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Unit 2, Lesson 6: Using Equations to Solve Problems

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

6.1: Number Talk: Quotients with Decimal Points

1. Without calculating, order the quotients of these expressions from least to greatest.

   $42.6 \div 0.07$

   $42.6 \div 70$

   $42.6 \div 0.7$

   $426 \div 70$

2. a. Place the decimal point in the appropriate location in the quotient:
   $42.6 \div 7 = 608571$

   b. Use this answer to find the quotient of *one* of the previous expressions.

6.2: Concert Ticket Sales

A performer expects to sell 5,000 tickets for an upcoming concert. They want to make a total of $311,000 in sales from these tickets.

1. Assuming that all tickets have the same price, what is the price for one ticket?

2. How much will they make if they sell 7,000 tickets?

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3. How much will they make if they sell 10,000 tickets? 50,000? 120,000? a million? x tickets?

4. If they make $379,420, how many tickets have they sold?

5. How many tickets will they have to sell to make $5,000,000?

6.3: 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. If a family threw away 2.4 kg of aluminum in a month, how many cans did they throw away? Explain or show your reasoning.

2. What would be the recycled value of those same cans? Explain or show your reasoning.

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3. Write an equation to represent the number of cans c given their weight w.

4. Write an equation to represent the recycled value r of c cans.

5. Write an equation to represent the recycled value r of w kilograms of aluminum.

Are you ready for more?

The EPA estimated that in 2013, the average amount of garbage produced in the United States was 4.4 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 6 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 20,300 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 miles. Since we know Denali is 20,310 feet above sea level, we can write

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

So $m = \frac{20{,}310}{5{,}280}$, which is approximately 3.85 miles.

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1. A car is traveling down a highway at a constant speed, described by the equation $d = 65t$, where d represents the distance, in miles, that the car travels at this speed in t hours.

   a. What does the 65 tell us in this situation?

   b. How many miles does the car travel in 1.5 hours?

   c. How long does it take the car to travel 26 miles at this speed?

2. Elena has some bottles of water that each holds 17 fluid ounces.

   a. Write an equation that relates the number of bottles of water (b) to the total volume of water (w) in fluid ounces.

   b. How much water is in 51 bottles?

   c. How many bottles does it take to hold 51 fluid ounces of water?

3. There are about 1.61 kilometers in 1 mile. Let x represent a distance measured in kilometers and y represent the same distance measured in miles. Write two equations that relate a distance measured in kilometers and the same distance measured in miles.
   (from Unit 2, Lesson 5)

4. In Canadian coins, 16 quarters is equal in value to 2 toonies.

number of quarters	number of toonies
1	
16	2
20	
24	

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a. Fill in the table.

b. What does the value next to 1 mean in this situation?

(from Unit 2, Lesson 2)

5. Each table represents a proportional relationship. For each table:

a. Fill in the missing parts of the table.
b. Draw a circle around the constant of proportionality.

x	y
2	10
	15
7	
1	

a	b
12	3
20	
	10
1	

m	n
5	3
10	
	18
1	

(from Unit 2, Lesson 2)

6. Describe some things you could notice in two polygons that would help you decide that they were not scaled copies.

(from Unit 1, Lesson 4)