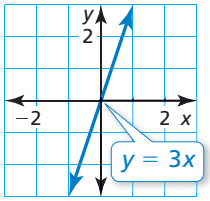
Name _____ Date _____

Direct Variation

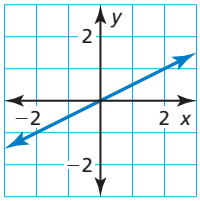
Two quantities x and y show **direct variation** when $y = kx$, where k is a number and $k \neq 0$. The number k is called the **constant of proportionality**.

The graph of $y = kx$ is a line with a slope of k that passes through the origin. So, two quantities that show direct variation are in a proportional relationship. For instance, in the graph at the right, x and y show direct variation.



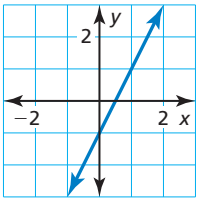
Example 1 **Tell whether *x* and *y* show direct variation. Explain your reasoning.**

a.



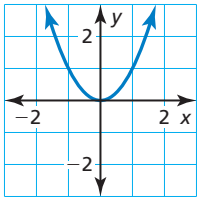
▶ The line passes through the origin. So, x and y show direct variation.

b.



▶ The line does *not* pass through the origin. So, x and y do *not* show direct variation.

c.



▶ The graph is *not* a line. So, x and y do *not* show direct variation.

Example 2 **Tell whether x and y are in a proportional relationship. Explain your reasoning.**

a. $y + 2 = 3x$

$y = 3x - 2$ Solve for y.

▶ The equation *cannot* be written in the form $y = kx$. So, x and y are *not* in a proportional relationship.

b. $\frac{1}{3}y = x$

$y = 3x$ Solve for y.

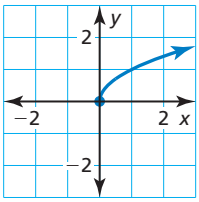
▶ The equation can be written in the form $y = kx$. So, x and y are in a proportional relationship.

Practice

Check your answers at BigIdeasMath.com.

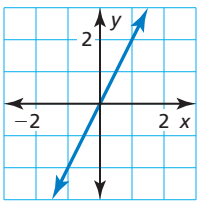
Tell whether *x* and *y* show direct variation. Explain your reasoning.

1.



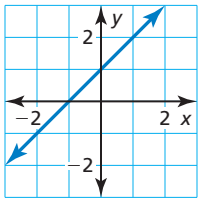
no; The graph is *not* a line.

2.



yes; The line passes through the origin.

3.



no; The line does *not* pass through the origin.

Tell whether *x* and *y* are in a proportional relationship. Explain your reasoning.

4. $y + 1 = 2x$

no; The equation *cannot* be written in the form $y = kx$.

5. $2y = x$

yes; The equation can be written in the form $y = kx$.

6. $y = \frac{5}{x}$

no; The equation *cannot* be written in the form $y = kx$.