

There is a very close relationship between fractions and ratios. A **ratio** is a comparison of two (or more) numbers. Order is very important in ratios.

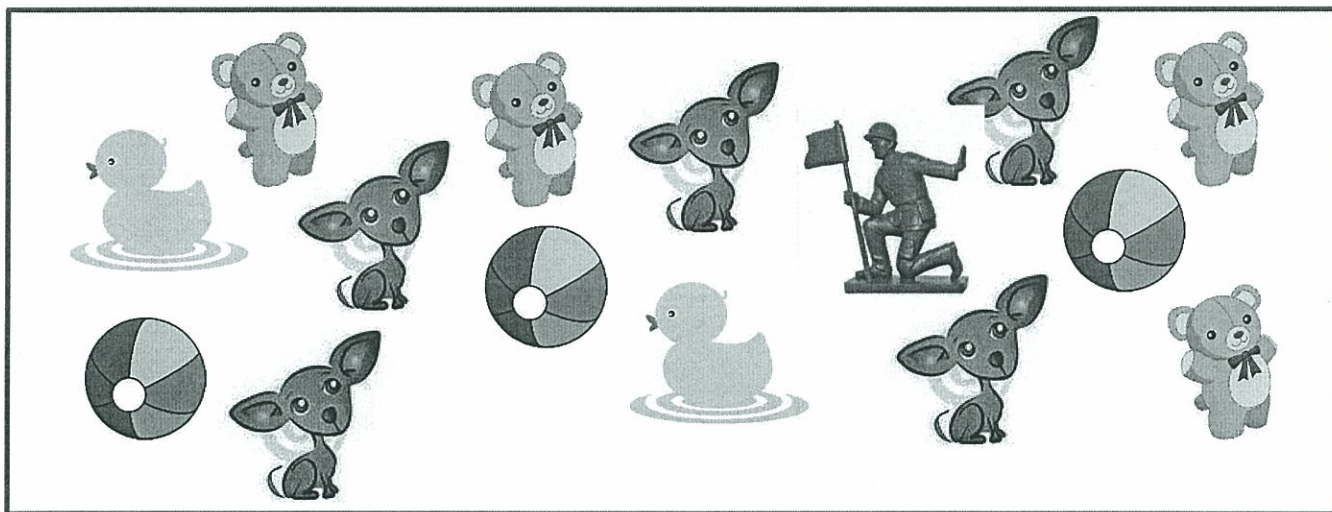
For example if there are 3 red marbles and 4 green marbles the ratio of red marbles to green marbles would look like this:

$$3:4 \quad \text{Read as "three to four"}$$

But the ratio of green marbles to red marbles would look like this:

$$4:3 \quad \text{Read as "four to three"}$$

**Ex. #1)** State the following ratios for the toys in the box



$$\text{Dogs:Teddies} = 5:4$$

$$\text{Beach Balls:Ducks} = 3:2$$

$$\text{Soldiers:Beach Balls} = 1:3$$

$$\text{Ducks:Teddies} = 2:4 = 1:2$$

$$\text{Dogs:Beach Balls} = 5:3$$

$$\text{Dogs:All Toys} = 5:15 = 1:3$$

$$\text{All Toys:Beach Balls} = 15:3 = 5:1 \quad \text{Ducks:Soldiers} = 2:1$$

Ratios can be simplified into **Lowest Terms** the same way that we simplify fractions. Divide both parts of the ratio by the same number until there are no more common factors.

**Ex. #2)** Simplify each ratio into lowest terms.

*\* Simplify above where possible \**

$$\text{a) } 6:8 = 3:4$$

$\div 2$

$$\text{b) } 12:8 = 6:4 = 3:2$$

$\div 2 \quad \div 2$

$$\text{c) } 9:6 = 3:2$$

$\div 3$

$$\text{d) } 8:8 = 4:4 = 2:2 = 1:1$$

$\div 2 \quad \div 2 \quad \div 2$

Ratios are often written as fractions.

Ex. #3) Write each ratio as a fraction in simplest form.

a)  $12:36 = \frac{12 \div 12}{36 \div 12} = \frac{1}{3}$

b)  $4:8 = \frac{4 \div 4}{8 \div 4} = \frac{1}{2}$

c)  $21 \text{ to } 49 = \frac{21 \div 7}{49 \div 7} = \frac{3}{7}$

d)  $60 \text{ out of } 100 = \frac{60}{100} = \frac{6 \div 10}{10 \div 10} = \frac{3}{5}$

A **Proportion** is simply two fractions that are equivalent (equal to each other). Proportions are used to find missing pieces of information. To solve a proportion you simply cross multiply and divide if you need to in order to isolate the unknown variable. To isolate a variable simply means to get it by itself.

Ex. #4) Solve each proportion:

a)  $\frac{5}{6} = \frac{x}{30}$   
 $5 \times 30 = x \times 6$   
 $150 = 6x$   
 $\frac{150}{6} = \frac{6x}{6}$   
 $25 = x$

b)  $\frac{x}{100} = \frac{7}{20}$   
 $20x = 700$   
 $\frac{20x}{20} = \frac{700}{20}$   
 $x = 35$

c)  $\frac{8}{9} = \frac{24}{x}$   
 $8x = 216$   
 $\frac{8x}{8} = \frac{216}{8}$   
 $x = 27$

d)  $\frac{18}{x} = \frac{2}{1}$   
 $18 = 2x$   
 $\frac{18}{2} = \frac{2x}{2}$   
 $9 = x$

e) A chainsaw needs a mixture of 1 part oil to 50 parts gasoline in order to operate. How much oil should Clint add to the gas can if there is already 2370 milliliters of gas in the can?

-set up proportion with each unit on same side of fraction

$\frac{1 \text{ oil}}{50 \text{ gas}} = \frac{x \text{ oil}}{2370 \text{ gas}}$

$2370 = 50x$   
 $\frac{2370}{50} = \frac{50x}{50}$   
 $47.4 = x$   
 Clint should add 47.4 mL of oil

f) A recipe for chocolate chip cookies calls for 2 cups of flour and 0.5 cups of chocolate chips. If Sally has  $1\frac{1}{4}$  cups of chocolate chips she wants to use up, how much flour will she need?

$1\frac{1}{4} = 1.25$

$\frac{2 \text{ flour}}{0.5 \text{ choc.}} = \frac{x \text{ flour}}{1.25 \text{ choc.}}$

$2.5 = 0.5x$   
 $\frac{2.5}{0.5} = \frac{0.5x}{0.5}$   
 $5 = x$

Sally will need 5 cups of flour