

4.6

Model Direct Variation

Goal • Write and graph direct variation equations.

Your Notes

VOCABULARY

Direct variation

Constant of variation

Example 1 Identify direct variation equations

Tell whether the equation represents direct variation. If so, identify the constant of variation.

a. $4x + 2y = 0$

b. $-2x + y = 3$

Solution

To tell whether an equation represents direct variation, try to rewrite the equation in the form $y = ax$.

a. $4x + 2y = 0$

Write original equation.

$2y = \underline{\hspace{2cm}}$

Subtract $\underline{\hspace{1cm}}$ from each side.

$y = \underline{\hspace{2cm}}$

Simplify.

Because the equation $4x + 2y = 0$ $\underline{\hspace{2cm}}$ be rewritten in the form $y = ax$, it $\underline{\hspace{2cm}}$ direct variation. The constant of variation is $\underline{\hspace{1cm}}$.

b. $-2x + y = 3$

Write original equation.

$y = \underline{\hspace{1cm}} + 3$

Add $\underline{\hspace{1cm}}$ to each side.

Because the equation $-2x + y = 3$ $\underline{\hspace{2cm}}$ be rewritten in the form $y = ax$, it $\underline{\hspace{2cm}}$ direct variation.

Your Notes

- ✓ **Checkpoint** Tell whether the equation represents direct variation. If so, identify the constant of variation.

1. $3x + 4y = 0$

2. $5x + y = 1$

Example 2 Graph direct variation equations

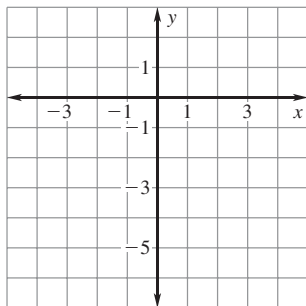
Graph the direct variation equation.

a. $y = -5x$

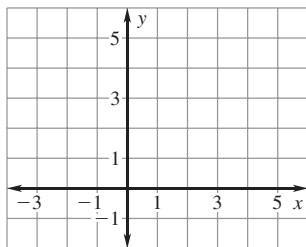
b. $y = \frac{3}{5}x$

Solution

- a. Plot a point at the origin. The slope is equal to the constant of variation, or -5 . Find and plot a second point, then draw a line through the points.



- b. Plot a point at the origin. The slope is equal to the constant of variation, or $\frac{3}{5}$. Find and plot a second point, then draw a line through the points.

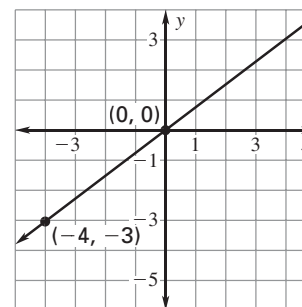


The graph of a direct variation equation is a line with a slope of a and a y -intercept of 0 . This line passes through the origin.

Your Notes

Example 3 Write and use a direct variation equation

The graph of a direct variation equation is shown.



- Write the direct variation equation.
- Find the value of y when $x = 80$.

Solution

- Because y varies directly with x , the equation has the form $y = ax$. Use the fact that $y = -3$ when $x = -4$ to find a .

$y = ax$ Write direct variation equation.

$\underline{\hspace{1cm}} = a(\underline{\hspace{1cm}})$ Substitute.

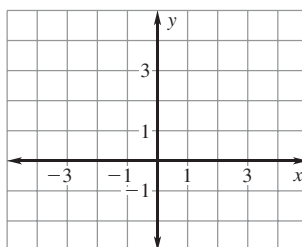
$\underline{\hspace{1cm}} = a$ Solve for a .

A direct variation equation that relates x and y is
 $y = \underline{\hspace{1cm}}$.

- When $x = 80$, $y = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$.

Checkpoint Complete the following exercises.

- Graph the direct variation equation $y = \frac{1}{2}x$.



- The graph of a direct variation equation passes through the point $(3, -4)$. Write the direct variation equation and find the value of y when $x = 15$.

Homework