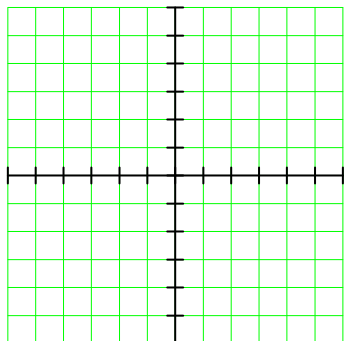


## Lesson 9.1 Parallel and Perpendicular Lines

### Activity 1 Horizontal and Vertical Lines

a. Graph  $3y = 15$ .

Compute its slope.

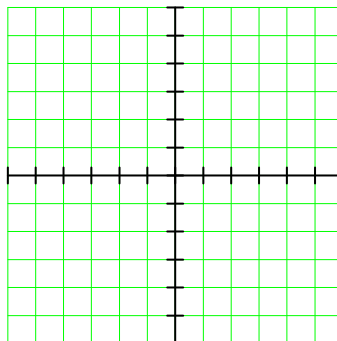


$m =$

Illustrate  $\Delta x$  and  $\Delta y$  on your graph.

b. Graph  $2x = -4$ .

Compute its slope.



$m =$

Illustrate  $\Delta x$  and  $\Delta y$  on your graph.

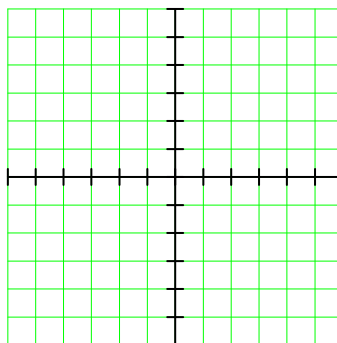
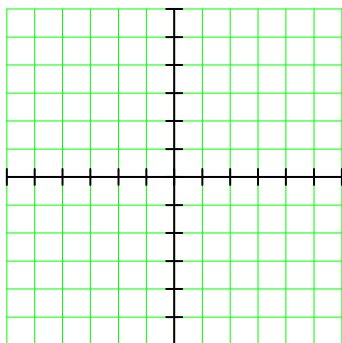
The slope of a horizontal line is \_\_\_\_\_ .

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

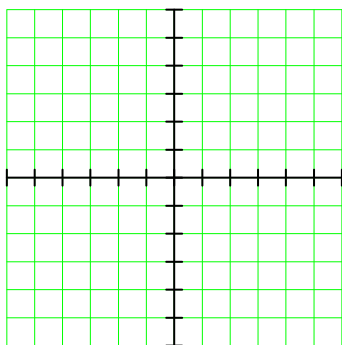
c. Make a sketch of each line, then find its equation.

(1) A horizontal line through  $(2, -4)$

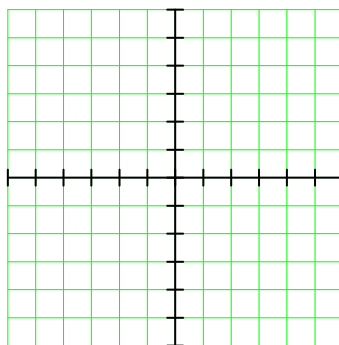
(2) The  $y$ -axis



(3) Parallel to the  $y$ -axis and including  $(-1, -2)$



(4) Perpendicular to  $x = 3$ , intersecting it at  $(3, 5)$



## Activity 2 Parallel and Perpendicular Lines

1. The slopes of several lines are given below. Which of the lines are parallel to the graph of  $y = 2.5x - 3$ , and which are perpendicular to it? Which are neither? Support each answer with a calculation.

a.  $m = \frac{2}{5}$

b.  $m = \frac{25}{10}$

c.  $m = \frac{-8}{20}$

d.  $m = \frac{-45}{18}$

e.  $m = \frac{40}{16}$

f.  $m = 25$

g.  $m = \frac{-1}{25}$

h.  $m = \frac{-5}{10}$

2. In each part, determine whether the two lines are parallel, perpendicular, or neither.

a.  $2x - 7y = 14$ ;  $7x - 2y = 14$       b.  $x + y = 6$ ;  $x - y = 6$

c.  $x = -3$ ;  $3y = 5$

d.  $2y = 5$ ;  $5y = -2$

### Activity 3 Applications

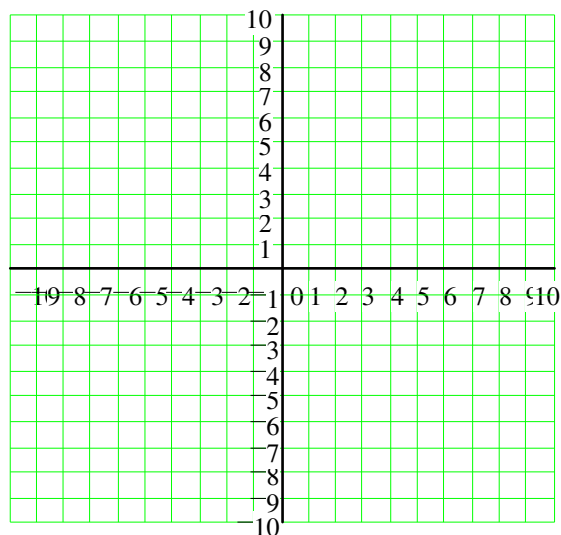
1. a. Sketch the triangle with vertices

$A(-6, -3)$ ,  $B(-6, 3)$ , and  $C(4, 5)$

- b. Find the slope of the side  $\overline{AC}$ .

- c. Sketch the altitude from point  $B$  to side  $\overline{AC}$ . Find the slope of the altitude.

- d. Find an equation for the line that includes the altitude from point  $B$  to side  $\overline{AC}$ . (Hint: You know a point  $(x, y)$  that lies on the line.)

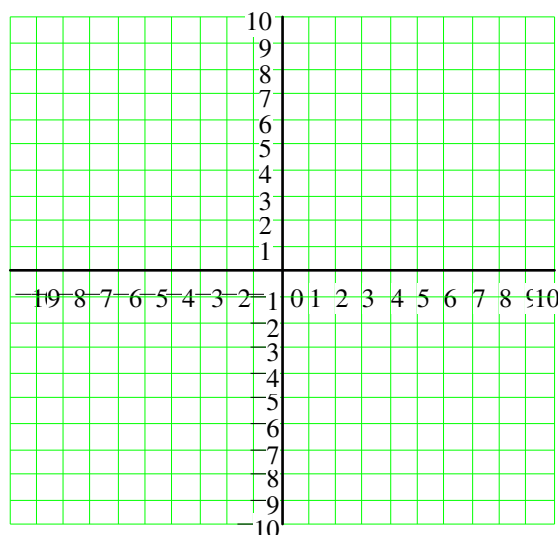


2. a. Write the equation  $2y - 3x = 5$  in slope-intercept form, and graph the equation.

- b. What is the slope of any line that is parallel to  $2y - 3x = 5$ ?

- c. On your graph for part (a), sketch by hand a line that is parallel to  $2y - 3x = 5$  and passes through the point  $(-3, 2)$ .

- d. Use the point-slope formula to write an equation for the line that is parallel to the graph of  $2y - 3x = 5$  and passes through the point  $(-3, 2)$ .

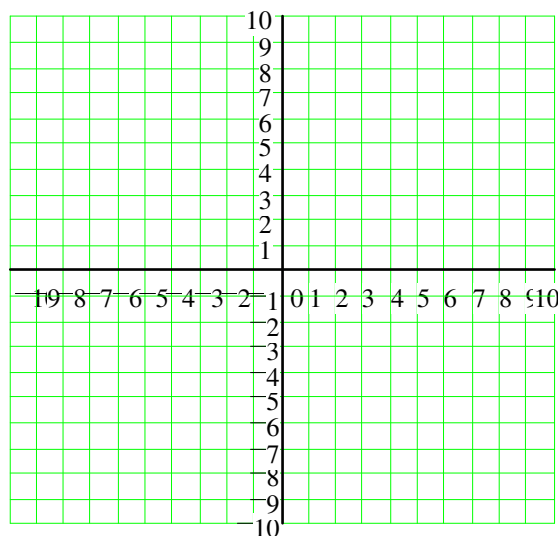


3. a. Write the equation  $x - 2y = 5$  in slope-intercept form, and graph the equation.

- b. What is the slope of any line that is perpendicular to  $x - 2y = 5$ ?

- c. On your graph for part (a), sketch a line that is perpendicular to  $x - 2y = 5$  and passes through the point  $(4, -3)$ .

- d. Use the point-slope formula to write an equation for the line that is perpendicular to the graph of  $x - 2y = 5$  and passes through the point  $(4, -3)$ .



## Wrap-Up

In this Lesson, we worked on the following skills and goals related to equations and graphs:

- Find equations for horizontal and vertical lines
- Decide whether two lines are parallel, perpendicular, or neither
- Find equations for parallel or perpendicular lines

## Check Your Understanding

1. How can you calculate the reciprocal of a decimal number?
2. Compare the graphs of the lines  $y = \frac{2}{5}$  and  $y = \frac{2}{5}x$ .
3. What two things do you need to know about a line in order to write its equation?
4. If you know the slope of the base of a triangle, how do you find the slope of its altitude?