


5.4 Solving Proportions

Learning Targets

- Solve using Mental Math 
- Solve using the Multiplication property of Equality
- Solve using Cross Products

Solve Using the Multiplication Property of Equality

Solve $\frac{5}{7} = \frac{x}{21}$ ← variable is in the numerator

$$\frac{5}{7} = \frac{x}{21}$$

(Handwritten blue annotations: a bracket above the 5 and 21 with a '3' next to it, and a bracket below the 7 and x with a '3' next to it, indicating a common factor of 3.)

$$21 \cdot \frac{5}{7} = 21 \cdot \frac{x}{21}$$

(Handwritten red annotations: a red line through the 21 in the denominator of the second fraction.)

$$15 = x$$

Write the proportion.

Multiplication Property of Equality

Simplify.

Solve Using the Multiplication Property of Equality

Use multiplication to solve the proportion.

1. $\frac{w}{6} = \frac{6}{9}$

$$\cancel{6} \cdot \frac{w}{\cancel{6}} = \frac{6}{9} \cdot \cancel{6}$$

$$w = 4$$

2. $\frac{12}{10} = \frac{a}{15}$

$$15 \cdot \frac{12}{10} = \frac{a}{15} \cdot \cancel{15}$$

$$\frac{180}{10} = a$$

$$18 = a$$

3. $\frac{y}{6} = \frac{2}{4}$

$$\cancel{6} \cdot \frac{y}{\cancel{6}} = \frac{2}{4} \cdot \cancel{6}$$

$$y = 3$$

Solve Using Cross-Products

Solve each proportion.

a. $\frac{x}{8} = \frac{7}{10}$

$$\begin{aligned} 10x &= 8 \cdot 7 \\ 10x &= \frac{56}{10} \\ \frac{10}{10}x &= \frac{56}{10} \end{aligned}$$

$$x = 5.6$$

Cross
Products Property

Multiply.

Divide.

b. $\frac{9}{y} = \frac{3}{17}$

$$\begin{aligned} 3y &= 9 \cdot 17 \\ 3y &= \frac{153}{3} \end{aligned}$$

$$y = 51$$

Solve Using Cross-Products

Use the Cross Products Property to solve the proportion.

$$4. \quad \frac{2}{7} = \frac{x}{28}$$

$$\frac{7x}{7} = \frac{56}{7}$$

$$x = 8$$

$$5. \quad \frac{12}{5} = \frac{6}{y}$$

$$\frac{30}{12} = \frac{12y}{12}$$

$$2.5 = y$$

Solve Using Cross-Products

Use the Cross Products Property to solve the proportion.

$$\frac{40}{z+1} = \frac{15}{6}$$

$$40 \cdot 6 = 15(z+1)$$

$$240 = 15z + 15$$

$$\begin{array}{r} 240 = 15z + 15 \\ - 15 \qquad \qquad - 15 \\ \hline 225 = 15z \\ \frac{225}{15} = \frac{15z}{15} \end{array}$$

$$z = 15$$



Solve Using Cross-Products

Use the Cross Products Property to solve the proportion.

$$\frac{(s+1)}{4} = \frac{4}{8}$$

$$8(s+1) = 4 \cdot 4$$

$$\begin{array}{r} 8s+8 = 16 \\ -8 \quad -8 \\ \hline \end{array}$$

$$\begin{array}{r} 8s = 8 \\ \hline \end{array}$$

$$\boxed{s=1}$$

$$\frac{5}{3} = \frac{20}{(m-4)} = 12$$

$$60 = 5(m-4)$$

$$\begin{array}{r} 60 = 5m - 20 \\ +20 \quad +20 \\ \hline \end{array}$$

$$80 = 5m$$

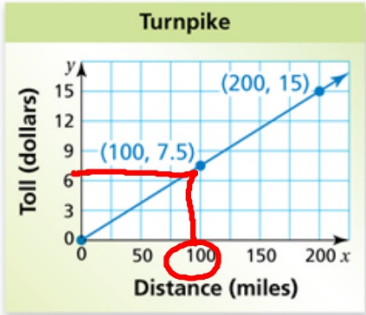
$$\begin{array}{r} 80 = 5m \\ \div 5 \quad \div 5 \\ \hline \end{array}$$

$$\boxed{16=M}$$



The graph shows the toll y due on a turnpike for driving x miles. Your toll is \$7.50. How many *kilometers* did you drive?

The point (100, 7.5) on the graph shows that the toll is \$7.50 for driving 100 miles. Convert 100 miles to kilometers.



Method 2: Convert using a proportion.

$$\begin{array}{c} \text{kilometers} \\ \text{miles} \end{array} \rightarrow \frac{1.61}{1} = \frac{x}{100} \leftarrow \begin{array}{c} \text{kilometers} \\ \text{miles} \end{array}$$

Write a proportion. Use $1.61 \text{ km} \approx 1 \text{ mi}$.

$$\begin{aligned} 1.61 \cdot 100 &= 1 \cdot x \\ 161 &= x \end{aligned}$$

Cross Products Property
Simplify.

So, you drove about 161 kilometers.

**Example
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Homework

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#1-3,

#4-24 even

#25-27

#31-34 a