

Introduction to Proportions

A proportion is an expression of the equality of two ratios or rates.

$$\frac{50\text{miles}}{4\text{gals}} = \frac{25\text{miles}}{2\text{gals}} \text{ is a proportion}$$

A proportion is **true** if the two fractions are equal (when written in lowest terms). The best way to check if a proportion is true is to check the equality of the “cross products”

.i.e. given $\frac{a}{b} = \frac{c}{d}$ is true if $ad = bc$

Is $\frac{2}{3} = \frac{8}{12}$ a true proportion?

$$2 * 12 = 24$$

$$3 * 8 = 24$$

$$24 = 24 \text{ so it is a true proportion}$$

A proportion is **false** if the cross products are not equal.

Is $\frac{4}{5} = \frac{8}{9}$ a true proportion?

$$4 * 9 = 36$$

$$5 * 8 = 40 \text{ therefore a false proportion}$$

Solving proportion problems

Sometimes, we do not know one of the values of a proportion. We use the above mentioned property of cross products to solve for the missing value

Solve $\frac{9}{6} = \frac{3}{n}$

By cross multiplying we get

$$9n = 6(3)$$

$$9n = 18$$

$$9n \div 9 = 18 \div 9$$

$$n = 2$$

thus $\frac{9}{6} = \frac{3}{2}$ is a true proportion