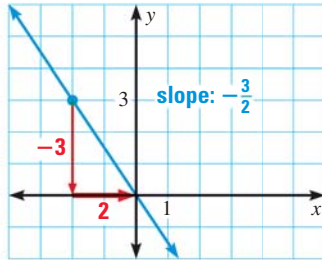
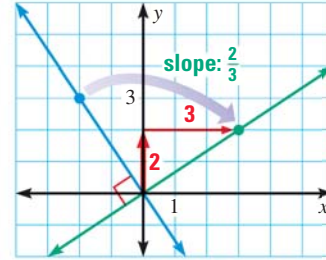


PERPENDICULAR LINES Two lines in the same plane are **perpendicular** if they intersect to form a right angle. Horizontal and vertical lines are perpendicular to each other.

Compare the slopes of the perpendicular lines shown below.



Rotate the line 90° in a clockwise direction about the origin to find a perpendicular line.



USE FRACTIONS

The product of a nonzero number m and its negative reciprocal is -1 :

$$m\left(-\frac{1}{m}\right) = -1.$$

KEY CONCEPT

For Your Notebook

Perpendicular Lines

- If two nonvertical lines in the same plane have slopes that are negative reciprocals, then the lines are perpendicular.
- If two nonvertical lines in the same plane are perpendicular, then their slopes are negative reciprocals.

EXAMPLE 2 Determine whether lines are parallel or perpendicular

Determine which lines, if any, are parallel or perpendicular.

Line a: $y = 5x - 3$ **Line b:** $x + 5y = 2$ **Line c:** $-10y - 2x = 0$

Solution

Find the slopes of the lines.

Line a: The equation is in slope-intercept form. The slope is 5.

Write the equations for lines b and c in slope-intercept form.

Line b: $x + 5y = 2$

$$5y = -x + 2$$

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

Line c: $-10y - 2x = 0$

$$-10y = 2x$$

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

- Lines b and c have slopes of $-\frac{1}{5}$, so they are parallel. Line a has a slope of 5, the negative reciprocal of $-\frac{1}{5}$, so it is perpendicular to lines b and c .



GUIDED PRACTICE for Example 2

2. Determine which lines, if any, are parallel or perpendicular.

Line a: $2x + 6y = -3$ **Line b:** $y = 3x - 8$ **Line c:** $-1.5y + 4.5x = 6$