Standard Form Review

2x + 3y = 6
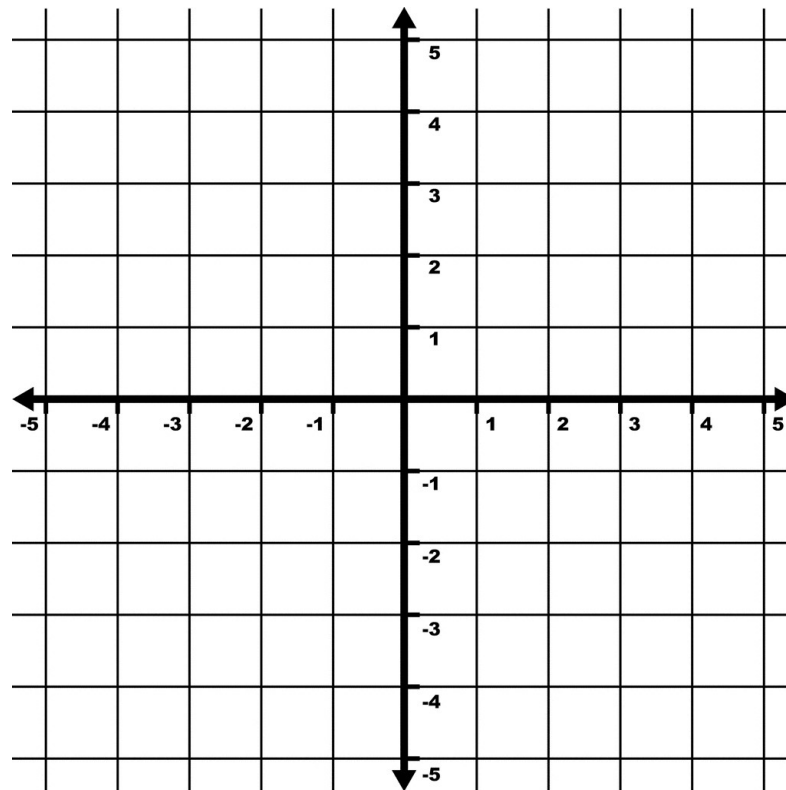
I can determine whether lines are parallel, perpendicular, or neither.

I can write equations of parallel lines and perpendicular lines.

parallel lines - lines in the same plane that never intersect

perpendicular lines - lines that intersect to form right angles

opposite reciprocals - two numbers whose product is -1

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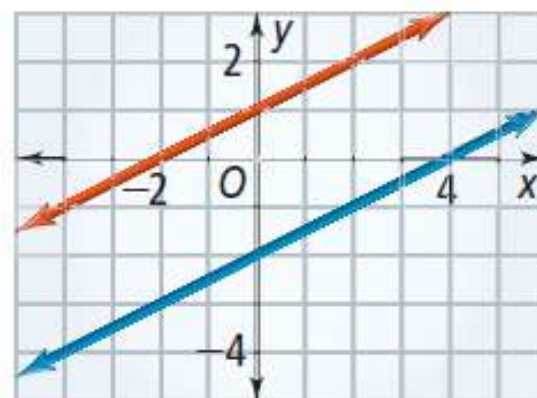
take note

Key Concept   Slopes of Parallel Lines

Words

Nonvertical lines are parallel if they have the same slope and different y-intercepts. Vertical lines are parallel if they have different x-intercepts.

Graph

Example

The graphs of $y = \frac{1}{2}x + 1$ and $y = \frac{1}{2}x - 2$ are lines that have the same slope, $\frac{1}{2}$, and different y-intercepts. The lines are parallel.

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Problem 1 Writing an Equation of a Parallel Line

A line passes through $(12, 5)$ and is parallel to the graph of $y = \frac{2}{3}x - 1$. What equation represents the line in slope-intercept form?

1. A line passes through $(-3, -1)$ and is parallel to the graph of $y = 2x + 3$. What equation represents the line in slope-intercept form?

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take note →

Key Concept   Slopes of Perpendicular Lines

Words

Two nonvertical lines are perpendicular if the product of their slopes is -1. A vertical line and a horizontal line are also perpendicular.
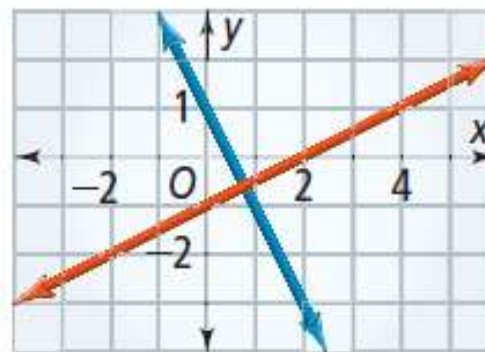
Graph

Example

The graph of $y = \frac{1}{2}x - 1$ has a slope of $\frac{1}{2}$.
The graph of $y = -2x + 1$ has a slope of -2.
Since $\frac{1}{2}(-2) = -1$, the lines are perpendicular.

Two numbers whose product is -1 are **opposite reciprocals**. So, the slopes of perpendicular lines are opposite reciprocals. To find the opposite reciprocal of $-\frac{3}{4}$, for example, first find the reciprocal, $-\frac{4}{3}$. Then write its opposite, $\frac{4}{3}$. Since $-\frac{3}{4} \cdot \frac{4}{3} = -1$, $\frac{4}{3}$ is the opposite reciprocal of $-\frac{3}{4}$.

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Problem 2 Classifying Lines

Are the graphs of $4y = -5x + 12$ and $y = \frac{4}{5}x - 8$ *parallel, perpendicular,* or *neither?* Explain.

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2. Are the graphs of the equations *parallel, perpendicular,* or *neither?* Explain.

a. $y = \frac{3}{4}x + 7$ and $4x - 3y = 9$

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Problem 3 **Writing an Equation of a Perpendicular Line**

Multiple Choice Which equation represents the line that passes through $(2, 4)$ and is perpendicular to the graph of $y = \frac{1}{3}x - 1$?

Ⓐ $y = \frac{1}{3}x + 10$ Ⓑ $y = 3x + 10$ Ⓒ $y = -3x - 2$ Ⓓ $y = -3x + 10$

3. A line passes through $(1, 8)$ and is perpendicular to the graph of $y = 2x + 1$. What equation represents the line in slope-intercept form?

Lesson Check

Do you know HOW?

1. Which equations below have graphs that are parallel to one another? Which have graphs that are perpendicular to one another?

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

2. What is an equation of the line that passes through $(3, -1)$ and is parallel to $y = -4x + 1$? Give your answer in slope-intercept form.

3. What is an equation of the line that passes through $(2, -3)$ and is perpendicular to $y = x - 5$? Give your answer in slope-intercept form.

Lesson Check

Do you know HOW?

1. Which equations below have graphs that are parallel to one another? Which have graphs that are perpendicular to one another?

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

2. What is an equation of the line that passes through $(3, -1)$ and is parallel to $y = -4x + 1$? Give your answer in slope-intercept form.

3. What is an equation of the line that passes through $(2, -3)$ and is perpendicular to $y = x - 5$? Give your answer in slope-intercept form.

Lesson Check

1. $y = 6x$ and $y = 6x - 2$; $y = -\frac{1}{6}x$ and $y = 6x$, $y = -\frac{1}{6}x$ and $y = 6x - 2$

2. $y = -4x + 11$

3. $y = -x - 1$