Notes on Ratios, Proportions
And Unit rate

A Ratio: This is comparison of two quantities.
A ratio can be written three ways:

Example: For every 3 boys there are 5 girls in the grade.

3 to 5 or 3:5 or $\frac{3}{5}$

A **Rate** compares quantities measured in different units.
Example: I drove 350 miles on 70 gallons of gas. The rate is:

$$\frac{350 \text{ miles}}{70 \text{ gallons}}$$

A rate is not necessarily useful in that form, sometimes it is more useful to find a **unit rate**. Unit means one. So, a **unit rate** is the rate of **one unit** of a given quantity.

For example: The unit rate of $\frac{350 miles}{70 gallons} = \frac{5 miles}{1 gallon}$

You can use **proportions** to find the unit rate.
A **proportion** is an equation stating that two ratios are equivalent.

First determine what unit question you are asking. In the question above there can be two questions that you can ask.
We will use a proportion box to help us set up the proportion. Remember, the item in the question will be your variable.

Question 1: How many miles did I travel on 1 gallon of gas?
This is a proportion box:

	Actually traveled	Unit rate
miles	350	*x*
gallons	70	1

This proportion will be set up like this:

$$\frac{350}{70} = \frac{x}{1}$$

We can solve this proportion using equivalent fractions:

$$\frac{350}{70} \div \frac{70}{70} = \frac{5miles}{1gallon}$$

Or you can solve this proportion by cross multiplying:

350 = 70x

Solve this algebraically

$$\frac{350}{70} = \frac{70x}{70}$$

5 = x

In this case I can go 5 miles on 1 gallon of gas.

Question 2: How many gallons did it take to travel 1 mile?

	Actually traveled	Unit rate
miles	350	1
gallons	70	*x*

This proportion will be set up like this:

$$\frac{350}{70} = \frac{1}{x}$$

We can solve this proportion using equivalent fractions:

$$\frac{350}{70} \div \frac{350}{350} = \frac{1 \text{ mile}}{.2 \text{ gallons}}$$

In this case I can go 1 mile on .2 gallon of gas.