Unit 5, Lesson 3

Writing Equations to Represent Relationships

Let's use equations to solve problems involving proportional relationships.

3.1 Math Talk: Products with Decimal Points

Find the value of each expression mentally.

- $32 \cdot (1.5)$
- $32 \cdot (0.15)$
- $3{,}200 \cdot (0.15)$
- $3{,}200 \cdot (0.03)$

3.2 Bottle Deposits

Answer the following questions. Be prepared to explain your reasoning.

In Iowa, collection centers pay 5¢ per bottle that is returned.

1. a. How much would 30 bottles be worth?

   b. How much would 250 bottles be worth?

   c. How much would 860 bottles be worth?

2. a. How many bottles would it take to earn $100?

   b. How many bottles would it take to earn $2,750?

3. Write an equation that relates the number of bottles to the amount of money received when the bottles are returned. What do your variables represent?

3.3 Recycling

Aluminum cans can be recycled instead of being thrown in the garbage. The weight of 10 aluminum cans is 0.16 kilograms. The aluminum in 10 cans that are recycled has a value of $0.14.

1. A family threw away 2.4 kg of aluminum cans in a month.
   a. How many cans did they throw away? Explain or show your reasoning.

   b. What would be the dollar value if they recycled those same cans? Explain or show your reasoning.

2. Write an equation to represent the relationship between each pair of quantities:
   a. the number of cans c and their weight w, in kilograms

   b. the number of cans c and their recycled value r, in dollars

   c. the weight of cans w and their recycled value r

Are you ready for more?

The U.S. Environmental Protection Agency (EPA) estimates that in 2018, the average amount of garbage produced in the United States was 4.9 pounds per person per day. At that rate, how long would it take your family to produce a ton of garbage? (A ton is 2,000 pounds.)

Lesson 3 Summary

Remember that if there is a proportional relationship between two quantities, their relationship can be represented by an equation of the form $y = kx$. Sometimes writing an equation is the easiest way to solve a problem.

For example, we know that Denali, the highest mountain peak in North America, is 20,310 feet above sea level. How many miles is that? There are 5,280 feet in 1 mile. This relationship can be represented by the equation

$$f = 5{,}280m$$

where f represents a distance measured in feet and m represents the same distance measured in miles. Since we know Denali is 20,310 feet above sea level, we can write

$$20{,}310 = 5{,}280m$$

Solving this equation for m gives $m = \frac{20{,}310}{5{,}280} \approx 3.85$, so we can say that Denali is approximately 3.85 miles above sea level.