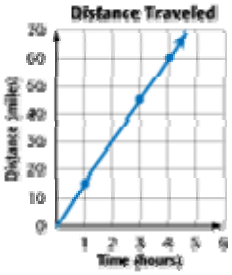
Lesson 9-4

Example 1 Real-World Example
EXERCISE The distance Kyle has ridden his bicycle varies directly as the amount of time he has been riding. Determine the distance that Kyle travels for each minute that he rides.

Since the graph of the data forms a line, the rate of change is constant. Use the graph to find the constant ratio.



$$\frac{\text{distance traveled}}{\text{time}} \rightarrow \frac{15}{1} \qquad \frac{45}{3} \text{ or } \frac{15}{1} \qquad \frac{60}{4} \text{ or } \frac{15}{1}$$

Kyle travels 15 miles for each hour that he rides.

Example 2 Real-World Example

PETS Most pets age at a different rate than their human companions. For example, a 3-year old dog is often considered to be 21 in human years. Assume that the age of a dog varies directly as its equivalent age in human years. What is the human-year age of a dog that is 8 years old?

Method 1 Use an equation.

Write an equation of direct variation. Let x represent the actual age and let y represent the human-equivalent age.

$y = kx$ direct variation
$21 = k(3)$ $y = 21, x = 3$
$7 = k$ Simplify.
$y = 7x$ Substitute for $k = 7$.

Use the equation to find y when $x = 8$.

$y = 7x$
$y = 7(8)$ $x = 8$
$y = 56$ Multiply.

Method 2 Use a proportion.

human equivalent age $\rightarrow$ $\frac{21}{3} = \frac{x}{8}$ $\leftarrow$ human equivalent age
actual age $\rightarrow$ $\leftarrow$ actual age

$21 \cdot 8 = 3 \cdot x$ Find the cross products.
$168 = 3x$ Multiply.
$\frac{168}{3} = \frac{3x}{3}$ Divide each side by 3.
$56 = x$ Simplify.

A dog that is 8 years old is 56 years old in human-equivalent years.

Example 3 Identify Direct Variation

Determine whether the linear function is a direct variation. If so, state the constant of variation.

Kilometers, y	60	120	180	240
Hours, x	1	2	3	4

Compare the ratios to check for a common ratio.

$\frac{\text{kilometers}}{\text{hours}} \rightarrow \frac{60}{1}$ $\frac{120}{2}$ or $\frac{60}{1}$ $\frac{180}{3}$ or $\frac{60}{1}$ $\frac{240}{4}$ or $\frac{60}{1}$

Since the ratios are proportional, the function is a direct variation. The constant of variation is $\frac{60}{1}$ or 60.

Example 4 Identify Direct Variation

Determine whether the linear function is a direct variation. If so, state the constant of variation.

Correct Answers, *x*	2	4	6	8
Points Earned, *y*	30	40	50	60

Compare the ratios to check for a common ratio.

$\frac{\text{points}}{\text{correct}} \rightarrow \frac{30}{2}$ or $\frac{15}{1}$ $\quad \frac{40}{4}$ or $\frac{10}{1}$ $\quad \frac{50}{6}$ or $\frac{8.33}{1}$ $\quad \frac{60}{8}$ or $\frac{7.5}{1}$

The ratios are not proportional, so the function is not a direct variation.