Let's Do Some Math Notice and Wonder	

Standards Unpacking		
Key	**Standard**	**Prerequisites/Vocabulary**
Put a box around the conceptual component of the standard. Underline the procedural/fluency component of the standard. Put a cloud around the application component of the standard.	**7.RP.1 -** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½ / ¼ miles per hour, equivalently 2 miles per hour.	What prior knowledge should my students have? What vocabulary/ notation should students know for this standard?
	7.RP.2 - Recognize and represent proportional relationships between quantities.	What prior knowledge should my students have? What vocabulary/ notation should students know for this standard?
	7.RP.2a - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	What prior knowledge should my students have? What vocabulary/ notation should students know for this standard?

Put a box around the conceptual component of the standard. Underline the procedural/fluency component of the standard. Put a cloud around the application component of the standard.	**7.RP.2b -** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	What prior knowledge should my students have?
		What vocabulary/ notation should students know for this standard?
	7.RP.2c - Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn .*	What prior knowledge should my students have?
		What vocabulary/ notation should students know for this standard?
	7.RP.2d - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points *(0, 0)* and *(1, r)* where *r* is the unit rate.	What prior knowledge should my students have?
		What vocabulary/ notation should students know for this standard?

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

Jeremiah is mowing the yard, which is 2 acres in size. He has mowed $\frac{1}{4}$ of an acre in $\frac{1}{12}$ of an hour. When he is done mowing his yard, he also has to mow his neighbor's yard which is 1 acre. If he can continue at the same rate, what is the unit rate for the number of acres he can mow in one hour?

S Underline the question.
This problem is asking me to find _____
_____.

Directions: Complete this page with your teacher and partner.

A.	**B.**	**C.**

1. The relationship between the red counters and the yellow counters in Box A is _____.

2. This relationship is called a _____, which is defined as _____
_____.

3. There are three ways to write a ratio: _____
_____.

Directions: Complete this page with your teacher and partner.

1.

What is the ratio of red counters to yellow counters? _____

How many equal groups can be created with 1 yellow counter in each group?___

How many red counters are in each group? _____

What is the unit rate for each group? _____

2.

What is the ratio of red counters to yellow counters? _____

How many equal groups can be created with 1 yellow counter in each group? ___

How many red counters are in each group? _____

What is the unit rate for each group? _____

3.

What is the ratio of red counters to yellow counters? _____

How many equal groups can be created with 1 yellow counter in each group? _____

How many red counters are in each group? _____

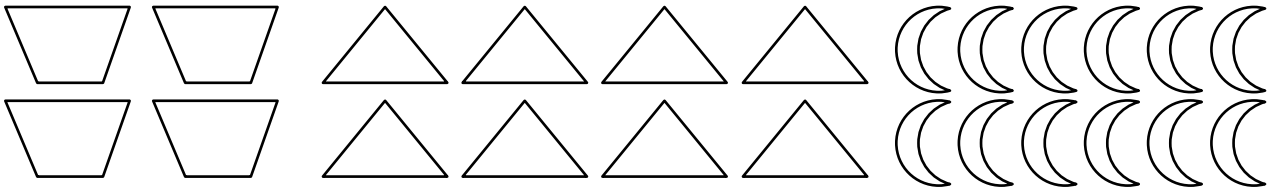
What is the unit rate for each group? _____

Directions: Complete this page with your teacher and partner.

1. What do you notice about the unit rates in Problems 1 – 3 on the previous page?

2. What operation was used to change the ratio to the unit rate in Problems 1 – 3 on the previous page?

3. Complete the graphic organizer below, based on the shapes drawn.



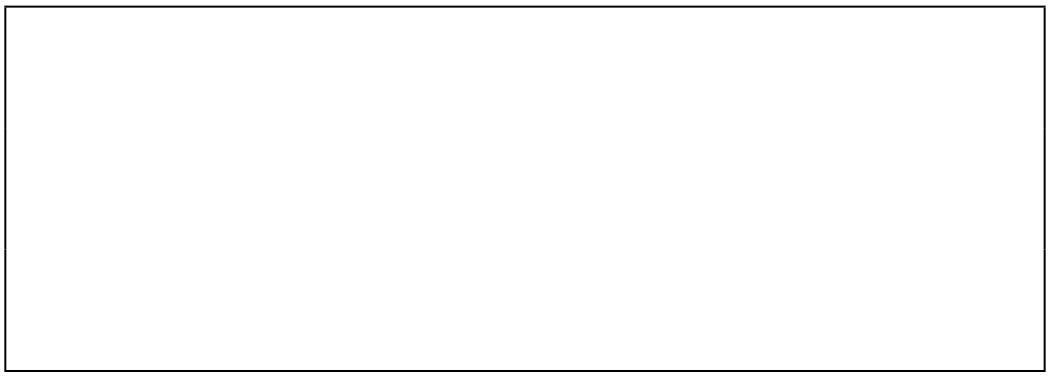
	Write the ratio	Divide to get a unit rate	Unit Rate
Moons to Trapezoids			
Triangles to Trapezoids			
Moons to Triangles			
Trapezoids to Triangles			

Directions: Complete this page with your teacher and partner.

As you can see from the previous page, ratios and unit rates do not always have to use whole numbers. Look at the problem below.

1. Marie is painting her bedroom. One-half gallon of paint will cover one-sixth of her wall. We can use pictures and unit rates to find the number of gallons of paint it will take to paint one whole wall.

The rectangle below represents Marie's wall.



2. Since one-half gallon of paint will cover one-sixth of the wall. Split the wall into six equal pieces.

3. How many gallons of paint will cover each one-sixth piece of the wall?

4. Mark each piece of the wall with one-half.

5. How many one-half gallons of paint will it take to paint the whole wall?

6. How many gallons of paint will it take to paint the whole wall?

	Write the ratio	Divide to get a unit rate	Unit Rate
Gallons to Walls			

Directions: Complete this page with your partner.

1. The Masters family is having their rectangular driveway filled with concrete. It takes $\frac{1}{3}$ of a ton of concrete to cover $\frac{1}{10}$ of the driveway. What is the unit rate for tons of concrete per driveway ?

	Write the ratio	Divide to get a unit rate	Unit Rate
Tons to Driveway			

2. Bella walks $\frac{1}{4}$ of a mile in $\frac{1}{6}$ of an hour. What is her walking rate (unit rate) per hour?

	Write the ratio	Divide to get a unit rate	Unit Rate
Miles to Hour			

3. A recipe calls for $\frac{1}{3}$ of a teaspoon of salt to make half of a pound of fudge. What is the unit rate of salt per pound of fudge?

4. A helicopter can travel $\frac{1}{5}$ of a mile in 20 seconds. What is the unit rate in miles per second?

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

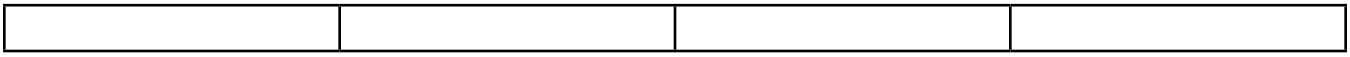
A printing shop is making agendas for different middle schools in the area. Four of the middle schools are in the chart below. Listed below each school is the number of agendas and the price paid to the printing shop. Do the number of agendas and the cost form a proportional relationship?

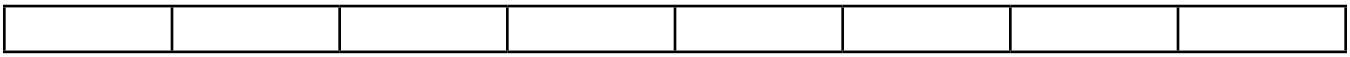
Middle School	South Middle School	East Middle School	North Middle School	West Middle School
Number of Agendas	65	52	41	58
Cost	$585.00	$468.00	$369.00	$522.00

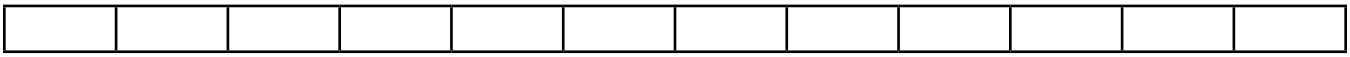
S Underline the question.
This problem is asking me to find _____
_____.

Directions: Complete this page with your teacher and partner.

1. Look at the models below. Write a fraction to represent each model.



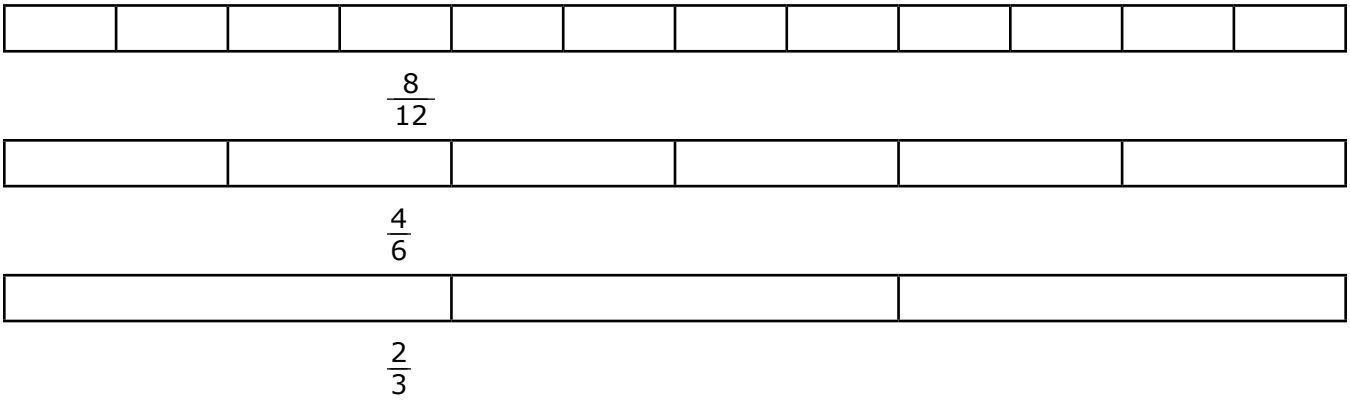




2. Describe the relationship between the three fractions. Explain your thinking.	
3. Explain how to show that $\frac{3}{4}$ and $\frac{6}{8}$ are equivalent without a model.	
4. Explain how to show that $\frac{3}{4}$ and $\frac{9}{12}$ are equivalent without a model.	

Directions: Complete this page with your teacher and partner.

5. Color the models below to show the fractions listed underneath them.



6. Describe the relationship between the three fractions. Explain your thinking.	
7. Explain how to show that $\frac{8}{12}$ and $\frac{4}{6}$ are equivalent without a model.	
8. Explain how to show that $\frac{4}{6}$ and $\frac{2}{3}$ are equivalent without a model.	

9. You can find an equivalent fraction by _____ both the numerator and the denominator by the _____ number.

10. You can find an equivalent fraction by _____ both the numerator and the denominator by the _____ number.

Directions: Complete the following pairs of equivalent fractions by multiplying or dividing.

11. $\frac{2}{5} \bullet \frac{5}{5} =$ _____

12. $\frac{21}{49} \div \frac{7}{7} =$ _____

13. $\frac{4}{11} \bullet \frac{11}{11} =$ _____

14. $\frac{3}{5} \bullet \frac{3}{3} =$ _____

15. $\frac{9}{10} \bullet \frac{5}{5} =$ _____

16. $\frac{24}{36} \div \frac{12}{12} =$ _____

Directions: Complete this page with your teacher and partner.

You can also use tables to determine and display proportional relationships.

1. The table shows the number of roses it takes to make a certain number of floral arrangements.

Roses	6	12	18	24
Floral Arrangements	1	2	3	4

2. We can write four different ratios comparing the number of roses to the number of floral arrangements.

3. How can you tell if the relationship between roses and floral arrangements is a proportional relationship?

4. How did we tell if two ratios were in a proportional relationship?

5. Since we have four ratios, we would have to compare each ratio to every other ratio in order to use cross products. That might take some time. What do you notice about the first ratio we wrote?

6. We could simplify each ratio to a unit rate to see if they are all the same. Are they all the same?

7. When ratios simplify to the same unit rate, the quantities in those ratios form a _____.

Directions: Complete this page with your teacher and partner.

8. Let's look at another relationship to see if we can use unit rates to determine proportional relationships.
The table shows the number of miles a boat has traveled in a certain number of hours.

Hours	1	2	4	7
Miles	45	90	180	315

9. Write the ratios in miles per hour and find all the unit rates.

10. Can all the ratios be simplified to the same unit rate?

11. What is the unit rate?

12. How do you know when two quantities in a table form a proportional relationship?

Directions: Complete this section with your partner.
Do the following tables represent proportional relationships? How do you know?

1. The chart shows how much customers paid for cherries at the grocery store.

Pounds	1	2	5	6
Cost	$2.50	$5.00	$12.50	$15.00

2. The chart shows the number of miles Mike traveled for the total number of hours in a bike race.

Hours	1	2	3	4
Miles	10	18	27	32

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

Sheila makes beaded jewelry to earn extra money. The number of beads she uses depends on the length in centimeters of the piece of jewelry. In the chart below is the number of beads she has used in different pieces of jewelry. What is the constant of proportionality for the number of beads per centimeter?

Centimeters	5	7	8	11
Number of Beads	15	21	24	33

S Underline the question.
This problem is asking me to find _____

_____.

Directions: Complete this page with your teacher and partner.

1. Do you remember what a unit rate is? It is a _____, with one as the denominator that describes a _____ between two quantities.

2. Place two-colored counters in the space below.

3. How many red counters do you have? _____

4. How many yellow counters do you have? _____

5. What is the unit rate for red counters to one yellow counter? _____

6. How many red counters would you have if you had three yellow counters? _____

Four yellow counters? _____ Five yellow counters? _____

7. Write all of the ratios for red to yellow counters using the numbers 1 – 5 as the denominators.

8. What do you get if you divide each of the ratios? _____

9. This number is called the unit rate, but it is also the _____.

Directions: Complete this page with your teacher and partner.

The constant of proportionality can be found in all proportional relationships, whether they are represented in diagrams, tables, graphs, equations, or verbal descriptions. You will work with your teacher to find the constant of proportionality in all of these situations.

Diagrams

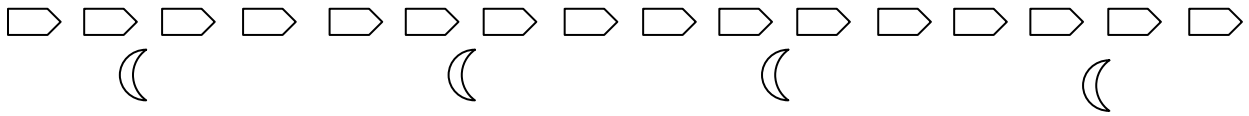
1. 

How many stars? _____ How many hearts? _____

2. What is the ratio of stars to hearts? _____

3. What is the unit rate of stars to one heart? _____

4. This is also called the _____. For every one heart you add, you must add _____ stars to the diagram.

5. 

How many arrows? _____ How many moons? _____

6. What is the ratio of arrows to moons? _____

7. What is the unit rate of arrows to one moon? _____

8. This is also called the _____. For every one moon you add, you must add _____ arrows to the diagram.

Directions: Complete this page with your teacher and partner.

Tables

1. The table shows how many minutes of commercials are within television shows of certain lengths.

TV Show Length	Minutes of Commercials
60	15
90	22.5
120	30
240	60

2. Write ratios of the dependent variable over the independent variable. The dependent variable is the quantity that relies or depends on another quantity. _____ depends on the number of _____, so the number of minutes of commercials is the _____ variable.

3. Find the unit rate, or the constant of proportionality.

4. For every one hour of tv show, there are _____ hours of commercials.

5. The table shows how many minutes math teachers at West High give students to take a test.

Number of Questions	Minutes to Test
10	20
15	30
16	32
20	40

6. Write ratios of the dependent variable over the independent variable.

7. Find the unit rate, or the constant of proportionality.

8. For every one question, there are __ minutes to take the test.

Directions: Complete this page with your teacher and partner.

Graphs

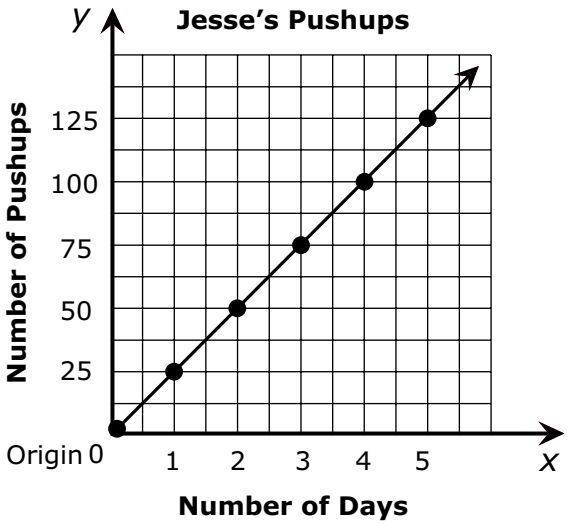
1. The graph shows the total number of pushups that Jesse has done this week.

2. What is the independent variable?

What is the dependent variable?

3. Write ratios of the dependent variable over the independent variable.

4. Change all of the ratios you wrote in Question 3 to unit rates.



5. What do you notice about all of the unit rates?

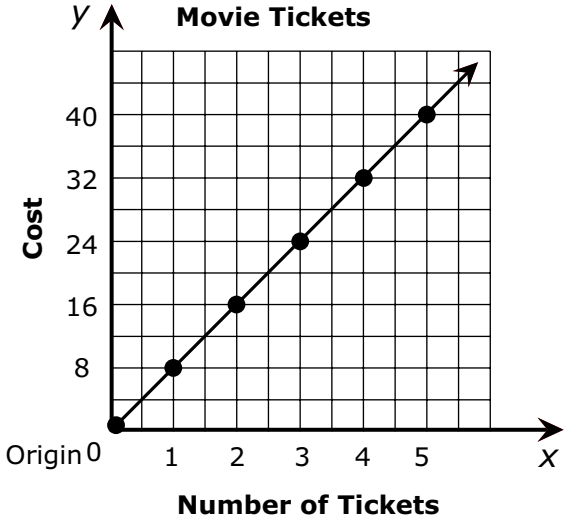
6. In a graph of a proportional relationship, the point that is named by the coordinate pair (1, *y*) gives the constant of proportionality. The constant of proportionality is the value of ___, when *x* is equal to ___.

7. The constant of proportionality is ___ pushups for every day.

8. The graph shows the cost of going to the movies.

9. Write the ratios for cost over the number of tickets.

10. What is the constant of proportionality?



Directions: Complete this page with your teacher and partner.

Equations and Verbal Descriptions

1. Let's look at the table from page S51 about the number of questions on a test, and the number of minutes to test.

Number of Questions	Minutes to test
10	20
15	30
16	32
20	40

2. How many minutes would a student have to test if there are 12 questions? ___

3. Can you write an equation that relates the number of minutes (y) to the number of questions (x)? _____

4. Look back at page S51. What is the constant of proportionality for the chart? ___

5. Do you see the constant of proportionality in the equation we wrote? _____

6. The equation $y = \$3.5x$ tells the total cost (y) for x number of pounds of grapes at the grocery store. What is the constant of proportionality in the equation? _____

7. With just a verbal description, you can also find the constant of proportionality. Consider the following: For every five DVD rentals, you receive a free rental. What is the constant of proportionality?

First, write a ratio with the dependent variable over the independent variable. ___

Then find the unit rate, which is also your constant of proportionality.

8. The equation $y = 12x$ tells how many total eggs (y) you get when you buy x packages of eggs. What is the constant of proportionality? _____

9. James gets paid $25.00 for every lawn he mows. What is the constant of proportionality? _____

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? _____
_____.

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 _____.

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 _____.

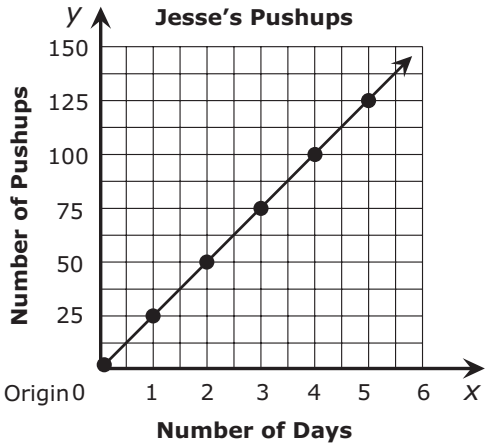
7. If there were 100 minutes in the television show, how many minutes of commercials would there be? _____

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

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? _____

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? _____

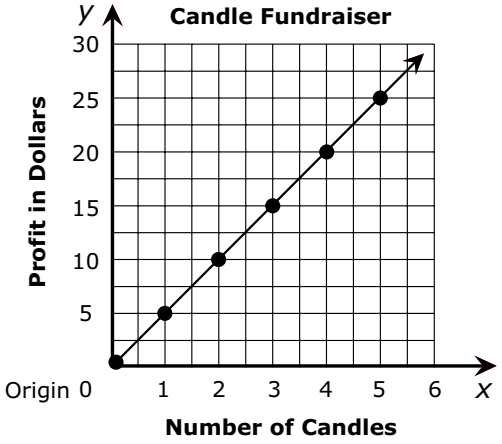
The _____ depends on the _____. So, if *y* represents the _____, the _____ variable, and *x* represents the _____, the _____ variable, we can write an equation that shows the relationship between *x* and *y*.

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? _____

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

Jessica's school is selling candles to raise money for a class trip. The graph shows the amount of money Jessica makes based on the number of candles she sells. What is the unit rate?



S Underline the question.
This problem is asking me to find _____.

Directions: Complete this page with your teacher and partner.

Look at the table below. What is the unit rate? _____

Floral Arrangements	1	2	3	4
Roses	6	12	18	24

Directions: Complete this page with your teacher and partner.

We can also tell if two quantities form a proportional relationship by looking at a graph of the two quantities.

Floral Arrangements	1	2	3	4
Roses	6	12	18	24

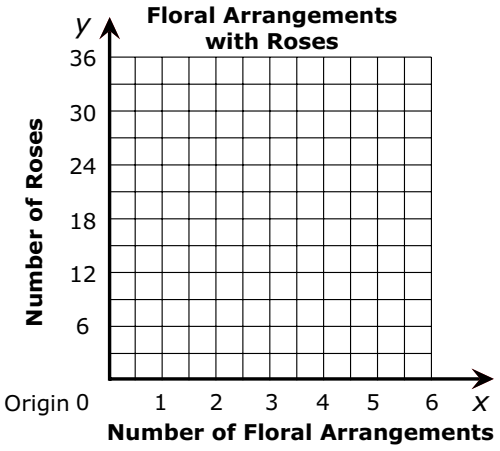
1. What value will be plotted on the *x*-axis? _____ This will be known as the _____. Explain why.

2. What value will be plotted on the *y*-axis? _____ This will be known as the _____. Explain why.

3. List the ordered pairs from the table above.

Graph the information from the table on the coordinate plane.

4. After plotting the points and connecting them, what do you notice about the graph?

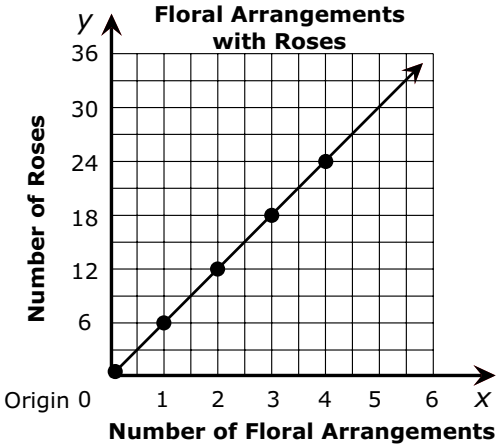


5. How many roses would be needed if zero floral arrangements were made?

6. Add a point for the number of roses for zero arrangements. Does it change the line in the graph?

7. What do you notice about the constant, proportional relationship in terms of the roses (*y*) and floral arrangements (*x*)?

Directions: Complete this page with your teacher and partner.



8. What does the point (0, 0) mean?

9. What does the point (1, 6) mean?

10. A unit rate is defined as _____
_____.

11. What is the unit rate in the table?

12. What is the coordinate pair that has the independent variable of 1?

13. What do you notice about the coordinate pair (1, *y*) and the unit rate?

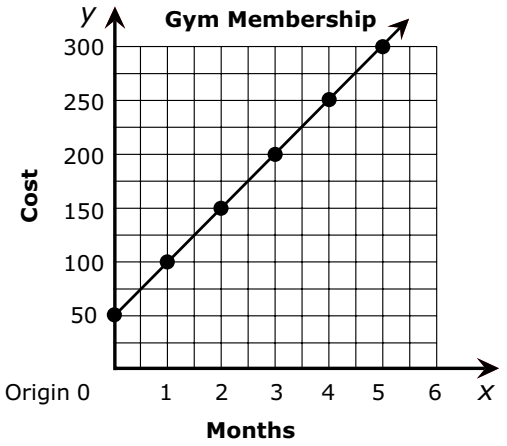
14. What does the point (2, 12) mean?

15. The point (3, 18) means that there are __ roses in __ arrangements, and the point (4, 24) means that there are ___ roses in __ arrangements.

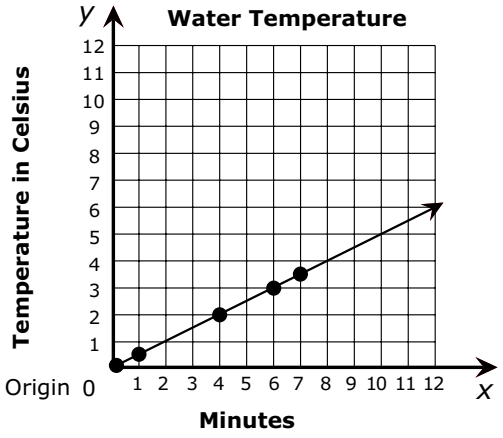
Directions: Complete this page with your partner.

Identify if the graph is proportional. Explain why or why not. If the graph is proportional, identify the unit rate.

1.

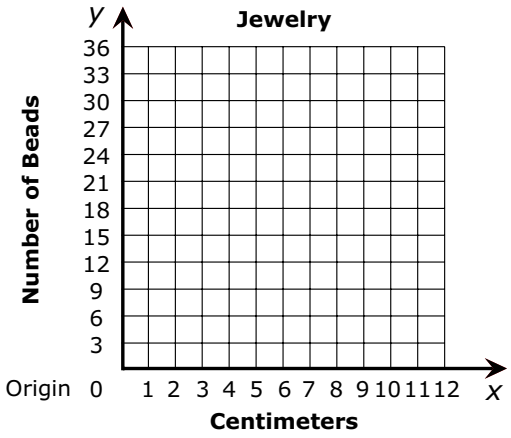


2.



3. Graph the relationship shown in the table below.

Centimeters	5	7	8	11
Number of Beads	15	21	24	33



4. What does the point (8, 24) mean?

5. How is the unit rate represented in the graph?

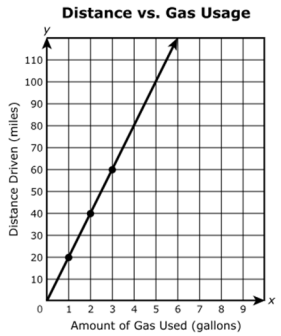
6. Does this graph represent a proportional relationship? _____ Explain why or why not.

Understanding Reasoning and Modeling Questions Use this sheet as a reflection tool to support the understanding of the evidence statement around the reasoning questions. After you engage/learn about the questions, use the tool to make notes around your take aways and implementation ideas.	
Current Unit Topics:	
	Evidence Statement for Reasoning
What Content Standards Are Addressed in This Evidence Statement from the Current Unit?	
Takeaways About the Statement – What Do Students Need to Be Able to Do	
What Should Be Evident in a Student Response	

Reasoning Question – 7.C.4

Used from: NJ Released Questions – 7.C.4 – 2019 – Ratio and Proportional Relationships – M22640

The graph shows the distance a car is driven for each gallon of gas used.



- Does the graph represent a proportional relationship? Explain your answer.
- How many miles can be driven using 5.5 gallons of gas?
- Use the graph to explain how you found the number of miles that can be driven using 5.5 gallons of gas.