

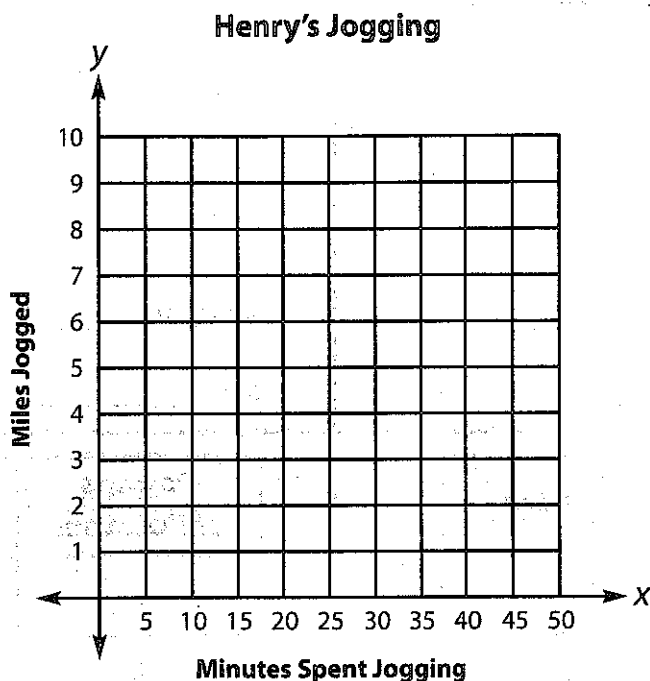
Standard 7.RP.2 (M)

Proportional Relationships on Graphs

We can also use graphs to determine if quantities are proportional. For two quantities on a graph to be proportional, the graph must meet two criteria.

- The graph must be a straight line.
- The graph must pass through the origin, $(0, 0)$.

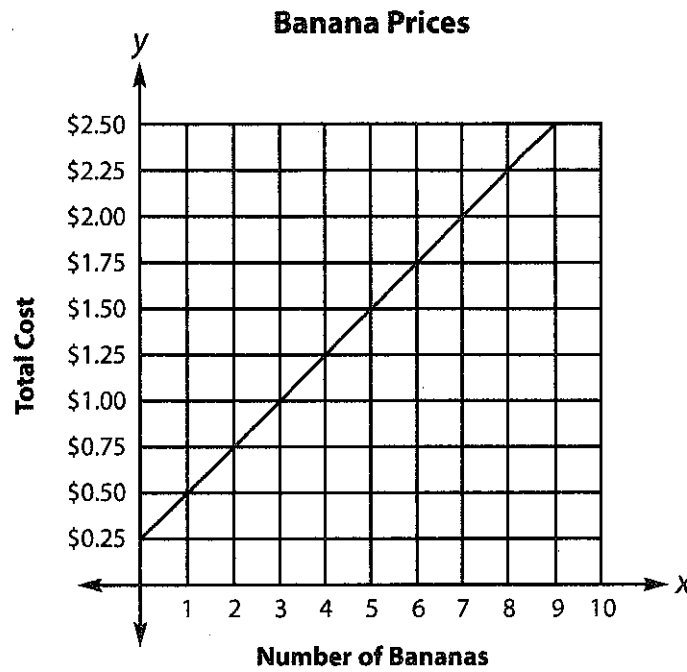
The graph below shows the distance Henry can jog based on the number of minutes he jogs.

**Talk About It**

- Does the graph show a proportional relationship? How do you know?
- How can you find the constant of proportionality using only the graph?
- What does any point (x, y) on the graph mean?
- What does the point $(0, 0)$ on the graph mean?
- What is special about the point $(1, 0.2)$ on the graph?
- What does the point $(1, y)$ mean on any graph?

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The graph below shows the total cost for different numbers of bananas.



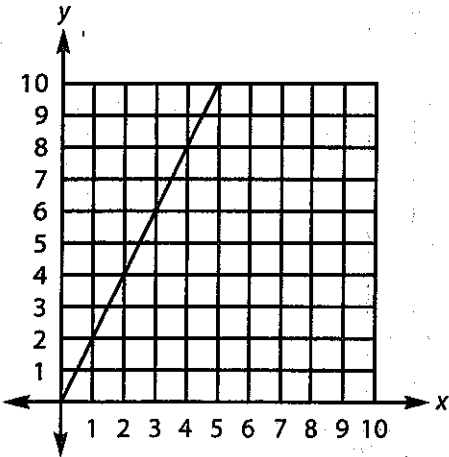
On Your Own: Does the graph above show a proportional relationship? How do you know?

Standard 7.RP.2 (M)

The Graph Test

Directions: Determine whether the two quantities shown on each graph below have a proportional relationship. Write YES or NO on each answer line. If the quantities have a proportional relationship, write the unit rate on the correct line.

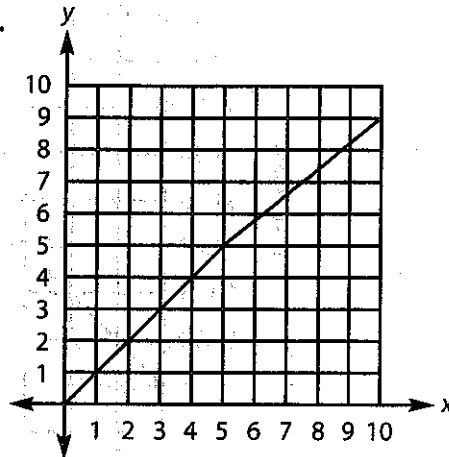
1.



Answer: _____

Unit rate: _____

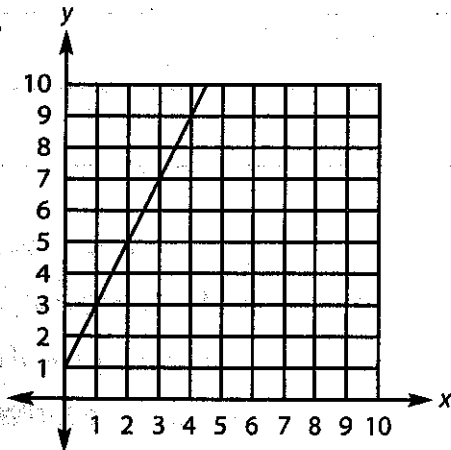
3.



Answer: _____

Unit rate: _____

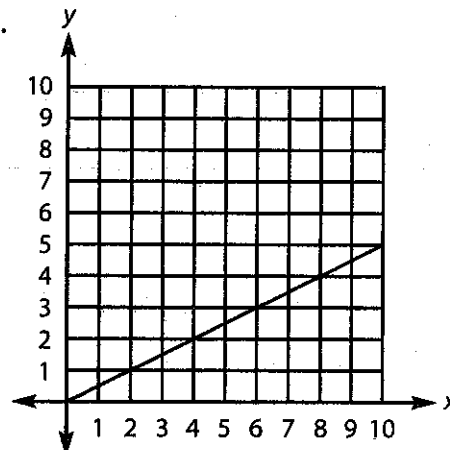
2.



Answer: _____

Unit rate: _____

4.

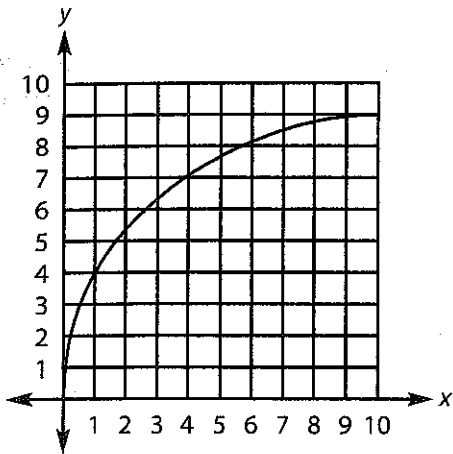


Answer: _____

Unit rate: _____

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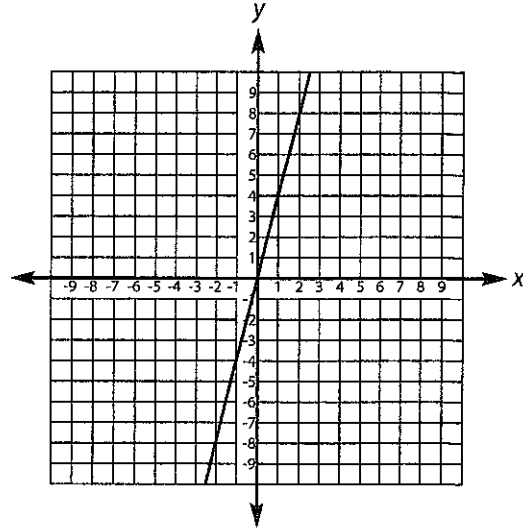
5.



Answer: _____

Unit rate: _____

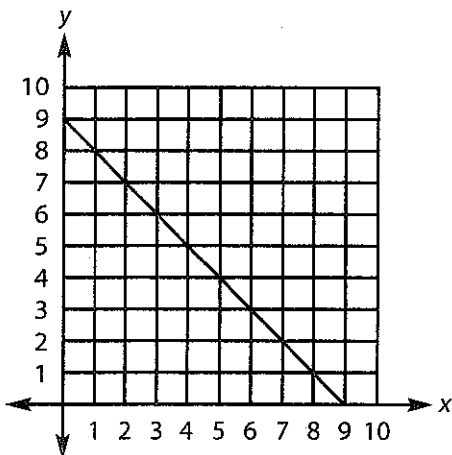
7. Challenge!



Answer: _____

Unit rate: _____

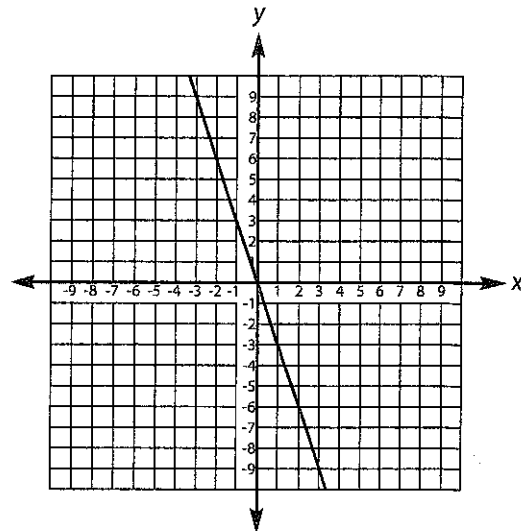
6.



Answer: _____

Unit rate: _____

8. Challenge!



Answer: _____

Unit rate: _____

Standard 7.RP.2 (L–M)

Writing Proportional Equations

You can write equations to represent proportional relationships. You know that proportional relationships use the form $y = kx$, where k is the constant of proportionality (unit rate) and x and y are two quantities.

Read the word problem below.

The cost of a pizza varies directly with the number of slices it has. Each slice of pizza costs \$1.15. What equation can be used to determine the total cost of a pizza?

When we write an equation, we can choose variables more closely matched to the problem (instead of x and y). For this problem, we will replace x with s for the number of slices in a pizza and replace y with c for the total cost of a pizza.

The total cost of the pizza will be k times the number of slices in the pizza. We already know that each slice of pizza costs \$1.15, so the value of k is 1.15.

$$k = 1.15$$

The total cost of the pizza will be 1.15 times the number of slices in the pizza.

$$c = ks$$

If a pizza has 6 slices, the equation looks like this.

$$c = 1.15 \times 6$$

$$c = 6.9$$

The total cost of a pizza with 6 slices is \$6.90.

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Try It: Read the word problem below, and think about how you would solve it. Then, complete the items that follow.

Mr. Miller traveled 186 miles in 3 hours. If he drove at a constant rate, what equation can be used to represent how far Mr. Miller drove?

- a. How is this problem different from the word problem on page 20?

- b. Write a variable to represent the amount of time Mr. Miller drove. _____

Write a variable to represent the distance Mr. Miller drove. _____

- c. How can you determine the constant of proportionality?

- d. What is the constant of proportionality for this problem? _____

- e. Write an equation to represent this problem. _____

Standard 7.RP.2 (M)

Equation Practice**Directions:** Read each scenario below. Then, write an equation to represent the scenario.

1. Mr. Denver drove at a constant rate. He drove 558 miles in 9 hours. Let d equal the distance driven, and let t equal the amount of time.

Equation: _____

2. A pizzeria sells pizza by the slice. Ten slices of pizza cost \$12.50. Let c equal the cost of n slices of pizza.

Equation: _____

3. Each layer of a wedding cake costs the same amount. A wedding cake with 5 layers costs \$3,065. Let c equal the cost of the cake, and let l equal the number of layers.

Equation: _____

4. The number of scoops of ice cream on a sundae and the total cost of the sundae have a proportional relationship. A four-scoop ice cream sundae costs \$2.56. Let c equal the cost of the sundae, and let s equal the number of scoops of ice cream.

Equation: _____

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5. Winston rode his bike at a constant rate. He rode 10 blocks in 4 minutes. Let b equal the number of blocks, and let t equal the amount of time.

Equation: _____

6. Rachel pumps 14 gallons of gasoline into her car in $3\frac{1}{2}$ minutes. The number of gallons of gasoline pumped varies directly to the amount of time. Let g equal the number of gallons of gasoline, and let t equal the amount of time.

Equation: _____

7. The number of cookies in a box and the total cost of the box have a proportional relationship. A box with 84 cookies costs \$5.04. Let n equal the number of cookies in the box, and let c equal the cost of the box.

Equation: _____

8. Tyra walked laps around the school track at a constant rate. She walked 28 laps in 16 minutes. Let n equal the number of laps Tyra walked, and let t equal the amount of time.

Equation: _____