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

_____.

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	

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

_____

Practice: Create a ratio to describe the following:

a. There are 2 basketballs for every soccer ball.

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

c. Each bagel costs $0.45.

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

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?

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 $$\frac{2\ red\ roses}{5\ white\ roses}$$	90 miles: 2 hours $$\frac{90\ miles}{2\ hours}$$	45 miles: 1 hour $$\frac{45\ miles}{1\ hour}$$	$$\frac{90\ miles}{2\ hours} = \frac{45\ miles}{1\ hour}$$

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

a. 8 sugar cookies to 3 chocolate chip cookies   b. 45 feet per second

c. 6 inches for every 3 years   d. 6 boys for every 4 girls

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. $\dfrac{12\ in.}{1\ ft} = \dfrac{48\ in.}{?}$ b. $\dfrac{3\ ft}{1\ yd} = \dfrac{?}{4\ yd}$

c. $\dfrac{360\ min}{6\ hrs} = \dfrac{?}{1\ hr}$ d. $\dfrac{300\ cm}{3\ m} = \dfrac{100\ cm}{?}$

e. $\dfrac{64\ fl\ oz}{8\ cups} = \dfrac{?}{1\ cup}$ f. $\dfrac{16\ c}{8\ pt} = \dfrac{?}{1\ pt}$

Creating Equivalent Ratios Using Double Number Lines

A double number line is a model that is made up of two number lines used to represent the equivalence of two related numbers. Each interval on the number has two sets of numbers and maintains the same ratio.

Scenario: It takes 1 cup of sugar to make 12 cupcakes. Use the double number line to determine equivalent ratios and answer each question.

0

0
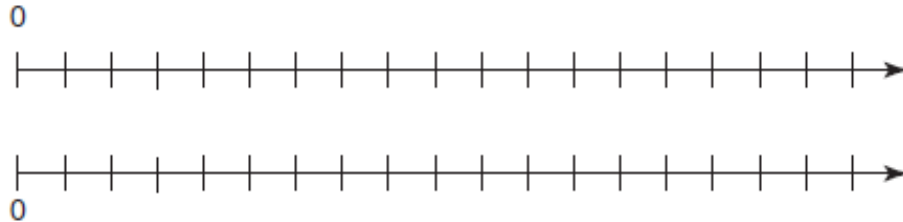
How many cupcakes can be made using the following amounts of sugar?

a. ½ cup of sugar

b. 1½ cups of sugar

c. ¼ cup of sugar

d. 8 cupcakes

e. 9 cupcakes

f. 15 cupcakes

Scenario: Shower heads come in various styles and allow different rates of water to flow in. This particular shower head using 20 gallons of water for every 5 minutes.

Water (gal)   0   20

Time (min)   0   5
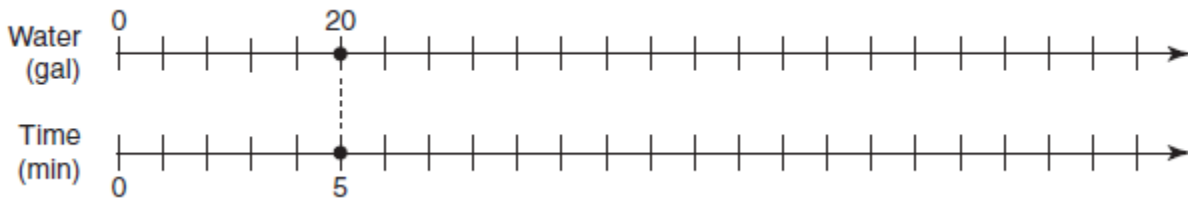
a. Gallons used in 1 minute?

B. Gallons used in 15 minutes?

c. Gallons used in 22 minutes?

Scenario: Miguel bought 4 rolls for $5. Create a double number line and use it to answer the following questions.

a. 16 rolls?

b. $15 dollars?

c. $22.50?

Creating Equivalent Ratios Using Tables

We can also use tables to determine equivalent ratios. Using the table below, show two calculations for the ratio of 150 lbs on Earth to 25 lbs on the moon.

Weight on Earth (lbs)	60	30	90	120	150
Weight on the moon (lbs)	10	5	15	20	25

Each table represents a series of equivalent ratios. Complete each table showing how you calculated each number.

a.

Yellow paint (oz)	1	2	10	
Red paint (oz)		6		60

b.

Yellow daffodils	32			16
White daffodils		48	6	12

c.

Children	3	6		18	
Toys	5		15		45