

Describe Proportional Relationships: Constant of Proportionality

FOCUS

Mathematics Objectives

- Use the constant of proportionality to write equations that represent proportional relationships.
- Use equations to solve problems involving proportional relationships.

Language Objective Describe the constant of proportionality and explain, orally and in writing, how to use it in an equation to represent a proportional relationship.

Essential Understanding Equations in the form $y = kx$, where k is the constant of proportionality, can be used to represent proportional relationships and solve problems.

COHERENCE

Previously in this topic, students:

- determined whether a relationship between two sets of quantities is proportional by testing for equivalent ratios.

In this lesson, students:

- find the constant of proportionality in a proportional relationship.
- write and use equations that represent situations involving proportional quantities.

Later in this topic, students will:

- graph proportional relationships.
- solve problems involving proportional relationships given in a variety of representations.

Additional Connections Writing and solving equations that represent a proportional relationship connects to solving real-life and mathematical problems using numerical and algebraic equations.

RIGOR

Conceptual Understanding Students learn how to represent a proportional relationship with an equation using the constant of proportionality.

Application Students use equations to solve problems involving proportional relationships.

Vocabulary

- constant of proportionality

Materials

- timers or stopwatches

Student Resources

 Family Engagement

Intervention System (IS)

M32 Constant of Proportionality

Teacher Resources

Available at
Savvas Realize®.

 Editable Lesson Plan

 Lesson Presentation Slides

 enVision on the Go: Planning Support

**Notes**

Language Support

Use this activity to support understanding of the equation that represents proportional relationships.

Scaffolding Meaning As students begin Example 1, revisit the terms *independent variable* and *dependent variable* and ask students to define them in their own words. Then have students read the problem.

- What is the independent variable?
What is the dependent variable?
[time; liters]

Write the equation for a proportional relationship. Invite volunteers to label and describe the letters that represent the *independent variable*, *dependent variable*, and *constant of proportionality*.

Have students copy the labeled equation into their notebooks and refer to it as they interpret real-world problems.

$$y = kx$$

Diagram labels for the equation $y = kx$:

- y : dependent variable
- k : constant of proportionality
- x : independent variable

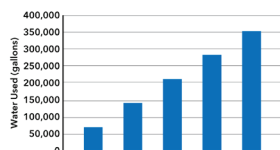
An additional activity is available online.

- Use the activity reviewing vocabulary with the Example 2 Try It!.

Math Talk

Show Reveal Graph

What do you think this graph is about?



Data Literacy The information revealed in this bar graph provides an opportunity to represent real-world data and proportional relationships using an equation. Use this Math Talk after Example 1, discussing with students how the information revealed represents a proportional relationship.

As new information is revealed about the graph, ask:

- What kind of graph is this?
- What do you notice about the heights of the bars?
- What sort of equation could model the relationship in the graph?

After showing the final slide, ask:

- How could you use the information in the graph to predict the amount of water 10 trees need? 20 trees?

Exit Ticket



Name **Use this Exit Ticket anytime after Example 1.**

Exit Ticket
Lesson 2-4

1. To properly water a vegetable garden, it takes about 20 gallons of water for a 32 square-foot garden and about 40 gallons of water for a 64 square-foot garden each week. What is the constant of proportionality?

- (A) 1.6
- (B) 0.625
- (C) $y = 0.625x$
- (D) $y = 1.6x$

Self-Assessment

Select how well you understand what you learned in this lesson.

Math Goal

I can use the constant of proportionality in an equation to represent a proportional relationship.



Language Goal

I can describe the constant of proportionality and explain, orally and in writing, how to use it in an equation to represent a proportional relationship.



Teacher Answer Key

1 of 1

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You can use the Assessment Sourcebook version or the auto-scored version on Savvas Realize®.

Prevent Misconceptions

Students may attempt to find the constant of proportionality using $\frac{x}{y}$ instead of $\frac{y}{x}$.

Review the terms *dependent variable* and *independent variable* and ask students to identify each variable in the context of the problem. If needed, use a prompt like:

- How many gallons of water are needed for each square foot of garden?

English Language Development

ELL English Language Learners (Example 1)

MLR3 Critique, Correct, and Clarify (Example 3)

Language Support (Example 1 and Example 2 Try It!)

Step 1 Explore and Share



15-20 min

Explore and Share Scout Observational Assessment

Describe Proportional Relationships: Constant of Proportionality

I can ... use the constant of proportionality in an equation to represent a proportional relationship.

Let's Build

Lesson 2-4

Explore and Share

Jamal can run 1 mile in 5.05 minutes. If Jamal maintains this pace during a 5-kilometer (5K) race, he expects to break the course record of 15.25 minutes. Is Jamal's expectation reasonable? Explain.

Be Precise How can you convert 5 kilometers to miles?

Reasoning Assuming that Jamal runs at a constant rate, how does his pace describe the time it takes him to finish a race of any length?

Sample answer: Write his pace as a rate: $\frac{\text{time}}{\text{distance}}$. Multiply it by the length of any race, and you will get the time it takes to finish that race.

Sample Student Work

Distance (mi)	Time (min)
x	15.25
1	5.05

$$\frac{x}{15.25} = \frac{1}{5.05}$$

$$x \approx 3.02$$

Jamal can run about 3.02 mi in the record time.

$$5 \text{ km} \times \frac{1 \text{ mi}}{1.6 \text{ km}} = 3.125 \text{ mi}$$

avJamal will only finish 3.02 mi of the 3.125-mi race in 15.25 min. He will not break the record.

$$\frac{1 \text{ mi}}{1.6 \text{ km}} = \frac{m \text{ mi}}{5 \text{ km}}$$

$$3.125 = m$$

$$3.125 \text{ mi} \cdot \frac{5.05 \text{ min}}{1 \text{ mi}}$$

$$= 15.78125 \text{ min}$$

At his pace, Jamal will take more than 15.25 minutes to run 5 km. So, breaking the record is not reasonable.

Evan's Work

Evan uses equivalent ratios to determine the distance Jamal would run in the course record time of 15.25 minutes.

Latisha's Work

Latisha uses Jamal's 1-mile time as a unit rate to find the time it would take him to run a 5k race.

ETP Explore and Share



Purpose Given a proportional relationship, students use equivalent ratios to predict values. In Example 1, students will extend this to writing an equation to represent a proportional relationship.

Introduce **WHOLE CLASS**

Ask: How fast can you run a mile?

Monitor, Select, and Sequence **SMALL GROUPS**

Observe students at work.

- **How do students use equivalent ratios to predict values?**
Some students might write a proportion and solve it using multiplication or division. If needed, ask: **How do you know whether to multiply or divide to find the missing value?**

Early Finishers

Ask: How would the problem change if the record was 32.14 minutes for a 10 km race? [Jamal could run 10 km in approximately 31.56 minutes, faster than the course record.]

Connect **WHOLE CLASS**

Connect Solution Strategies Have students first present the strategies they used to convert kilometers to miles. Have them discuss how they could have also converted Jamal's pace to kilometers and how they could then multiply his pace (in kilometers) by the 5 km distance of the race.

Next, have students present the rest of their solutions. Have students who solved by comparing distances present first, then students who solved by comparing times. Have them discuss how both solutions are comparing Jamal's time to the record time; someone is faster if they can travel further in the same time, or travel the same distance in less time.

When presenting Example 1, discuss how the constant of proportionality of Jamal's running in the Explore and Share was 5.05 minutes per mile. Have students write an equation that represents the proportional relationship for Jamal's running speed; $t = 5.05d$.

In Example 2, connect back to the Explore and Share to have students solve an equation for distance (y) given a time of 15.25 minutes (x). Students can see how this aligns with the strategy of comparing time to run 3.125 miles.

Visual Learning Animation

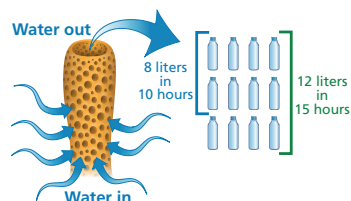
Essential Question How can you represent a proportional relationship with an equation?

Visual Learning

Example 1 Write an Equation to Represent a Proportional Relationship

A sponge is an example of a *filter feeder*. It takes in food by filtering water through its body. The sponge maintains a constant flow of water through its body.

What is an equation that represents the proportional relationship between the time and the amount of water filtered?



The **constant of proportionality** is the constant multiple that relates proportional quantities x and y . It is the value of the ratio $\frac{y}{x}$ and is represented by k .

Make a table to find the constant of proportionality.

Hours (x)	Liters (y)	Liters Hours ($\frac{y}{x}$)
10	8	$\frac{8}{10} = 0.8$
15	12	$\frac{12}{15} = 0.8$

The constant of proportionality, k , is 0.8.

You can use k to write an equation that represents a proportional relationship.

$$k = \frac{y}{x}$$

$$kx = y$$

$$y = kx$$

You can use an equation in the form $y = kx$ to represent any proportional relationship.

Use the equation to represent the relationship between time and the amount of water filtered.

$$y = 0.8x$$

Try It! Maria made two batches of fruit punch. The table at the right shows how many quarts of juice she used for each batch. Write an equation that relates the proportional quantities.

$$y = 1.6x$$

Apple Juice (x)	Grape Juice (y)	Grape Juice Apple Juice ($\frac{y}{x}$)
5	8	$\frac{8}{5} = 1.6$
10	16	$\frac{16}{10} = 1.6$

ETP Essential Question

Engage students in a discussion about the **Essential Question**. Discuss how the constant of proportionality relates the two quantities in an equation of a proportional relationship.

ETP Example 1 Write an Equation to Represent a Proportional Relationship

- How can you restate the information in the form “The sponge filters y liters of water for every x hours”? [The sponge filters 8 liters of water for every 10 hours, or 12 liters of water for every 15 hours.]
- How do you know which quantity should be x and which quantity should be y ? [x is the independent variable. y is the dependent variable. The liters of water, y , depend on the number of hours, x .]

How do you get from $k = \frac{y}{x}$ to $kx = y$? [Multiply both sides of the equation by x .]

ETP Try It!

- How can you check that the quantities are proportional? [Test for equivalent ratios in the table.]
- How can you find the constant of proportionality? [$\frac{y}{x} = \frac{8}{5}$; So, the constant of proportionality is 1.6.]
- How does the equation change if the amount of grape juice is the independent variable, x , and the amount of apple juice is the dependent variable, y ? [The constant of proportionality that relates apple juice to grape juice is $\frac{5}{8} = 0.625$, so the equation is $y = 0.625x$.]

ELL English Language Learners SPEAKING

Emerging Review Example 1.

Have students discuss these questions with a partner.

- What do x , y , and 0.8 mean in the equation?
- What could you use the equation $y = 0.8(5)$ to do? [Find the amount of water the sponge filters in 5 hours.]
- How could you use the equation to find the time it takes the sponge to filter 6 liters of water?

Expanding Review Example 1.

Have students collaborate with a partner to complete these sentences and read them aloud to the class.

- Determine if this situation is _____ by testing for _____ in the table. [proportional, equivalent ratios]
- The number 0.8 is called the _____. [constant of proportionality]
- Use the equation _____ to find the number of hours it takes a sponge to filter 4 liters of water. [$y = 0.8(4)$]

Bridging Review Example 1.

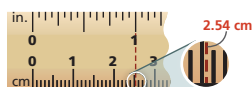
Have students work with a partner to describe the mathematics in the problem using these terms: *proportional relationship*, *equivalent ratios*, and *constant of proportionality*.

Have each pair verbally share their description with the class.

Step 2 Visual Learning *continued*

Example 2 Solve Problems Using an Equation

1 inch = 2.54 centimeters. How many centimeters long is an 18-inch ruler?



STEP 1

Write an equation to represent this relationship.

centimeters inches
 $y = kx$
 constant multiple or
 constant of proportionality
 $y = 2.54x$

STEP 2

Use the equation to find the length of the ruler in centimeters.

$$y = 2.54x$$

$$y = 2.54(18)$$

$$y = 45.72$$

The ruler is 45.72 centimeters long.

Try It! A florist sells a dozen roses for \$35.40. She sells individual roses for the same unit cost. Write an equation to represent the relationship between the number of roses, x , and the total cost of the roses, y . How much would 18 roses cost? $y = 2.95x$; \$53.10

Example 3 Determine Whether $y = kx$ Describes a Situation

Can you represent the total cost, y , for admission and x rides at the amusement park using an equation in the form $y = kx$? Explain.



STEP 1

Make a table that shows the total cost.

Rides	Cost
1	\$25
2	\$30
3	\$35

STEP 2

Compare the ratios to determine whether the relationship is proportional.

$$\frac{\$25}{1} = \$25$$

$$\frac{\$30}{2} = \$15$$

$$\frac{\$35}{3} = \$11.67$$

This relationship is not proportional, so it cannot be represented with an equation of the form $y = kx$.

Try It! Balloon A is released 5 feet above the ground. Balloon B is released at ground level. Both balloons rise at a constant rate.

Which situation can you represent using an equation of the form $y = kx$? Explain.

You can represent the height of Balloon B using the equation $y = 4x$. The ratios of height (y) to time (x) are equivalent, and the constant of proportionality is 4.

Balloon A		Balloon B	
Time (s)	Height (ft)	Time (s)	Height (ft)
1	19	1	4
2	13	2	8
3	17	3	12

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ETP Example 2 Solve Problems Using an Equation

- Could you use another mark on the ruler to determine the ratio of inches to centimeters? Explain. [Yes; The relationship between inches and centimeters remains the same. So, any mark will result in the same constant of proportionality.]
- Do you substitute 18 for x or for y ? [x ; The number of inches is represented by x because the constant of proportionality was calculated as the ratio of centimeters to inches.]

ETP Try It!

- What ratio can you use to find the constant of proportionality? [$\frac{35.40}{12}$]

ETP Example 3 Determine Whether $y = kx$ Describes a Situation

- What must be true about the quantities if you are able to write an equation in the form $y = kx$ to represent them? [They must be proportional.]
- Do the values of all the ratios from the table need to be different to conclude that the quantities are not proportional? [No; It only takes one ratio that is not equivalent.]

ETP Try It!

Q: How do you determine whether the quantities in each table can be represented by an equation in the form $y = kx$? [Determine if they are proportional.]

MLR3 Critique, Correct, and Clarify

Example 3 Have students work in small groups to critique and clarify the following statement. Encourage students to use this lesson's vocabulary in their response. The situation in Example 3 can be modeled by the equation $y = 5x$ to show the cost of riding x rides.

Support Student Understanding

Example 2 Some students may need to review units of measure, particularly the relationship between inches and centimeters. When working through Example 2, it is helpful to understand that while inches and centimeters both measure length, a centimeter is shorter than an inch.

If needed, have students use a ruler to measure the lengths of various objects in the room. Observe that the number of centimeters is always greater than twice the number of inches for the same length. In this way, students can develop an intuition for the relative sizes of inches and centimeters.

Extend Student Thinking

Example 2 Challenge students to solve problems involving other units of measure.

- How many yards are in 7.5 km? Assume 1 mi = 1.6 km. [About 8,250 yards]
- A car weighs 2 tons. There are 2,000 pounds in 1 ton and about 2.2 pounds in 1 kilogram. What is the weight of the car in kilograms? [About 1,818 kilograms]

Step 2 Visual Learning *continued*

Key Concept

Two proportional quantities x and y are related by a constant multiple, or the constant of proportionality, k .

You can represent a proportional relationship using the equation $y = kx$.

Talk About Math Ideas

How is a constant of proportionality like a unit rate?

Do You Understand?

1. **Essential Question** How can you represent a proportional relationship with an equation?

You can write an equation representing a proportional relationship in the form $y = kx$, where k is the constant of proportionality.

2. **Generalize** How can you use an equation to find an unknown value in a proportional relationship?

Use the constant of proportionality to write an equation. Then substitute a known value in the equation to find the unknown value.

3. **Reasoning** Why does the equation $y = 3x + 5$ NOT represent a proportional relationship?

Sample answer: The equation is not in the form $y = kx$, so y is not a constant multiple of x . The values of x and y that make the equation true do not form equivalent ratios.

Do You Know How?

4. Determine whether each equation represents a proportional relationship. If it does, identify the constant of proportionality.

a. $y = 0.5x - 2$ **No**

b. $y = 1,000x$ **Yes; 1,000**

c. $y = x + 1$ **No**

5. The manager of a local park estimates that she needs 3 trash bags for every 5 people who attend a park cleanup. If 1,200 people volunteer for the park cleanup, how many trash bags should the manager order?

720 trash bags

6. A half dozen water bottle filters cost \$15. What constant of proportionality relates the number of water bottle filters and total cost? Write an equation that represents this relationship.

2.50; $y = 2.50x$

ETP Key Concept

- How does the definition of a proportional relationship help you remember how to write an equation that represents it? [Two quantities are proportional if the elements of one set are a constant multiple of the related elements of the other set. This means that the ordered pairs (x, y) represent a proportional relationship if for all values of x , $y = kx$ for some constant k .]

ETP Talk About Math Ideas

Have students engage in a think-pair-share to discuss the response to the question comparing the constant of proportionality to a unit rate. Listen for discussion relating the equation $y = kx$ to the equation $\frac{y}{x} = k$ when $x = 1$, which is also a description of the unit rate in the situation.

ETP Do You Understand/Do You Know How?



Essential Question

Students should understand that when the elements of one set of quantities are a constant multiple of the related elements in another set, this relationship can be represented as $y = kx$, where the related quantities are y and x , and k is a constant. This constant k is the constant of proportionality for the proportional relationship.

Item 3

- If $b = 0$, does $y = kx + b$ represent a proportional relationship between y and x ? Explain. [Yes; $y = kx + 0 = kx$]

Prevent Misconceptions

Item 5 In order to identify which quantity is x and which is y , it may be helpful for students to rewrite the given information.

- How can you rewrite the given information so that the number of people who attend the park cleanup is first? [For every 5 people who attend the park cleanup, the manager of the park needs 3 trash bags.]
- Which quantity is x ? [The number of people who attend the park cleanup] Which quantity is y ? [The number of trash bags needed]

Step 3 Practice and Problem Solving

15–20 min

Interactive Practice Adaptive Practice

Name _____

Practice and Problem Solving

Lesson Help

7. What is the constant of proportionality in the equation $y = 5x$?
5

8. What is the constant of proportionality in the equation $y = 0.41x$?
0.41

9. The equation $P = 3s$ represents the perimeter P of an equilateral triangle with side length s . Is there a proportional relationship between the perimeter and the side length of an equilateral triangle? Explain.
Yes; The equation $P = 3s$ is in the form $y = kx$, so the relationship is proportional.

10. **Model with Math** In a chemical compound, there are 3 parts zinc for every 16 parts copper, by mass. A piece of the compound contains 320 grams of copper. Write and solve an equation to determine the amount of zinc in the chemical compound.
 $y = 0.1875x$; 60 grams

11. The weight of 3 eggs is shown. Assuming the three eggs are all the same weight, find the constant of proportionality.
40



12. The height of a stack of video game cases is proportional to the number of cases in the stack. The height of 6 video game cases is 114 mm.

a. Write an equation that relates the height, y , of a stack of video game cases and the number of cases, x , in the stack.
 $y = 19x$

b. What would be the height of 13 video game cases?
247 mm

13. Ann's car can travel 228 miles on 6 gallons of gas.

a. Write an equation to represent the distance, y , in miles Ann's car can travel on x gallons of gas.
 $y = 38x$

b. Ann's car used 7 gallons of gas during a trip. How far did Ann drive?
266 miles

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You may opt to have students complete automatically scored practice items online.

14. The value of a baseball player's rookie card began to increase once the player retired in 1996. The value has increased by \$2.52 each year since then.

a. How much was the baseball card worth in 1997? In 1998? In 1999?
\$9.98; \$12.50; \$15.02

b. **Construct Arguments** Why is there not a proportional relationship between the years since the player retired and the card value? Explain.
The ratios of the number of years after 1996 and card value are not equivalent, so the quantities are not in a proportional relationship.



15. **Higher Order Thinking** A car travels $2\frac{1}{3}$ miles in $3\frac{1}{2}$ minutes at a constant speed.

a. Write an equation to represent the distance the car travels, d , in miles for m minutes.
 $d = \frac{2}{3}m$

b. Write an equation to represent the distance the car travels, d , in miles for h hours.
 $d = 40h$

Assessment Practice

16. For every ten sheets of stickers you buy at a craft store, the total cost increases \$20.50.

Write an equation that relates the number of sheets purchased, x , and the total cost, y , of the stickers.
 $y = 2.05x$

Use the equation you wrote to complete the table.

Cost of Stickers				
Number of Sheets (x)	3	5	13	19
Total Cost (y)	\$6.15	\$10.25	\$26.65	\$38.95

17. 600,000 gallons of water pass through a given point along a river every minute. Which equation represents the amount of water, y , that passes through the point in x minutes?

☐ $x = 10,000y$

☒ $y = 600,000x$

☐ $y = 10,000x$

☐ $y = 600,000 + x$

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Practice and Problem Solving

Error Intervention

Item 10 Model with Math Students may find the ratio of zinc to copper (0.1875) or copper to zinc ($5\frac{1}{3}$) for the constant of proportionality. It is important that they use the correct constant for the variables they choose.

- If you use y for the unknown amount, what does y represent? What is the equation and the solution? [y = number of grams of zinc; $y = 0.1875x$, so $y = 0.1875(320)$; $y = 60$ g]
- If you use x to represent the number of grams of zinc, what is the equation and the solution? [$y = 5\frac{1}{3}x$, so $320 = 5\frac{1}{3}x$; $x = 60$ g]

English Language Learners

Item 9 Some students may not recall the meaning of *equilateral*. Elicit that *equi-* means "equal." Tell them that *lateral* refers to "sides."

Engage Through Student Choice

Go online for an assignment strategy.

Item Analysis: Practice and Problem Solving

Example	Items	DOK
1	7, 8, 9, 11	1
	15, 17	2
2	12, 13, 16	2
3	10, 14	2

Step 4 Assess and Differentiate



15-30 min

ETP Quick Check



Assess lesson content with the Quick Check.

- The online Quick Check is **automatically scored** and **remediation, practice, or enrichment** will be assigned based on student performance.
- You can use the Assessment Sourcebook version to prescribe targeted remediation or enrichment.

0-3 points: Reteach to Build Understanding and Additional Vocabulary Support Activities

4-5 points: Enrichment Activity

In addition, **English Language Learners** may benefit from the Build Mathematical Literacy Activity.

Differentiation Library DL

- Additional Differentiation Library resources are described at the start of this topic.
- Differentiation resources that support diverse learning styles are online and in the Differentiation Library Teacher's Guide.

Video Tutorials Available on Savvas Realize®

Students can access instructional tutorials online.

- How Do You Find the Constant of Variation from a Direct Variation Equation?
- What's the Direct Variation or Direct Proportionality Formula?

Item Analysis: Additional Practice

Example	Items	DOK
1	1, 5	1
	2, 3, 10	2
	8	3
2	7, 9	2
3	4, 6	2

Additional Practice

Printable or autoscored on Savvas Realize®

Name _____

2-4 Additional Practice

1. A recipe calls for 3 ounces of flour for every 2 ounces of sugar. Find the constant of proportionality. **$\frac{1}{2}$**

2. Percy rides his bike 11.2 miles in 1.4 hours at a constant rate. Write an equation to represent the proportional relationship between the number of hours Percy rides, x , and the distance in miles, y , that he travels. **$y = 8x$**

3. Water is dripping from a faucet into a bowl at a constant rate. The number of milliliters of water in the bowl, y , and the time in seconds, x , are shown in the table.

Time in Seconds (x)	Milliliters in Bowl (y)
20	320
35	560
45	720
60	960

a. What is the constant of proportionality for the relationship between the number of milliliters of water in the bowl and the time in seconds?
16

b. **Model with Math** Write an equation to represent this relationship.
 $y = 16x$

4. The relationship between x and y is proportional. When x is 29, y is 275.5.

a. Find the constant of proportionality of y to x .
9.5

b. Write an equation that relates y and x .
 $y = 9.5x$

c. Use the equation to find x when y is 408.5.
 $x = 43$

5. The width of a row of identical townhouses, y , and the number of townhouses, x , have a proportional relationship. The width of 5 townhouses is 105 ft.

a. What is the constant of proportionality?
21

b. Write an equation that relates the width of a row of townhouses and the number of townhouses.
 $y = 21x$

c. What would be the width of 9 townhouses in feet?
189 ft

6. Some friends in college took a road trip to Florida. Use the table to determine whether an equation in the form $y = kx$ can be written for the situation. Explain your answer.

Hours Driven (x)	Miles Traveled (y)
1.5	82.5
2.5	137.5
4	232
7	350

No; Sample answer: Because the ratio of $\frac{y}{x}$ is not the same, the relationship is not proportional. So an equation cannot be written for the situation.

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7. An engineer makes different-size samples of a new material. The table shows volumes and their related masses.

a. What would be the mass of 100 cubic centimeters of the material?
1,000 g

b. What would be the mass of 500 cubic centimeters of the material?
5,000 g

Volume in Cubic Centimeters (x)	Mass in Grams (y)
9	90
14	140
25	250

8. **Higher Order Thinking** The number of pizzas, y , and the weight of the shredded cheese topping, x , on the pizzas have a proportional relationship. When shredded, a 50-lb block of cheese is enough to make 150 large pizzas.

a. Find the constant of proportionality.
3

b. How can you use the constant of proportionality to find how much cheese is on one slice of pizza, if there are 8 slices per pizza? Explain.
Sample answer: The constant of proportionality is the same as the unit rate. So the unit rate is $\frac{3 \text{ pizzas}}{1 \text{ lb}}$ of cheese, which means that there is $\frac{1}{3}$ pound of cheese on 1 pizza. Divide $\frac{1}{3}$ by 8 to find the amount of cheese on one slice of pizza. There is $\frac{1}{24}$ pound of cheese on one slice, assuming that every slice has the same amount of cheese.

Assessment Practice

9. For every 3 lemons Chrissy buys at a farm stand, the total cost increases by \$1.80.

The constant of proportionality is **0.6**.

An equation that relates the total cost, y , and the number of lemons, x , is $y = \text{0.6}x$.

Use the equation you wrote to complete the table.

Number of Lemons (x)	Total Cost (y)
4	\$2.40
7	\$4.20
15	\$9.00
18	\$10.80

10. For every dozen bagels you buy, the cost increases \$15. Which equation represents the cost, y , and the number of bagels, x ?

Ⓐ $y = 1.25 + x$

Ⓑ $y = 15x$

Ⓒ $x = 15y$

Ⓓ $y = 1.25x$

24 2-4 Describe Proportional Relationships: Constant of Proportionality

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