

LESSON 7: Representing Proportional Relationships with Equations

Warm-Up

Directions: Find the constant of proportionality for each problem.

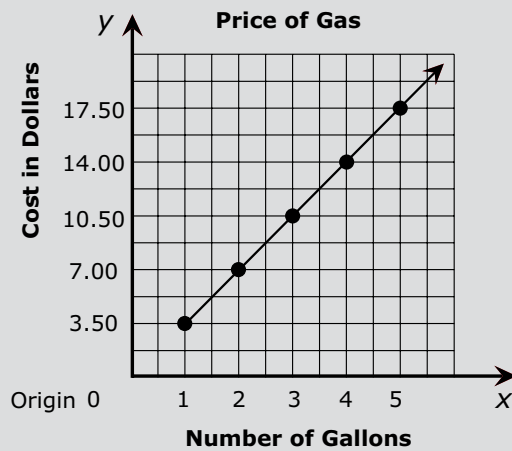
1. Stars to circles



2.

Touchdowns	Points
1	6
2	12
3	18
4	24

3.



4. For every question Beth answers correctly on a game show, she receives 10 points.

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete the following SOLVE problem with your teacher. You will only complete the S step.

Nick is purchasing some supplies for a party. He is trying to decide how many cases of water he can afford to buy. Each case of water costs \$4.50. What equation can he use to represent the proportional relationship between the number of cases of water he buys and the cost?

S Underline the question.

This problem is asking me to find _____
_____.

Directions: Complete this page with your teacher and partner.

1. What is the constant of proportionality for the number of red chips to yellow chips? ____ This means that for every ____ red chip there are ____ yellow chips.
2. Let's choose a variable to represent the yellow chips and the red chips.

3. The number of yellow chips (dependent variable) that are in the work space depends on the number of red chips (independent variable) in the work space.

	Variable	Relationship	Value	Value	Value
Red Chip					
Yellow Chip					

4. Is there a pattern or relationship between the values of the red chips and the yellow chips in the table? _____
5. What operation can be used to represent that relationship? _____
Why? _____.
6. How can we show the relationship in an equation? _____
_____.

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your teacher and partner.

Use the pictorial representation of the stars and hearts to answer Questions 1 – 7.



1. If there is only 1 heart, how many stars are there?
 If there are two hearts, how many stars are there?
 If there are three hearts, how many stars are there?
2. This means that for every one heart you add, you must add _____ stars to the diagram.
3. What is the constant of proportionality (or unit rate) for the number of stars to hearts?
4. If there were four hearts, how many stars would we have?

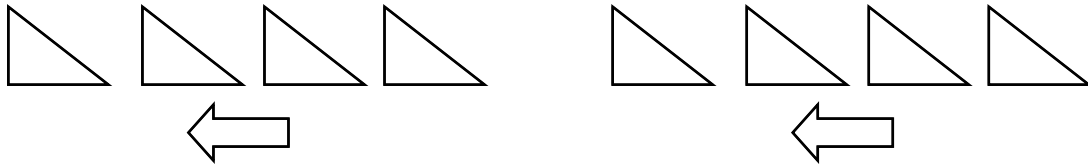
Explain your thinking. Every time we add a heart, we must add _____ stars to continue the pattern. There are always twice as many _____ as hearts.

5. The _____ that are in the diagram depends on the _____ in the diagram. So, if s represents the number of stars, the _____ variable, and h represents the number of hearts, the _____ variable, we can write an equation that shows the relationship between hearts (h) and stars (s).
6. How did you determine the number of stars (s) there would be for each number of hearts (h)?
7. How could we show that in an equation? _____ The number of _____ multiplied by _____ equals the number of _____.

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your partner.

Use the pictorial representation of the triangles and arrows to answer Questions 1 – 7.



- If there is only 1 arrow how many triangles are there?
If there are 2 arrows, how many triangles are there?
- What is the constant of proportionality (or unit rate) for the number of triangles to arrows?
- If there were three arrows, how many triangles would we have?
If there were four arrows, how many triangles would we have?
- Explain your thinking. Every time we add an arrow, we must add _____ triangles to continue the pattern. There are always four times as many _____ as arrows.
- The _____ that are in the diagram depends on the _____ in the diagram. So, if t represents the number of triangles, the _____ variable, and a represents the number of arrows, the _____ variable, we can write an equation that shows the relationship between triangles (t) and arrows (a).
- How did you determine the number of triangles (t) there would be for each number of arrows (a)?
- How could we show that in an equation? _____ The number of _____ multiplied by _____ equals the number of _____.

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your teacher and partner.

1. The table shows how many minutes of commercials are within television shows of certain lengths. What is the constant of proportionality?

TV Show Length (x)	Minutes of Commercials (y)
60	15
90	22.5
120	30
240	60

2. The number of minutes of commercials depends on the number of minutes in the television show.
- If there were 120 minutes in the television show, how many minutes of commercials would there be?
 - If there were 150 minutes in the television show, how many minutes of commercials would there be?
 - If there were 200 minutes in the television show, how many minutes of commercials would there be?
3. How did you determine the number of minutes of commercials, y , there would be for the number of minutes in the television show, x ?
4. We can use _____ to represent the situation. This time we are going to use the variables x and y because those are the most common variables used in written equations.
5. If we use y to represent the _____, the _____ variable, and x represents the _____, the _____ variable, we can write an equation that shows the relationship between x and y .
6. How could we show that in an equation? _____ The number of _____, multiplied by _____ equals the number of _____.
7. If there were 100 minutes in the television show, how many minutes of commercials would there be?

If there were 300 minutes in the television show, how many minutes of commercials would there be?

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your partner.

1. The table shows the cost of different numbers of pictures.

Number of Pictures	Cost
10	\$5.00
15	\$7.50
20	\$10.00
25	\$12.50

2. The cost depends on the number of pictures ordered.

If there were 10 pictures ordered, what is the cost?

If there were 20 pictures ordered, what is the cost?

If there were 25 pictures ordered, what is the cost?

3. How did you determine the cost, y , for the number of pictures ordered, x ?

4. If we use y to represent the _____, the _____ variable, and x represents the _____, the _____ variable, we can write an equation that shows the relationship between x and y .

5. How could we show that in an equation? _____ The number of pictures ordered, __, multiplied by _____ equals the _____, _____.

6. If there were 30 pictures ordered, what is the cost?

7. If there were 50 pictures ordered, what is the cost?

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your teacher and partner.

1. The graph shows the total number of pushups that Jesse has done this week.

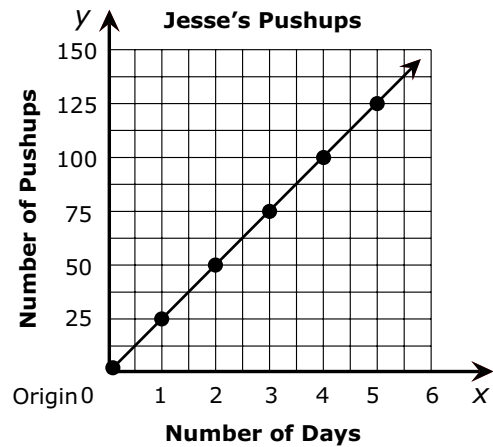
What is the constant of proportionality?

2. The number of pushups depends on the number of days.

If Jesse does pushups for 2 days, how many pushups will he do?

If Jesse does pushups for 3 days, how many pushups will he do?

If Jesse does pushups for 4 days, how many pushups will he do?



3. How did you determine the number of pushups Jesse would do based on the number of days he did pushups?

4. If y represents the _____, the _____ variable, and x represents the _____, the _____ variable, we can write an equation that shows the relationship between x and y .

5. How could we show that in an equation? _____ The number of _____ multiplied by _____ equals the number of _____.

6. If Jesse does pushups for 5 days, how many pushups will he do?

7. If Jesse does pushups for 10 days, how many pushups will he do?

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your partner.

1. The graph shows the cost of movie tickets. What is the constant of proportionality?

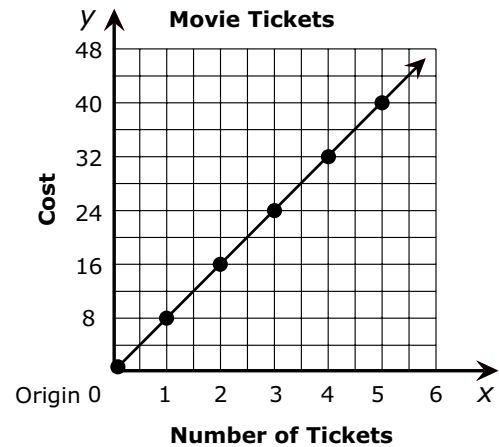
2. The cost depends on the number of tickets.

If 2 tickets are bought, what is the cost?

If 3 tickets are bought, what is the cost?

If 5 tickets are bought, what is the cost?

3. How did you determine the cost, y , of the tickets, x ?



4. If y represents the _____, the _____ variable, and x represents the number of _____, the _____ variable, we can write an equation that shows the relationship between x and y .

5. How could we show that in an equation? _____ The number of _____ multiplied by ___ equals the _____.

6. If 6 tickets are bought, what is the cost?

7. If 8 tickets are bought, what is the cost?

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page with your teacher and partner.

1. The veterinarian says that for every pound your dog weighs, the dog should get 0.1 cc of medicine.

The number of cc of medicine depends on the number of pounds the dog weighs. If y represents the _____, and x represents the _____ then we can write an equation that shows the relationship between x and y by using the coefficients given in the problem.

2. How do we determine the constant of proportionality?
3. How can you determine the number of cc of medicine, y , there would be for the number of pounds the dog weighs, x ?

Constant of Proportionality (K)	y (dependent variable)	x (independent variable)	Equation	Dog weight: 5 pounds	Dog weight: 20 pounds	Dog weight: 25 pounds

4. Tim gets paid \$1.00 for every five golf balls he finds and returns at the golf course. What is the constant of proportionality?

The _____ depends on the _____.
 So, if y represents the _____, the _____ variable,
 and x represents the _____, the _____ variable,
 we can write an equation that shows the relationship between x and y .

Constant of Proportionality (K)	y (dependent variable)	x (independent variable)	Equation	Found: 5 golf balls	Found: 20 golf balls	Found: 25 golf balls

5. If Tim finds 30 golf balls, how much money should he get?

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete the following SOLVE problem with your teacher.

Nick is purchasing some supplies for a party. He is trying to decide how many cases of water he can afford to buy. Each case of water costs \$4.50. What equation can he use to represent the proportional relationship between the number of cases of water he buys and the cost?

S Underline the question.

This problem is asking me to find _____
_____.

O Identify the facts.

Eliminate the unnecessary facts.
List the necessary facts.

L Write in words what your plan of action will be.

Choose an operation or operations.

V Estimate your answer.

Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

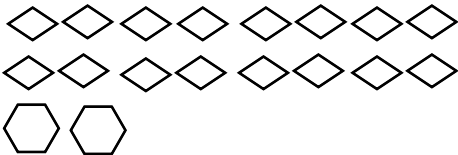
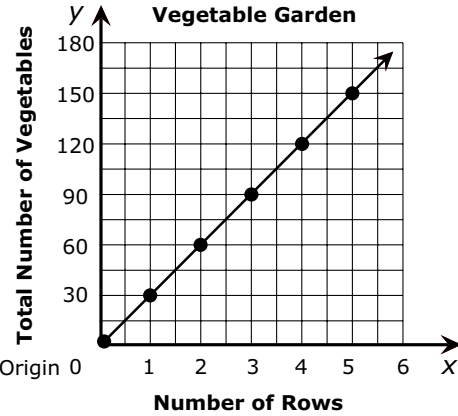
Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

LESSON 7: Representing Proportional Relationships with Equations

Directions: Complete this page by writing the equation that will represent the constant of proportionality.

Type of Representation	Example	Constant of Proportionality and Equation										
Diagram	 <p>$x = \text{hexagons}, y = \text{diamonds}$</p>	Ratio: Constant of Proportionality: Equation:										
Table	<table border="1" data-bbox="526 730 992 884"> <tr> <td>Cups of granola</td> <td>2</td> <td>4</td> <td>6</td> <td>11</td> </tr> <tr> <td>Cups of candy</td> <td>3</td> <td>6</td> <td>9</td> <td>33</td> </tr> </table> <p>$x = \text{granola}, y = \text{candy}$</p>	Cups of granola	2	4	6	11	Cups of candy	3	6	9	33	Ratio: Constant of Proportionality: Equation:
Cups of granola	2	4	6	11								
Cups of candy	3	6	9	33								
Graph		Ratio: Constant of Proportionality: Equation:										
Verbal Description	<p>The band is selling coupon books for \$25 each. For each book they sell, they get to keep \$10.</p> <p>$x = \text{coupon books sold}, y = \text{total amount raised.}$</p>	Ratio: Constant of Proportionality: Equation:										

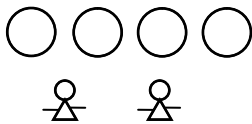
LESSON 7: Representing Proportional Relationships with Equations

Homework

Name _____ Date _____

Directions: Write an equation that represents each proportional relationship.

1. Cookies to students



2. Stars to Moons

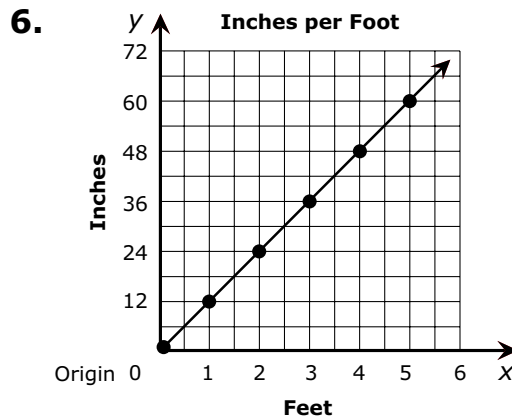
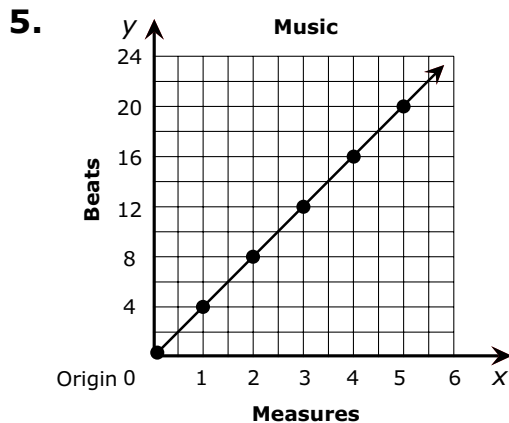


3.

Laps in pool	2	4	6	8
meters	100	200	300	400

4.

Guests	3	5	8	11
Cost	\$9	\$15	\$24	\$33



7. Theresa is buying snacks for soccer practice. The snacks are \$0.95 each.

8. Jack works at a hospital where he gets paid \$19 an hour.

9. Janice is having a cartwheel competition. She completed 15 cartwheels in two minutes.

10. For a stage production, 108 light bulbs are needed for 12 posts.