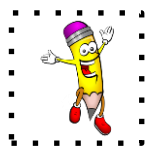## Rates & Unit Rates

Objective: You've learned about ratios, and you've learned to find equal ratios, create tables, and graph the tables. In this lesson you'll learn about a special kind of ratio called a rate.

Rate: Some ratios are known as rates.

*A rate is a comparison of two quantities with different units of measure.

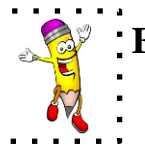*A unit rate is a rate with a "1" in the denominator.

Ex #1: The average Dalmatian can run 15,400 feet in 5 minutes. Here is the rate:

$$\frac{15{,}400 \ feet}{5 \ mins}$$

This rate compares the number of *feet* to the number of *minutes*. This can be read as "15,400 feet *per* 5 minutes." The units of measure are different so it is called a *rate*.

Ex #2: Abbott earned $165 working at Blue Moon for 11 hours last week. Here is the rate:

$$\frac{\$165}{11 \ hrs}$$

This rate compares the number of *dollars* to the number of *hours*. This can be read as "$165 *per* 11 hours." The units of measure are different so it is called a *rate*.

But neither of those examples has a quantity of "1" in the denominator. To find a unit rate, divide both numerator and denominator by the denominator so that the denominator simplifies to a "1".

Rates and Unit Rates:

$$\frac{60 \text{ miles}}{3 \text{ hours}} \quad \frac{20 \text{ miles}}{1 \text{ hour}} = 20 \text{ miles/hour}$$

$$\frac{40 \text{ words}}{2 \text{ min.}} \quad \frac{20 \text{ words}}{1 \text{ min.}} = 20$$

Let's revisit Ex #1: It's a rate, but let's turn it into a unit rate:

$$\frac{15{,}400 \; ft \div 5}{5 \; mins \div 5} = \frac{3{,}080 \; ft}{1 \; min}$$

Let's revisit Ex #2: It's a rate, but let's turn it into a unit rate:

$$\frac{\$165 \div 11}{11 \; hrs \div 11} = \frac{\$15}{1 \; hr}$$

Why turn a rate into a unit rate? As we saw from working with tables and graphing, once we "find the one" we can apply it to any situation easily and correctly.

YOU TRY:

1. **Mrs. Doolan can grade 8 constructed responses in 52 minutes. First, write a rate. Then, solve for the unit rate:**

2. **Mr. Gow needs 43.5 pounds of bird seed for every 6 weeks of winter. First, write a rate. Then, solve for the unit rate:**