Ratios and Proportions

The <u>ratio of a to b</u> is $\dfrac{a}{b}$. The ratio of a to b can also be written as a:b. Because a ratio is a quotient, its denominator cannot be zero.

Example 1: A geometry class consists of 16 female students, 12 male students, and 2 teachers. Write each ratio in simplest form.

male students : female students

$12 : 16$

$3 : 4$

students : teachers

$28 : 2$

$14 : 1$

Example 2: Simplify the ratio.

$$\frac{12 \, cm}{4 \, m} \cdot \frac{1 \, m}{100 \, cm} = \frac{12}{400} = \frac{3}{100}$$

$$\frac{6 \, ft}{18 \, in} \cdot \frac{12 \, in}{1 \, ft} = \frac{72}{18} = \frac{4}{1}$$

A <u>proportion</u> is an equation showing that two ratios are equal. If the ratio $\frac{a}{b}$ is equal to the ratio $\frac{c}{d}$, then the following proportion can be written:

$$\frac{a}{b} = \frac{c}{d}$$

The numbers a and d are the <u>extremes</u> of the proportion.

The numbers b and c are the <u>means</u> of the proportion.

Here are two properties that are useful when solving a proportion:

Cross Product Property - The product of the extremes equals the product of the means.

$$\frac{x}{3} = \frac{7}{21}$$

Reciprocal Property - If two ratios are equal, then their reciprocals are also equal.

$$\left(\frac{x}{3} = \frac{7}{10}\right) \implies \frac{3}{x} = \frac{10}{7}$$

Example 3: Solve the proportion.

$$\frac{x}{6} \diagdown \frac{5}{9}$$

$$\frac{9x}{9} = \frac{30}{9}$$

$$x = \frac{10}{3}$$

$$\frac{3}{x} \diagdown \frac{4}{7}$$

$$\frac{21}{4} = \frac{4x}{4}$$

$$\frac{21}{4} = x$$

Name

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16-30 even

Notes Inequalities/Absolute Values