**Ratio vs. Rates**

**Ratio** is any comparison of two numerical measurements. Each measurement is called a "term."



The ratio of bananas to apples is

**2:5**

**Rate** is a little bit different than the ratio, it is a special ratio. It is a comparison of measurements that have different units.

**Example:**

If 15 burgers cost $75, the rate is $75 for 15 yummy burgers. In ratio:

**$75 : 15**



Here, the first term of the ratio is the price in dollars and the second term is the number of burgers. You can write this rate as $75/15 burgers or $75:15 burgers. Both expressions mean that you pay $75 "for every" 15 burgers.

**Sample Problem 1:**

**Tell whether the given quantities represent a mere RATIO or a RATE.**

1. 10 pieces of red pens to 6 pieces of blue pens

Solution: RATIO

1. 200 miles to 4 hours

Solution: RATE

**Unit Rate** is a rate in which the second term equals "1". If you want you determine a unit rate, you need to know how much of the first term exists for every one unit of the second term.

**Example:**

Here, the rate is $2.49 for every kilo of tomatoes, or in ratio $2.49:1.



Notice that the value of the second term in the ratio is 1. Therefore, when rates are expressed as a quantity of 1, then the rate

**$2.49 per kilo** is a unit rate.

And since ratios can be expressed as fractions, it is also CORRECT to say that a unit rate has **1** as the denominator.

**$2.49:1. or** $\frac{\$2.49 }{1}$ **or $2.49 per kilo**

**Sample Problem 2:**

**Which among the given quantities express a unit rate?**

1. 90 words per 30 minutes
2. 3 words per minute
3. 180 words per hour
4. 60 words per 20 minutes

**How Do We Calculate the Unit Rate?**

**Step 1: Check what information is given.**

The problem must have two terms, and you must be asked to determine how much of one term exists per unit of the other term.

**Some common examples are:**







* miles/kilometers per hour
* dollars per kilo
* price per item
* salary per month

**Example:**

A bakeshop can bake 400 chocolate cupcakes in an 8 hour work day. How many chocolate cupcakes can that same bakeshop make in one hour? In other words, **how many chocolate cupcakes are typically baked per hour?**



**CHOCOLATE CUPCAKES PER HOUR**

 First term Second term

**Step 2: Rewrite the given date as a quotient or a fraction.**

$\frac{First Term}{Second Term}$$\frac{400 Chocolate Cupcakes}{8 hours}$

**Step 3: Divide the first term (numerator) and the second term (denominator) by the value of the denominator.**

Remember that we want to express the rate as a SINGLE unit which means that the denominator MUST be equal to 1.

$$\frac{400 Chocolate Cupcakes}{8 hours}$$

400 Chocolate cupcakes / **8** **= 50**

8 hours / **8 = 1**

$$\frac{400 Chocolate Cupcakes}{8 hours}=\frac{50 Chocolate Cupcakes}{1 hour}$$

**Step 4: Write the unit rate expression.**

Therefore, the bakeshop can bake **50 chocolate cupcakes per hour.**

**Sample Problem 3:**

**Answer the problem.**

James traveled 200 miles in 4 hours. If he used the same speed the entire trip, how fast did he drive miles per hour?

Solution:

Step 1: 200 miles in 4 hours

Step 2: $\frac{200 miles}{4 hours}$

Step 3: 200 miles / 4 = 50

 4 hours / 4 = 1

Step 4: Therefore, he drives **4 miles per hour.**