Day 1: Ratios & Proportions

A **ratio** is a comparison of two nonnegative quantities that uses division. Ratios can compare part to part or part to whole relationships. Words that indicate ratio relationships are for every, of

Consider the following scenario: *On the co-ed soccer team, there are four times as many boys on it as it has girls. We would say the ratio is 4:1.*

Part to Part Comparisons		Part to Whole Comparisons	
cats	dogs	football player	football team
football	baseball	MRS. Pease	Campbell Faculty
teacher	student		

What other ratios would show four times as many boys as girls?

4:1 OR $\frac{4}{1}\ \overset{\times 2}{\underset{\times 2}{}}\ = \frac{8}{2}$ OR 8:1

Practice: Create a ratio to describe the following:

a. There are 2 basketballs for every soccer ball. 2:1

b. There are 3 blueberry muffins in a 6 pack of muffins. 3:6

c. Each bagel costs $0.45. 0.45:1

d. For every 3 boys at soccer camp, there are 2 girls. 3:2

e. Billy wanted to write a ratio of the number of apples to the number of peppers in his refrigerator. He wrote 1:3. Did Billy write the ratio correctly?

NO; apples: peppers

3 : 1

Rates vs Ratios

A **rate** is a ratio that compares two quantities that are measured in different units. If the rate is expressed as per 1 unit, it is considered a **unit rate**. When two ratios or rates are equivalent to each other, you can write them as a proportion. A **proportion** is an equation that states two ratios are equal.

Ratio	Rate	Unit Rate	Proportion
2 red rose: 5 white roses $\frac{2 \text{ red roses}}{5 \text{ white roses}}$	90 miles: 2 hours $\frac{90 \text{ miles}}{2 \text{ hours}}$	45 miles: 1 hour $\frac{45 \text{ miles}}{1 \text{ hour}}$	$\frac{90 \text{ miles}}{2 \text{ hours}} = \frac{45 \text{ miles}}{1 \text{ hour}}$

Determine if the following can best be described as a ratio, rate, or unit rate:

a. 8 sugar cookies to 3 chocolate chip cookies — Ratio

b. 45 feet per 1 second — Unit Rate

c. 6 inches for every 3 years — Rate

d. 6 boys for every 4 girls — Ratio

Creating Equivalent Ratios by Scaling Up or Down

When we want to create equivalent ratios, we can use the same method as creating equivalent fractions. This is called scaling up or scaling down. Use the scaling up or scaling down method to determine the unknown quantity.

a. $\frac{12 \text{ in.}}{1 \text{ ft}} \overset{\times 4}{=} \frac{48 \text{ in.}}{? \text{ ft}}$; $1 \times 4 = 4$ ft.

b. $\frac{3 \text{ ft}}{1 \text{ yd}} \overset{\times 4}{=} \frac{? \text{ ft}}{4 \text{ yd}}$; $3 \times 4 = 12$ ft

c. $\frac{360 \text{ min}}{6 \text{ hrs}} \overset{\div 6}{=} \frac{?}{1 \text{ hr}}$; $360 \div 6 = 60$ min

d. $\frac{300 \text{ cm}}{3 \text{ m}} \overset{\div 3}{=} \frac{100 \text{ cm}}{? \text{ m}}$; $100 \div 3 = 1$ m

e. $\frac{64 \text{ fl oz}}{8 \text{ cups}} \overset{\div 8}{=} \frac{? \text{ oz}}{1 \text{ cup}}$; $64 \div 8 = 8$ oz

f. $\frac{16 \text{ c}}{8 \text{ pt}} \overset{\div 8}{=} \frac{? \text{ c}}{1 \text{ pt}}$; $16 \div 8 = 2$ c