

**Algebra I**  
**Lesson 2.6 – Rates, Ratios, and Proportions**  
**Mrs. Snow, Instructor**

Miles per hour, gallons per square foot, miles per gallon, teacher to student ratio, male to female ratio, win to loss. These relationships are **ratios** and are comparisons of two quantities that are divided. We can write **ratios** in a couple different ways: *the ratio of a to b may be written as a : b or  $\frac{a}{b}$  where  $b \neq 0$ .*

**Vocabulary**

**Equivalent** – ratios that are equal ( $\frac{a}{b} = \frac{c}{d}$ ), more specifically,

**Proportion** – a statement that has to equivalent ratios, that is:  $\frac{1}{2} = \frac{5}{10}$

**Rate** – a ratio where the quantities have two different units:  $\frac{58 \text{ mi}}{2 \text{ gal}}$

**Unit rate** – a rate written as “stuff” per single amount. You can convert any rate to a unit rate:  $\frac{58 \text{ mi}}{2 \text{ gal}} = \frac{29 \text{ mi}}{1 \text{ gal}}$   
*Denominator is a single unit*

<p>The ratio of games won to games lost for a baseball team is 3: 2. If the team lost 12 games, how many did they win?</p> $\frac{\text{win}}{\text{loss}} \rightarrow \frac{3}{2}$ $\frac{3}{2} = \frac{x}{12}$ $6(12) \frac{3}{2} = \frac{x}{12} (12)$ $18 = x$ <p>ans: 18 wins</p>	<ol style="list-style-type: none"> <li>1. Write a ratio comparing win to lost games</li> <li>2. Write a proportion. With x as the unknown number of wins.</li> <li>3. Solve for x</li> <li>4. <i>reduce before you multiply!!</i></li> <li>5. <i>units!!!</i></li> </ol>
<p>Cory earned \$52.50 in 7 hours. Find the unit rate. (how much does he make per hour?)</p> $\frac{52.50}{7} = \frac{x}{1}$ $7.5$ <p>ans: \$7.50 dollars per hour</p>	<ol style="list-style-type: none"> <li>1. Write proportion to find an equivalent ratio with a denominator equal to 1.</li> <li>2. Well, we already have solved for x, so divide the left side of the equation!</li> <li>3. <i>remember units!!!!</i></li> </ol>

Another way we can solve proportions is to **cross multiply** or use the **Cross Product Property**. In a proportion, the cross products are equal.

$\frac{2}{3} = \frac{4}{6}$ $(2)(6) = (4)(3)$ $12 = 12$	<ol style="list-style-type: none"> <li>1. Draw an X through your proportion; left side numerator down to right side denominator and right side numerator down to left side denominator.</li> <li>2. Set the products equal to each other</li> </ol>
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**Solve:**

The ratio of cat to dog adoptions at an animal rescue shelter is 3:4. If 18 cats are adopted during the month of December, how many dogs were adopted?

The Keith went on a bike ride, according to the map he had gone 56 miles. He had only been on the road for 4 hours. What was his speed in miles per hour? What is the speed in feet/second? Round to the nearest tenth.

$\frac{4}{7} = \frac{x}{42}$	$-\frac{5}{2} = \frac{y}{8}$	$\frac{g+3}{5} = \frac{7}{4}$
$\frac{27}{x} = \frac{3}{8}$	$\frac{2w}{9} = \frac{10}{15}$	$\frac{3}{x-5} = \frac{4}{8}$

A scale model of the human heart is 16 feet long. The scale is 32:1. How many inches long is the actual human heart?