

**LESSON**  
**18-1**

# Review for Mastery

## Slopes of Parallel and Perpendicular Lines

Two lines are **parallel** if they lie in the same plane and have no points in common. The lines will never intersect.

**Identify which lines are parallel.**

$$y = -2x + 4; \quad y = 3x + 4; \quad y = -2x - 1$$

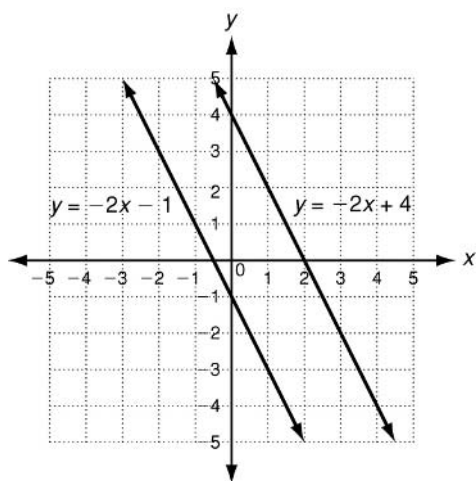
If lines have the same slope, but different  $y$ -intercepts, they are parallel lines.

$$y = -2x + 4; \quad y = 3x + 4; \quad y = -2x - 1$$

$$m = -2, \quad m = 3 \quad m = -2$$

$$b = 4 \quad b = 4 \quad b = -1$$

$y = -2x + 4$  and  $y = -2x - 1$  are parallel.



Two lines are **perpendicular** if they intersect to form right angles.

**Identify which lines are perpendicular.**

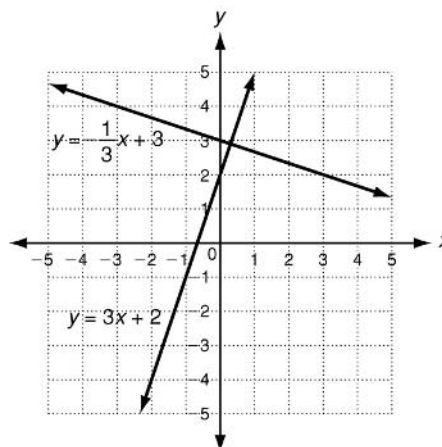
If the product of the slopes of two lines is  $-1$ , the two lines are perpendicular.

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

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

Because  $3\left(-\frac{1}{3}\right) = -1$ ,  $y = 3x + 2$  and

$y = -\frac{1}{3}x + 3$  are perpendicular.



**Identify which two lines are parallel. Then graph the parallel lines.**

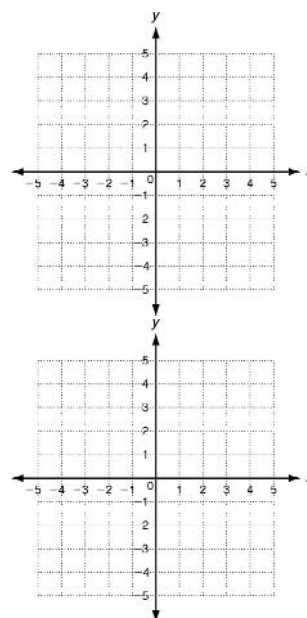
1.  $y = 4x + 2$ ;  $y = 2x + 1$ ;  $y = 2x - 3$

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**Identify which two lines are perpendicular. Then graph the perpendicular lines.**

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

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**LESSON**  
**18-1****Review for Mastery****Slopes of Parallel and Perpendicular Lines** *continued*

**Write an equation in slope-intercept form for the line that passes through (2, 4) and is parallel to  $y = 3x + 2$ .**

**Step 1:** Find the slope of the line.

The slope is 3.

**Step 2:** Write the equation in point-slope form.

$$y - y_1 = m(x - x_1)$$

$$y - 4 = 3(x - 2)$$

**Step 3:** Write the equation in slope-intercept form.

$$y - 4 = 3(x - 2)$$

$$y - 4 = 3x - 6$$

$$\begin{array}{r} +4 \quad +4 \\ \hline y = 3x - 2 \end{array}$$

**Write an equation in slope-intercept form for the line that passes through (2, 5) and is perpendicular to  $y = \frac{2}{3}x + 2$ .**

**Step 1:** Find the slope of the line and the slope for the perpendicular line.

The slope is  $\frac{2}{3}$ . The slope of the

perpendicular line will be  $-\frac{3}{2}$ .

**Step 2:** Write the equation (with the new slope) in point-slope form.

$$y - y_1 = m(x - x_1)$$

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

**Step 3:** Write the equation in slope-intercept form.

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

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

$$\begin{array}{r} +5 \quad +5 \\ \hline y = -\frac{3}{2}x + 8 \end{array}$$

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

3.  $y = 6x - 3$  parallel: \_\_\_\_\_ perpendicular: \_\_\_\_\_

4.  $y = \frac{4}{3}x - 1$  parallel: \_\_\_\_\_ perpendicular: \_\_\_\_\_

5. Write an equation in slope-intercept form for the line that passes through (6, 5) and is parallel to  $y = -x + 4$ .

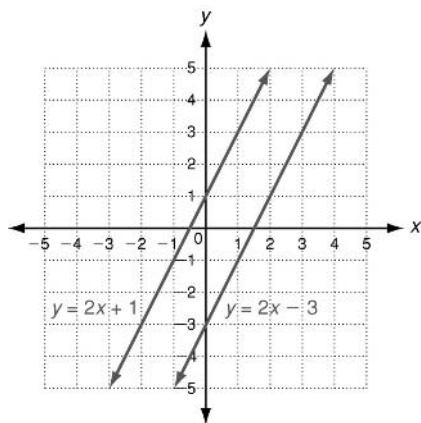
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6. Write an equation in slope-intercept form for the line that passes through (8, -1) and is perpendicular to  $y = -4x - 7$ .

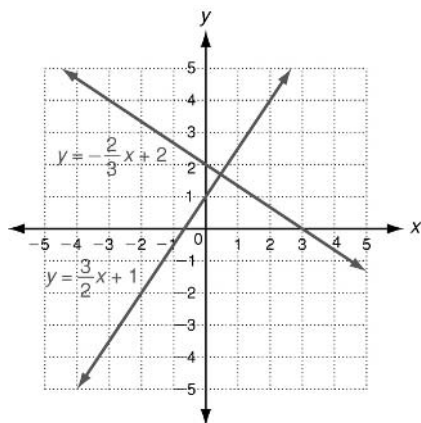
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## Review for Mastery

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



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



3. 6;  $-\frac{1}{6}$

4.  $\frac{4}{3}$ ;  $-\frac{3}{4}$

5.  $y = -x + 11$

6.  $y = \frac{1}{4}x - 3$

## Challenge

1. a.  $y = 2x + 4$

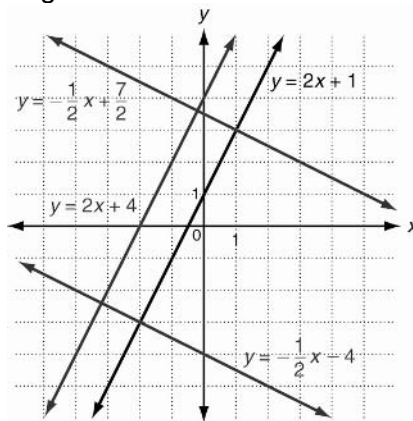
2. a.  $-3$

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

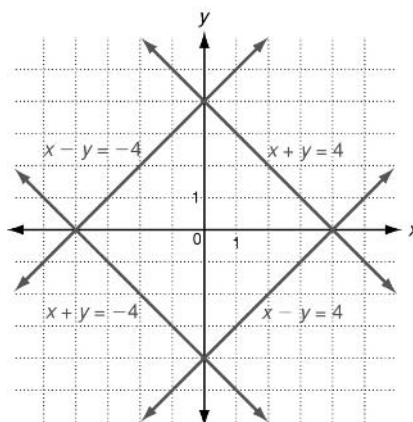
3. a. 3

b.  $y = -\frac{1}{2}x + \frac{7}{2}$

4. It is a rectangle because it has four right angles.



5-6.  $x - y = -4$ ;  $x + y = -4$ ;  $x - y = 4$ ;  $x + y = 4$



## Problem Solving

- The top and bottom are parallel because they are both horizontal. The sides are parallel because they both have a slope of  $-\frac{5}{3}$ . It is a parallelogram because both pairs of opposite sides are parallel.
- The slope of  $AB$  is  $\frac{1}{4}$ , the slope of  $AC$  is  $-\frac{7}{4}$ , and the slope of  $BC$  is  $-\frac{1}{4}$ . None of the slopes have a product of  $-1$  so no sides are perpendicular.
- D
- G
- C

## Reading Strategies

Possible answers are given for 1 and 2.

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