

Name: \_\_\_\_\_

Date: \_\_\_\_\_

UNIT 1 DAY 3: RATES, PATTERNS AND PROBLEM SOLVING!



Algebra at its core is all about using the **properties of numbers** (how they behave) to manipulate unknowns, called **variables**. But, in practicality, Algebra is used to recognize patterns, turn them into mathematical relationships, and then use these relationships for useful purposes. Today's lesson, being the first of the course, is exploratory in nature and will utilize a basic understanding of **rates or ratios**.

**Do Now:** Answer the following rate/ratio questions using multiplication and division. Show your calculation (and keep track of your units!).

- (a) If there are 12 eggs per carton, then how many eggs do we have in 5 cartons?

$$\begin{array}{r}
 +12 \quad 12 \rightarrow 1 \quad +1 \\
 \hline
 +12 \quad 24 \rightarrow 2 \quad +1 \\
 \hline
 +12 \quad 36 \rightarrow 3 \quad +1 \\
 \hline
 +12 \quad 48 \rightarrow 4 \quad +1 \\
 \hline
 +12 \quad 60 \rightarrow 5 \quad +1
 \end{array}$$

- (b) If a car is traveling at 65 miles per hour, then how far does it travel in 2 hours?

$$\begin{array}{r}
 +65 \quad (65 \text{ miles} \rightarrow 1 \text{ hr}) +1 \\
 \hline
 +65 \quad (130 \text{ miles} \rightarrow 2 \text{ hr}) +1
 \end{array}$$

- (c) If a pizza contains 8 slices and there are 4 people eating, how many slices are there per person?

$$\frac{\text{slices}}{\text{person}} = \frac{8}{4} = 2 \text{ slices per person}$$

- (d) If a biker travels 20 miles in one hour, how many minutes does it take per mile traveled?

$$\frac{\text{minutes}}{\text{mile}} = \frac{60}{20} = 3 \text{ min per mile}$$

Rates show up everywhere in the real world, whether it is your pay per hour of work or the texts you can send per month. Rates are all about multiplication and division because they ultimately are a **ratio** of two quantities, both of which are **changing** or **varying**.

**Exercise #2:** A runner is traveling at a constant rate of 8 meters per second. How long does it take for the runner to travel 100 meters?

- (a) Experiment with solving this problem by setting up a table to track how far the runner has moved after each second.

time, $t$ (seconds)	Distance, $D$ (meters)
1	8 m
2	16 m
5	40 m
10	80 m

$$D = 80 \text{ m} = 10( \quad )$$

- (b) Create an equation that gives the distance,  $D$ , that the person has run if you know the amount of time,  $t$ , they have been running.

$$D = 8t$$

- (c) Now, set up and solve a simple algebraic equation based on (b), that gives the exact amount of time it takes for the runner to travel 100 meters.