



**BEST** FOR  
**ALL**

We will set all students on a path to success.

**Math**  
**Grade 6**  
**Boot Camp**  
**Student Materials**  
**Week 3**



# Lesson 11

## Lesson 11: Comparing Ratios Using Ratio Tables

### Classwork

#### Example 1

Create four equivalent ratios (2 by scaling up and 2 by scaling down) using the ratio 30 to 80.

Write a ratio to describe the relationship shown in the table.

Hours	Number of Pizzas Sold
2	16
5	40
6	48
10	80

### Exercise 1

The following tables show how many words each person can text in a given amount of time. Compare the rates of texting for each person using the ratio table.

Michaela

<b>Minutes</b>	3	5	7	9
<b>Words</b>	150	250	350	450

Jenna

<b>Minutes</b>	2	4	6	8
<b>Words</b>	90	180	270	360

Maria

<b>Minutes</b>	3	6	9	12
<b>Words</b>	120	240	360	480

Complete the table so that it shows Max has a texting rate of 55 words per minute.

Max

<b>Minutes</b>				
<b>Words</b>				

### Exercise 2: Making Juice (Comparing Juice to Water)

- a. The tables below show the comparison of the amount of water to the amount of juice concentrate (JC) in grape juice made by three different people. Whose juice has the greatest water-to-juice concentrate ratio, and whose juice would taste strongest? Be sure to justify your answer.

Laredo's Juice		
Water	JC	Total
12	4	16
15	5	20
21	7	28
45	15	60

Franca's Juice		
Water	JC	Total
10	2	12
15	3	18
25	5	30
40	8	48

Milton's Juice		
Water	JC	Total
8	2	10
16	4	20
24	6	30
40	10	50

Put the juices in order from the juice containing the most water to the juice containing the least water.

\_\_\_\_\_

Explain how you used the values in the table to determine the order.

What ratio was used to create each table?

Laredo: \_\_\_\_\_

Franca: \_\_\_\_\_

Milton: \_\_\_\_\_

Explain how the ratio could help you compare the juices.

- b. The next day, each of the three people made juice again, but this time they were making apple juice. Whose juice has the greatest water-to-juice concentrate ratio, and whose juice would taste the strongest? Be sure to justify your answer.

Laredo's Juice		
Water	JC	Total
12	2	14
18	3	21
30	5	35
42	7	49

Franca's Juice		
Water	JC	Total
15	6	21
20	8	28
35	14	49
50	20	70

Milton's Juice		
Water	JC	Total
16	6	22
24	9	33
40	15	55
64	24	88

Put the juices in order from the strongest apple taste to the weakest apple taste.

\_\_\_\_\_

Explain how you used the values in the table to determine the order.

What ratio was used to create each table?

Laredo: \_\_\_\_\_

Franca: \_\_\_\_\_

Milton: \_\_\_\_\_

Explain how the ratio could help you compare the juices.

How was this problem different than the grape juice questions in part (a)?

- c. Max and Sheila are making orange juice. Max has mixed 15 cups of water with 4 cups of juice concentrate. Sheila has made her juice by mixing 8 cups water with 3 cups of juice concentrate. Compare the ratios of juice concentrate to water using ratio tables. State which beverage has a higher juice concentrate-to-water ratio.
- d. Victor is making recipes for smoothies. His first recipe calls for 2 cups of strawberries and 7 cups of other ingredients. His second recipe says that 3 cups of strawberries are combined with 9 cups of other ingredients. Which smoothie recipe has more strawberries compared to other ingredients? Use ratio tables to justify your answer.

### Lesson Summary

Ratio tables can be used to compare two ratios.

Look for equal amounts in a row or column to compare the second amount associated with it.

3	6	12	30
7	14	28	70

10	25	30	45
16	40	48	72

The values of the tables can also be extended in order to get comparable amounts. Another method would be to compare the values of the ratios by writing the values of the ratios as fractions and then using knowledge of fractions to compare the ratios.

When ratios are given in words, creating a table of equivalent ratios helps in comparing the ratios.

12: 35 compared to 8: 20

Quantity 1	12	24	36	48
Quantity 2	35	70	105	140

Quantity 1	8	56
Quantity 2	20	140

### Problem Set

- Sarah and Eva were swimming.
  - Use the ratio tables below to determine who the faster swimmer is.

Sarah

<b>Time (min)</b>	3	5	12	17
<b>Distance (meters)</b>	75	125	300	425

Eva

<b>Time (min)</b>	2	7	10	20
<b>Distance (meters)</b>	52	182	260	520

- Explain the method that you used to determine your answer.
- A 120 lb. person would weigh about 20 lb. on the earth's moon. A 150 lb. person would weigh 28 lb. on Io, a moon of Jupiter. Use ratio tables to determine which moon would make a person weigh the most.



# Lesson 12



## Lesson 12: From Ratio Tables to Double Number Line Diagrams

### Classwork

#### Exercise 2

The amount of sugary beverages Americans consume is a leading health concern. For a given brand of cola, a 12 oz. serving of cola contains about 40 g of sugar. Complete the ratio table, using the given ratio to find equivalent ratios.

Cola (ounces)		12	
Sugar (grams)		40	

#### Exercise 3

A 1 L bottle of cola contains approximately 34 fluid ounces. How many grams of sugar would be in a 1 L bottle of the cola? Explain and show how to arrive at the solution.

#### Exercise 4

A school cafeteria has a restriction on the amount of sugary drinks available to students. Drinks may not have more than 25 g of sugar. Based on this restriction, what is the largest size cola (in ounces) the cafeteria can offer to students?

**Exercise 5**

Shontelle solves three math problems in four minutes.

- a. Use this information to complete the table below.

<b>Number of Questions</b>	3	6	9	12	15	18	21	24	27	30
<b>Number of Minutes</b>										

- b. Shontelle has soccer practice on Thursday evening. She has a half hour before practice to work on her math homework and to talk to her friends. She has 20 math skill-work questions for homework, and she wants to complete them before talking with her friends. How many minutes will Shontelle have left after completing her math homework to talk to her friends?

Use a double number line diagram to support your answer, and show all work.

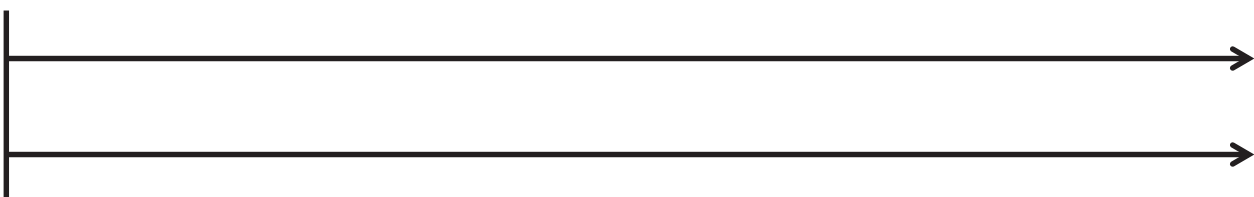
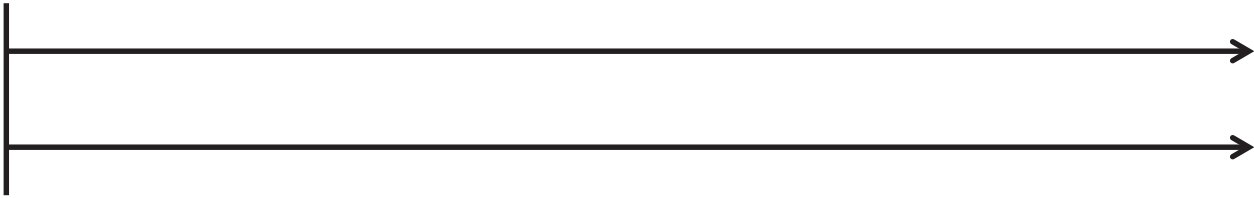
### Lesson Summary

A *double number line* is a representation of a ratio relationship using a pair of parallel number lines. One number line is drawn above the other so that the zeros of each number line are aligned directly with each other. Each ratio in a ratio relationship is represented on the double number line by always plotting the first entry of the ratio on one of the number lines and plotting the second entry on the other number line so that the second entry is aligned with the first entry.

### Problem Set

1. While shopping, Kyla found a dress that she would like to purchase, but it costs \$52.25 more than she has. Kyla charges \$5.50 an hour for babysitting. She wants to figure out how many hours she must babysit to earn \$52.25 to buy the dress. Use a double number line to support your answer.
2. Frank has been driving at a constant speed for 3 hours, during which time he traveled 195 miles. Frank would like to know how long it will take him to complete the remaining 455 miles, assuming he maintains the same constant speed. Help Frank determine how long the remainder of the trip will take. Include a table or diagram to support your answer.

Double Number Line Reproducible





# Lesson 13

## Lesson 13: From Ratio Tables to Equations Using the Value of a Ratio

### Classwork

#### Exercise 1

Jorge is mixing a special shade of orange paint. He mixed 1 gallon of red paint with 3 gallons of yellow paint.

Based on this ratio, which of the following statements are true?

- $\frac{3}{4}$  of a 4-gallon mix would be yellow paint.
- Every 1 gallon of yellow paint requires  $\frac{1}{3}$  gallon of red paint.
- Every 1 gallon of red paint requires 3 gallons of yellow paint.
- There is 1 gallon of red paint in a 4-gallon mix of orange paint.
- There are 2 gallons of yellow paint in an 8-gallon mix of orange paint.

Use the space below to determine if each statement is true or false.



**Exercise 2**

Based on the information on red and yellow paint given in Exercise 1, complete the table below.

Red Paint ( $R$ )	Yellow Paint ( $Y$ )	Relationship
	3	$3 = 1 \times 3$
2		
	9	$9 = 3 \times 3$
	12	
5		

**Exercise 3**

- a. Jorge now plans to mix red paint and blue paint to create purple paint. The color of purple he has decided to make combines red paint and blue paint in the ratio 4: 1. If Jorge can only purchase paint in one gallon containers, construct a ratio table for all possible combinations for red and blue paint that will give Jorge no more than 25 gallons of purple paint.

Blue ( $B$ )	Red ( $R$ )	Relationship

Write an equation that will let Jorge calculate the amount of red paint he will need for any given amount of blue paint.

Write an equation that will let Jorge calculate the amount of blue paint he will need for any given amount of red paint.

If Jorge has 24 gallons of red paint, how much blue paint will he have to use to create the desired color of purple?

If Jorge has 24 gallons of blue paint, how much red paint will he have to use to create the desired color of purple?

- b. Using the same relationship of red to blue from above, create a table that models the relationship of the three colors blue, red, and purple (total) paint. Let  $B$  represent the number of gallons of blue paint, let  $R$  represent the number of gallons of red paint, and let  $T$  represent the total number of gallons of (purple) paint. Then write an equation that models the relationship between the blue paint and the total paint, and answer the questions.

Blue ( $B$ )	Red ( $R$ )	Total Paint ( $T$ )

Equation:

Value of the ratio of total paint to blue paint:

How is the value of the ratio related to the equation?

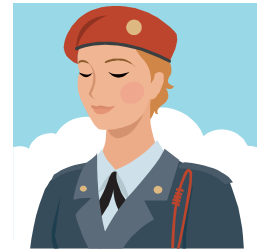


**Exercise 4**

During a particular U.S. Air Force training exercise, the ratio of the number of men to the number of women was 6:1. Use the ratio table provided below to create at least two equations that model the relationship between the number of men and the number of women participating in this training exercise.

Women ( $W$ )	Men ( $M$ )

Equations:



If 200 women participated in the training exercise, use one of your equations to calculate the number of men who participated.

**Exercise 5**

Malia is on a road trip. During the first five minutes of Malia's trip, she sees 18 cars and 6 trucks. Assuming this ratio of cars to trucks remains constant over the duration of the trip, complete the ratio table using this comparison. Let  $T$  represent the number of trucks she sees, and let  $C$  represent the number of cars she sees.

Trucks ( $T$ )	Cars ( $C$ )
1	
3	
	18
12	
	60

What is the value of the ratio of the number of cars to the number of trucks?

What equation would model the relationship between cars and trucks?

At the end of the trip, Malia had counted 1,254 trucks. How many cars did she see?

**Exercise 6**

Kevin is training to run a half-marathon. His training program recommends that he run for 5 minutes and walk for 1 minute. Let  $R$  represent the number of minutes running, and let  $W$  represent the number of minutes walking.

<b>Minutes Running (<math>R</math>)</b>		10	20		50
<b>Minutes Walking (<math>W</math>)</b>	1	2		8	

What is the value of the ratio of the number of minutes walking to the number of minutes running?

What equation could you use to calculate the minutes spent walking if you know the minutes spent running?

**Lesson Summary**

The value of a ratio can be determined using a ratio table. This value can be used to write an equation that also represents the ratio.

Example:

1	4
2	8
3	12
4	16

The multiplication table can be a valuable resource to use in seeing ratios. Different rows can be used to find equivalent ratios.

**Problem Set**

A cookie recipe calls for 1 cup of white sugar and 3 cups of brown sugar.

Make a table showing the comparison of the amount of white sugar to the amount of brown sugar.

White Sugar ( <i>W</i> )	Brown Sugar ( <i>B</i> )

1. Write the value of the ratio of the amount of white sugar to the amount of brown sugar.
2. Write an equation that shows the relationship of the amount of white sugar to the amount of brown sugar.
3. Explain how the value of the ratio can be seen in the table.
4. Explain how the value of the ratio can be seen in the equation.

Using the same recipe, compare the amount of white sugar to the amount of total sugars used in the recipe.

Make a table showing the comparison of the amount of white sugar to the amount of total sugar.

White Sugar ( $W$ )	Total Sugar ( $T$ )

- Write the value of the ratio of the amount of total sugar to the amount of white sugar.
- Write an equation that shows the relationship of total sugar to white sugar.



# Lesson 14

## Lesson 14: From Ratio Tables, Equations, and Double Number

### Line Diagrams to Plots on the Coordinate Plane

#### Classwork

Kelli is traveling by train with her soccer team from Yonkers, NY to Morgantown, WV for a tournament. The distance between Yonkers and Morgantown is 400 miles. The total trip will take 8 hours. The train schedule is provided below:

Leaving Yonkers, New York	
Destination	Distance
Allentown, PA	100 miles
Carlisle, PA	200 miles
Berkeley Springs, WV	300 miles
Morgantown, WV	400 miles

Leaving Morgantown, WV	
Destination	Distance
Berkeley Springs, WV	100 miles
Carlisle, PA	200 miles
Allentown, PA	300 miles
Yonkers, NY	400 miles

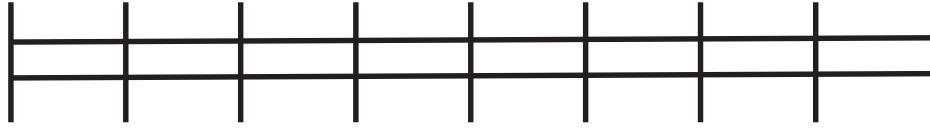


#### Exercises

- Create a table to show the time it will take Kelli and her team to travel from Yonkers to each town listed in the schedule assuming that the ratio of the amount of time traveled to the distance traveled is the same for each city. Then, extend the table to include the cumulative time it will take to reach each destination on the ride home.

Hours	Miles

2. Create a double number line diagram to show the time it will take Kelli and her team to travel from Yonkers to each town listed in the schedule. Then, extend the double number line diagram to include the cumulative time it will take to reach each destination on the ride home. Represent the ratio of the distance traveled on the round trip to the amount of time taken with an equation.



Using the information from the double number line diagram, how many miles would be traveled in one hour?

\_\_\_\_\_

How do you know?

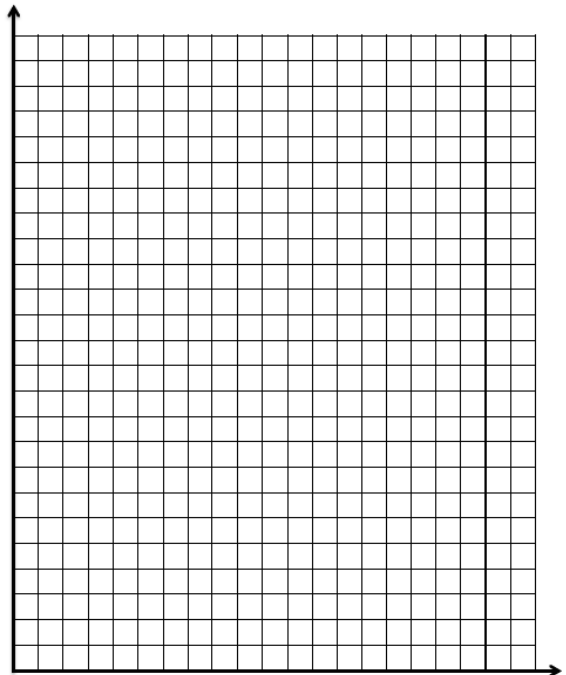
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**Example 1**

Dinner service starts once the train is 250 miles away from Yonkers. What is the minimum time the players will have to wait before they can have their meal?

Hours	Miles	Ordered Pairs



## Lesson Summary

A ratio table, equation, or double number line diagram can be used to create ordered pairs. These ordered pairs can then be graphed on a coordinate plane as a representation of the ratio.

Example:

Equation:  $y = 3x$

$x$	$y$
0	0
1	3
2	6
3	9

Ordered Pairs

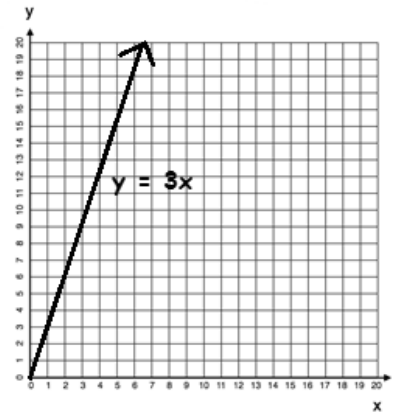
$(x, y)$

$(0, 0)$

$(1, 3)$

$(2, 6)$

$(3, 9)$



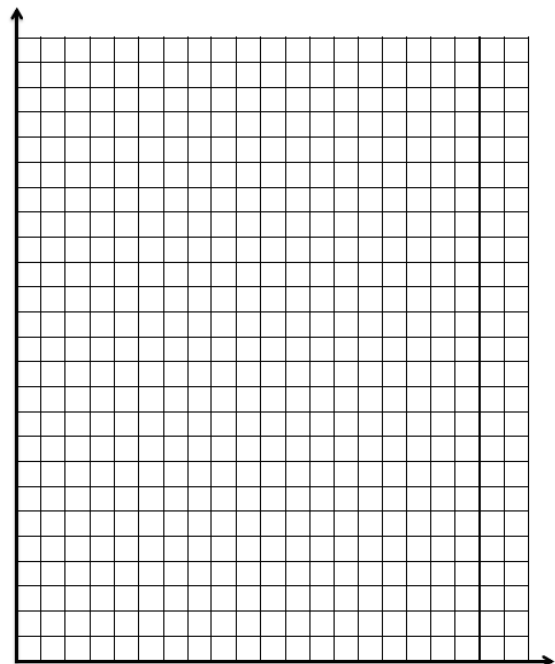
## Problem Set

1. Complete the table of values to find the following:

Find the number of cups of sugar needed if for each pie Karrie makes, she has to use 3 cups of sugar.

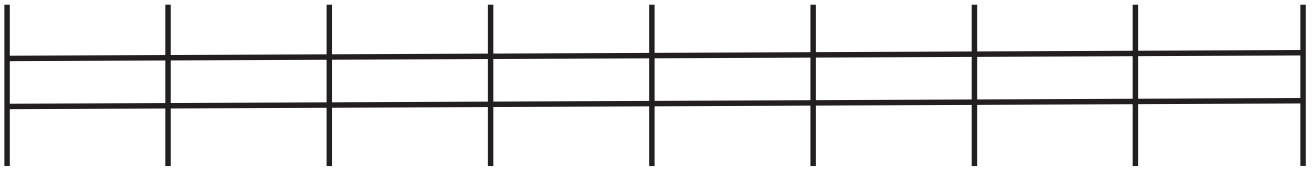
Pies	Cups of Sugar
1	
2	
3	
4	
5	
6	

Use a graph to represent the relationship.

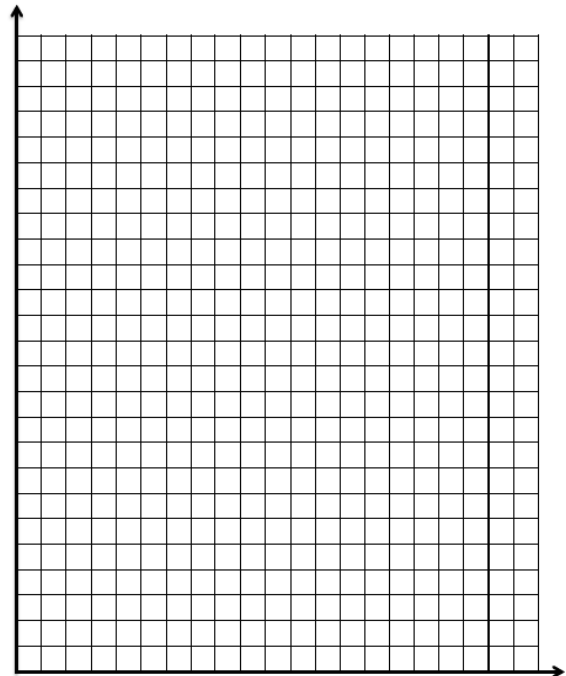




Create a double number line diagram to show the relationship.



2. Write a story context that would be represented by the ratio 1:4.  
Complete a table of values for this equation and graph.



# Lesson 15

## Lesson 15: A Synthesis of Representations of Equivalent Ratio

### Collections

#### Classwork

##### Exploratory Challenge

At the end of this morning's news segment, the local television station highlighted area pets that need to be adopted. The station posted a specific website on the screen for viewers to find more information on the pets shown and the adoption process. The station producer checked the website two hours after the end of the broadcast and saw that the website had 24 views. One hour after that, the website had 36 views.

##### Exercise 1

Create a table to determine how many views the website probably had one hour after the end of the broadcast based on how many views it had two and three hours after the end of the broadcast. Using this relationship, predict how many views the website will have 4, 5, and 6 hours after the end of the broadcast.

##### Exercise 2

What is the constant number,  $c$ , that makes these ratios equivalent?

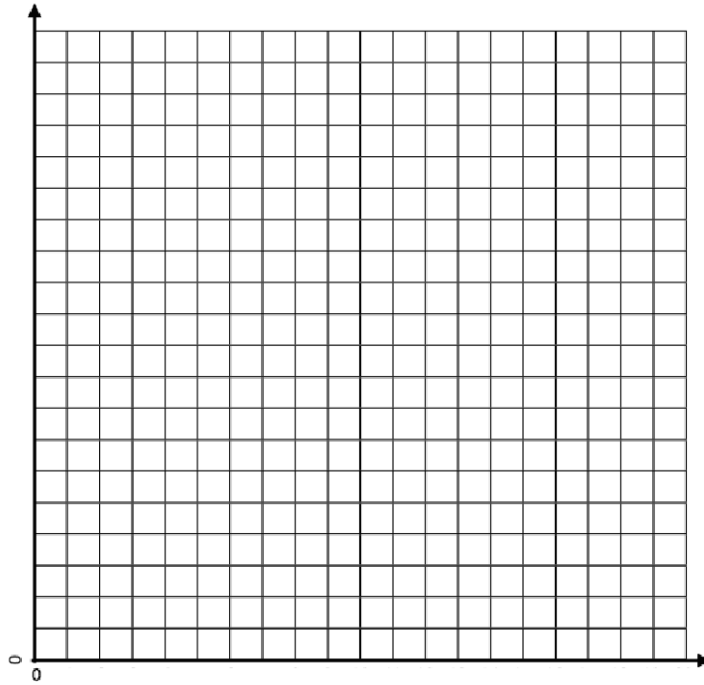
Using an equation, represent the relationship between the number of views,  $v$ , the website received and the number of hours,  $h$ , after this morning's news broadcast.

**Exercise 3**

Use the table created in Exercise 1 to identify sets of ordered pairs that can be graphed.

**Exercise 4**

Use the ordered pairs you created to depict the relationship between hours and number of views on a coordinate plane. Label your axes and create a title for the graph. Do the points you plotted lie on a line?



**Exercise 5**

Predict how many views the website will have after twelve hours. Use at least two representations (e.g., tape diagram, table, double number line diagram) to justify your answer.

**Exercise 6**

Also on the news broadcast, a chef from a local Italian restaurant demonstrated how he makes fresh pasta daily for his restaurant. The recipe for his pasta is below:

3 eggs, beaten

1 teaspoon salt

2 cups all-purpose flour

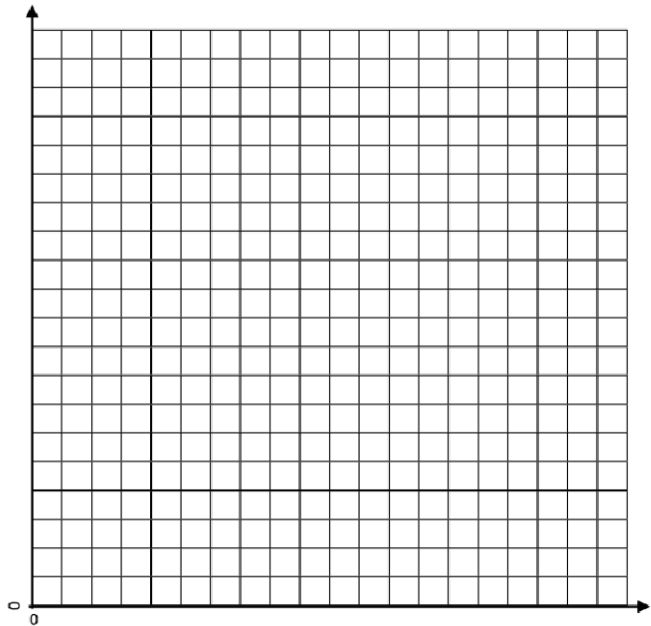
2 tablespoons water

2 tablespoons vegetable oil

Determine the ratio of the number of tablespoons of water to the number of eggs.

Provided the information in the table below, complete the table to determine ordered pairs. Use the ordered pairs to graph the relationship of the number of tablespoons of water to the number of eggs.

Tablespoons of Water	Number of Eggs
2	
4	
6	
8	
10	
12	



What would you have to do to the graph in order to find how many eggs would be needed if the recipe was larger and called for 16 tablespoons of water?

Demonstrate on your graph.

How many eggs would be needed if the recipe called for 16 tablespoons of water?

**Exercise 7**

Determine how many tablespoons of water will be needed if the chef is making a large batch of pasta and the recipe increases to 36 eggs. Support your reasoning using at least one diagram you find applies best to the situation, and explain why that tool is the best to use.

**Lesson Summary**

There are several ways to represent the same collection of equivalent ratios. These include ratio tables, tape diagrams, double number line diagrams, equations, and graphs on coordinate planes.

**Problem Set**

1. The producer of the news station posted an article about the high school's football championship ceremony on a new website. The website had 500 views after four hours. Create a table to show how many views the website would have had after the first, second, and third hours after posting, if the website receives views at the same rate. How many views would the website receive after 5 hours?
2. Write an equation that represents the relationship from Problem 1. Do you see any connections between the equations you wrote and the ratio of the number of views to the number of hours?
3. Use the table in Problem 1 to make a list of ordered pairs that you could plot on a coordinate plane.
4. Graph the ordered pairs on a coordinate plane. Label your axes and create a title for the graph.
5. Use multiple tools to predict how many views the website would have after 12 hours.



Graph Reproducible

