

Inverse Variation (Pages 270–275)

An **inverse variation** is described by an equation of the form $xy = k$, where $k \neq 0$. We say that y *varies inversely as* x . You can use a proportion, such as $\frac{x_1}{x_2} = \frac{y_2}{y_1}$, to solve problems involving inverse variation.

EXAMPLES

- A** Suppose y varies inversely as x and $y = 9$ when $x = 4$. Find y when $x = 12$.

$$\frac{x_1}{x_2} = \frac{y_2}{y_1} \quad \text{Inverse variation proportion}$$

$$\frac{4}{12} = \frac{y_2}{9} \quad x_1 = 4, x_2 = 12, \text{ and } y_1 = 9$$

$$36 = 12y_2 \quad \text{Find the cross products.}$$

$$\frac{36}{12} = \frac{12y_2}{12} \quad \text{Divide each side by 12.}$$

$$3 = y_2$$

So, when $x = 12$, $y = 3$.

- B** Suppose y varies inversely as x , and $y = 3$ when $x = 4$. Find the constant of variation and write an equation for the statement.

$$\begin{aligned} xy &= k && \text{Inverse variation} \\ (4)(3) &= k && x = 4, y = 3 \\ 12 &= k && \text{Multiply.} \end{aligned}$$

The constant of variation is 12. An equation for the statement is $xy = 12$.

PRACTICE

Solve. Assume that y varies inversely as x .

- Find x when $y = 7$ if $y = 3$ when $x = 14$.
- If $y = -8$ when $x = 5$, find x when $y = -10$.
- If $y = 9$ when $x = 6$, find y when $x = 2$.
- Suppose $y = 21$ when $x = -4$. Find y when $x = 28$.

Find the constant of variation. Then write an equation for each statement.

- y varies inversely as x , and $y = 2$ when $x = 8$.
- y varies inversely as x , and $y = -5$ when $x = 4$.
- y varies inversely as x , and $y = 4$ when $x = \frac{1}{2}$.
- y varies inversely as x , and $y = 3$ when $x = 2.4$.
- Electronics** The amount of current in a circuit varies inversely as the resistance in the circuit. Suppose there is 100 milliamps of current when the resistance is 60 ohms. What would the current be if the resistance were increased to 150 ohms?



- 10. Standardized Test Practice** Suppose y varies inversely as x and $y = 5$ when $x = 8$. Find x when $y = 10$.

A 3

B 4

C 7

D 16

Answers: 1. 6 2. 4 3. 27 4. -3 5. 16; $xy = 16$ 6. -20; $xy = -20$ 7. 2; $xy = 2$ 8. 7.2; $xy = 7.2$ 9. 40 milliamps 10. B