

NAME: _____

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

Problem-Based Task 1.2.1: Rafting and Hiking Trip

To celebrate graduation, you and 4 of your closest friends have decided to take a 5-day white-water rafting and hiking trip. During your 5-day trip, 2 days are spent rafting. If the rafting trip covers a distance of 60 miles and you are expected to raft 8 hours each day, how many miles must you raft each hour?

For the hiking portion of your trip, you and your friends carry the same amount of equipment, which works out to 35 pounds of equipment each. For extra money, you can hire an assistant, who will carry 50 pounds of equipment. Each assistant charges a flat fee of \$50 and an additional \$22 for each mile. The total amount you would have to pay the assistant is \$512. How many miles will your group be hiking? Is it worth hiring two assistants to help you and your friends carry the equipment? Justify your answers.

NAME: _____

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

Problem-Based Task 1.2.1: Rafting and Hiking Trip

Coaching

- a. If the rafting trip covers a distance of 60 miles and you are expected to raft 8 hours each day, how many miles must you raft each hour?

What is the ratio of miles to days?

$$\frac{60 \text{ miles}}{2 \text{ days}}$$

What is the ratio you are looking for?

$$\frac{\text{miles}}{\text{hour}}$$

What is the ratio of days to hours?

$$\frac{1 \text{ day}}{8 \text{ hrs}}$$

How do you convert the original ratio of miles to days into miles per hour?

$$\frac{60 \text{ miles}}{2 \text{ days}} \times \frac{1 \text{ day}}{8 \text{ hrs}} = \frac{60 \text{ miles}}{16 \text{ hours}} = 3.75 \text{ mph}$$

- b. How many miles will your group be hiking?

What is the equation of the cost of hiring an assistant?

What is the solution to this equation?

- c. Is it worth hiring two assistants to help you and your friends carry the equipment?

How much weight will each of you carry without assistants?

How much weight will each of you carry with two assistants?

What is the difference in the cost per day?

Are you willing to pay more money to have someone carry your equipment?

NAME: _____

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

Practice 1.2.1: Creating Linear Equations in One Variable

For the problem below, read each scenario and give the units you would use to work with each situation.

1. What units would you use for each scenario that follows?

- a. riding a bicycle
 $\frac{\text{miles}}{\text{hours}}$
- b. rainfall during a storm
 $\frac{\text{inches}}{\text{day}}$
- c. water coming from a fire hydrant
 $\frac{\text{gallons}}{\text{sec}}$
- d. watching caloric intake
 $\frac{\text{calories}}{\text{serving}}$

For problems 2–8, read each scenario, write an equation, and then solve the problem. Remember to include the appropriate units.

2. You need to buy new tile for your kitchen. It measures 13.25 feet by 7.5 feet. What is the area of the kitchen that you calculated? What is the most accurate area you can report to your hardware store in order to purchase enough tile?

$$(13.25 \text{ ft})(7.5 \text{ ft}) = x \text{ ft}^2$$
$$99.375 \text{ ft}^2$$

3. Zach watches TV 3 times as much as Joel. Joel watches TV 2 hours a day. How many hours a day does Zach watch TV?

$$3(2) = x$$
$$6 \text{ hours} = x$$

4. It costs Raquel \$5 in tolls to drive to work and back each day, plus she uses 3 gallons of gas. It costs her a total of \$15.50 to drive to work and back each day. How much per gallon is Raquel paying for her gas? How do you know?

$$5 + 3x = 15.50$$
$$3x = 10.50$$
$$x = \$3.50 \text{ per gallon}$$

continued

NAME: _____

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

5. Hayden bought 4 tickets to a football game. He paid a 5% service charge for buying them from a broker. His total cost was \$105.00. What was the price of each ticket, not including the service charge?

$$4(x + 0.05x) = 105$$

$$4(1.05x) = 105$$

$$4.2x = 105$$

$$x = \$25 \text{ per ticket w/o service charge}$$

6. It cost Justin \$100 to have cable TV installed in his house. Each month he pays an access fee plus tax of 7% of his monthly bill. After 6 months, Justin had paid a total of \$350.38 for his access fee, taxes, and his initial installation. What is Justin's monthly access fee not including taxes?

$$6(x + 0.07x) + 100 = 350.38$$

$$6(1.07x) = 250.38$$

$$6.42x = 250.38$$

$$x = \$39 \text{ monthly access fee w/o taxes}$$

7. You and 3 friends divide the proceeds of a garage sale equally. The garage sale earned \$412. How much money did you receive?

$$4x = 412$$

$$x = \$103$$

8. The area of Sofia's herb garden is $\frac{1}{8}$ the area of her vegetable garden. The area of her herb garden is 6 square feet. What is the area of her vegetable garden?

$$6 \text{ ft}^2 (1/8) = x$$

$$0.75 \text{ ft}^2 = x$$

9. Driving to your friend's house, you travel at an average rate of 35 miles per hour. On your way home, you travel at an average rate of 40 miles per hour. If the round trip took you 45 minutes, how far is it from your house to your friend's house?

$d = rt$

$$d = \frac{35}{40} \times (45)$$

$$d = 39.375 \text{ miles}$$

10. Two trains heading toward each other are 400 miles apart. One train travels 15 miles per hour faster than the other train. If they arrive at the same station in 5 hours, how fast is each train traveling?

$$d = rt$$

$$400 = 5(x + 15)$$

$$400 = 5x + 75$$

$$325 = 5x$$

$$x = 65 \text{ mph (train 1)}$$

$$x+15 = 80 \text{ mph (train 2)}$$

$$d = 400 \text{ miles}$$

$$x = \text{mph of train 1}$$

$$x+15 = \text{mph of train 2}$$

$$t = 5 \text{ hours}$$