!**

6. Graph $2y = -6x + 8$

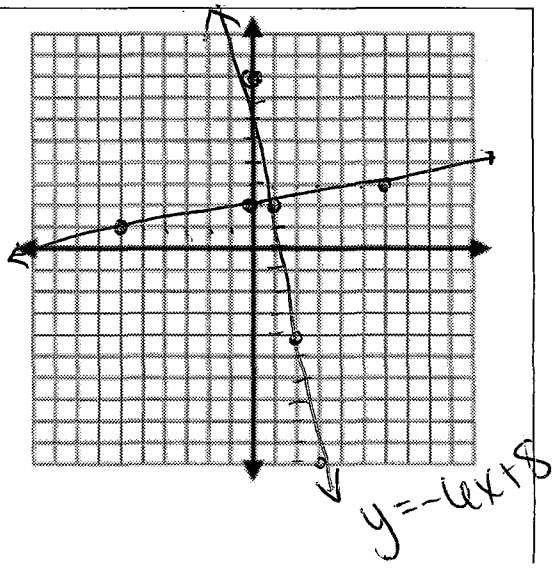
a. What is the slope of a line that is perpendicular to the given line? Flip & switch!

$-6 \rightarrow \frac{1}{-6} \rightarrow \boxed{\frac{1}{6}}$

b. Write an equation that is perpendicular to the given line.

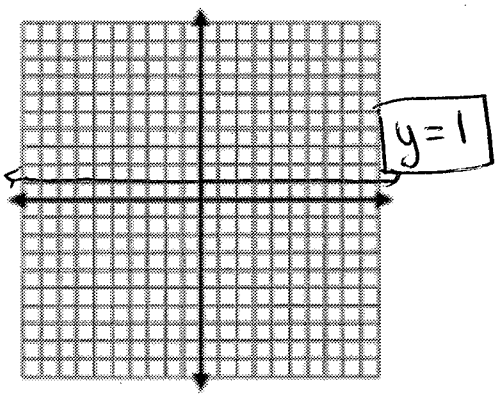
$y = \frac{1}{6}x + 2$

Opposite Reciprocal slope

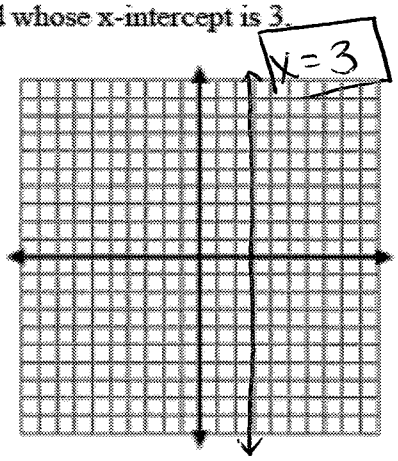


MIXED PRACTICE

7. Write an equation of the line that is parallel to the x-axis and whose y-intercept is 1.



8. Write an equation of the line that is parallel to the y-axis and whose x-intercept is 3.



9. What is the slope of a line parallel to $y - 3x = 6$

$+3x \quad +3x$

$y = 3x + 6$

equal!

a) $\frac{1}{3}$

b) $-\frac{1}{3}$

c) 3

d) -3

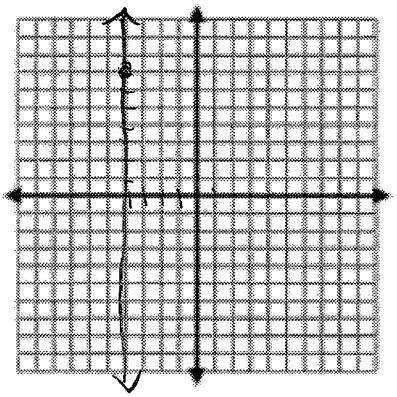
10. Which is an equation of the line that passes through the point (-4, 7) and is parallel to the y-axis?

(a) $x = -4$

(b) $y = 4x + 2$

(c) $y = -4x + 2$

(d) $y = 2x + 2$



11. Which of the following represents a line parallel to $x + y = 5$

$-x \quad -x$

$y = 5 - x$

$m = -1$ equal

(a) $y = x + 3$

(b) $y - x = 3$

(c) $x - y = 3$

(d) $y = -x + 3$

12. Which properties best describe the coordinate graph of two distinct parallel lines?

(a) different slopes and same intercepts

(b) same slopes and different intercepts

(c) same slopes and same intercepts

(d) different slopes and different intercepts

13. Which equation represents a line parallel to the line whose equation is $2y - 5x = 10$?

1) $5y - 2x = 25$

2) $5y + 2x = 10$

3) $4y - 10x = 12$ $+10x \quad +10x$

4) $2y + 10x = 8$

$2y = -10x + 5$

$\frac{4y}{4} = \frac{10x}{4} + \frac{12}{4}$

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

$+5x \quad +5x$

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

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

14. Two lines are represented by the equations $-\frac{1}{2}y = 6x + 10$ and $y = mx$. For which value of m will the lines be parallel?

$\frac{-\frac{1}{2}y}{-\frac{1}{2}} = \frac{6x}{-\frac{1}{2}} + \frac{10}{-\frac{1}{2}}$

$y = -12x - 20$

$m = -12$

15. What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

$-\frac{2}{3} \rightarrow$ Flip $\rightarrow \frac{3}{-2} \rightarrow$ switch $\rightarrow \frac{3}{2} = m$

16. What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

$-\frac{5}{3} \rightarrow$ Flip $\rightarrow \frac{3}{-5} \rightarrow$ switch $\rightarrow \frac{3}{5} = m$

$-5x \quad -5x$

$\frac{3y}{3} = \frac{8}{3} - \frac{5x}{3}$

$y = \frac{8}{3} - \frac{5}{3}x$

17. What is the slope of a line that is perpendicular to a line that has no slope? Explain your answer.

An undefined slope b/c

$\frac{0}{1} \rightarrow$ Flip $\rightarrow \frac{1}{0} \rightarrow$ switch $\rightarrow \frac{-1}{0}$

↳ undefined!

cannot divide by zero!

Directions: In 18-21 state in each case whether the lines are parallel, perpendicular, or neither.

18. $y = 3x + 2, y = 3x - 5$

parallel
same slope

19. $y = -2x - 6, y = 2x + 6$

Neither!

20. $y = 4x - 8, 4y + x = 3$

$-x \quad -x$

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

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

perpendicular
opposite reciprocal slopes

21. $y = 2x, x = -2y$

$\frac{x}{-2} \quad \frac{-2y}{-2}$

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

perpendicular
opposite reciprocal slopes

1. What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?

1) $x + y = 5$

2) $2x + y = -2$

3) $y - x = -1$

4) $y - 2x = 3$

2. What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?

Flip switch

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

1) $\frac{1}{3}$

2) $-\frac{1}{3}$

3) 3

4) -3

3. Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?

$-2x \quad -2x$

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

$-\frac{2}{3} \rightarrow \frac{3}{-2} \rightarrow \frac{3}{2}$

1) $6y = -4x + 12$

2) $2y = 3x + 6$

3) $2y = -3x + 6$

4) $3y = -2x + 12$

4. Which line is perpendicular to the line whose equation is $5y + 6 = -3x$?

$-6 \quad -6$

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

$\frac{-3}{5} \rightarrow \frac{5}{-3} \rightarrow \frac{5}{3}$

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

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

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

4) $y = \frac{3}{5}x + 7$

5. The lines represented by the equations $y + \frac{1}{2}x = 4$ and $3x + 6y = 12$ are

$-3x \quad -3x \rightarrow \frac{6y}{6} = \frac{12}{6} - \frac{3x}{6}$

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

1) the same line

2) parallel

3) perpendicular

4) neither parallel nor perpendicular

6. Which statement describes the lines whose equations are $y = \frac{1}{3}x + 12$ and $\frac{6y}{6} = \frac{2x}{6} + \frac{6}{6}$?

$\frac{6}{6} \rightarrow \frac{1}{3}$

1) They are segments.

2) They are perpendicular to each other.

3) They intersect each other.

4) They are parallel to each other.

7. The equation of line k is $y = \frac{1}{3}x - 2$. The equation of line m is $-2x + 6y = 18$. Lines k and m are

1) parallel

2) perpendicular

3) the same line

4) neither parallel nor perpendicular

$+2x \quad +2x$

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

$\frac{1}{3}x$

8. The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are

1) parallel

2) perpendicular

3) the same line

4) neither parallel nor perpendicular

$3y + 1 = 6x$

$-1 \quad -1$

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

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

$2y + 1 = x - 9$

$-1 \quad -1$

$\frac{2y}{2} = \frac{x}{2} - \frac{10}{2}$

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