

5.5 Solving Proportions

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Mar 10-9:20 AM

For two ratios, the product of the numerator in one ratio and the denominator in the other is a **cross product**. If the cross products of the ratios are equal, then the ratios form a proportion.

$$\frac{2}{5} = \frac{6}{15}$$

$$5 \cdot 6 = 30$$

$$2 \cdot 15 = 30$$

Mar 10-9:10 AM

CROSS PRODUCT RULE

In the proportion $\frac{a}{b} = \frac{c}{d}$, the cross products, $a \cdot d$ and $b \cdot c$ are equal.

You can use the cross product rule to solve proportions with variables.

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Use cross products to solve the proportion.

$$\frac{9}{15} = \frac{m}{5}$$

$$\frac{9}{15} = \frac{m}{5}$$

$$15m = 45$$

$$\frac{15m}{15} = \frac{45}{15}$$

$$m = 3$$

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Use cross products to solve the proportion.

$$\frac{6}{7} = \frac{m}{14}$$

$$\frac{6}{7} = \frac{m}{14}$$

$$7m = 84$$

$$\frac{7m}{7} = \frac{84}{7}$$

$$m = 12$$

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When setting up a proportion to solve a problem, use a variable to represent the number you want to find. In proportions that include different units of measurement, either the units in the numerators must be the same and the units in the denominators must be the same or the units within each ratio must be the same.

$$\frac{16 \text{ mi}}{4 \text{ hr}} = \frac{8 \text{ mi}}{x \text{ hr}} \qquad \frac{16 \text{ mi}}{8 \text{ mi}} = \frac{4 \text{ hr}}{x \text{ hr}}$$

Mar 10-9:20 AM

If 3 volumes of Jennifer's encyclopedia takes up 4 inches of space on her shelf, how much space will she need for all 26 volumes?

Set up a proportion using the given information. Let x represent the inches of space needed.

$$\frac{3 \text{ volumes}}{4 \text{ inches}} = \frac{26 \text{ volumes}}{x} \quad \begin{array}{l} \leftarrow \text{volumes} \\ \leftarrow \text{inches} \end{array}$$

Mar 10-9:22 AM

If 3 volumes of Jennifer's encyclopedia takes up 4 inches of space on her shelf, how much space will she need for all 26 volumes?

$$\frac{3 \text{ volumes}}{4 \text{ in}} = \frac{26 \text{ volumes}}{x}$$

$$\frac{3x}{3} = \frac{104}{3}$$

$$34.7 \text{ in}$$

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John filled his new radiator with 6 pints of coolant, which is the 10 inch mark. How many pints of coolant would be needed to fill the radiator to the 25 inch level?

$$\frac{6 \text{ pt}}{10 \text{ in}} = \frac{x}{25 \text{ in}}$$

$$\frac{10x}{10} = \frac{150}{10}$$

$$15 \text{ pt}$$

Mar 10-9:22 AM

Use cross products to solve the proportion.

$$1. \frac{25}{20} = \frac{45}{t}$$

$$\frac{25t}{25} = \frac{900}{25} \quad t = 36$$

$$2. \frac{x}{9} = \frac{19}{57}$$

$$\frac{57x}{57} = \frac{171}{57} \quad x = 3$$

$$3. \frac{2}{3} = \frac{r}{36}$$

$$\frac{3r}{3} = \frac{72}{3} \quad r = 24$$

$$4. \frac{n}{10} = \frac{28}{8}$$

$$\frac{8n}{8} = \frac{280}{8} \quad n = 35$$

Apr 12-10:34 AM

- 5.** Carmen bought 3 pounds of bananas for \$1.08. June paid \$ 1.80 for her purchase of bananas. If they paid the same price per pound, how many pounds did June buy?

$$\frac{\$1.08}{3 \text{ lb}} = \frac{\$1.80}{x}$$

$$\frac{1.08x}{1.08} = \frac{5.4}{1.08}$$

$$x = 5 \text{ lb}$$

Apr 12-10:35 AM