Name _____ **Ms. Abadie's** _____ **Period**

Chapter 5	Ratios and Proportions
MAFS.7.RP.1.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
Essential Question	How can rates help you describe real-life problems? *In this lesson I am learning how to compare two quantities using ratios, rates, and unit rates so I can better communicate and understand these comparisons in real-world context.*

5.1 Ratios and Rates

A **ratio** is a comparison of two quantities using division.

$\frac{3}{4}$, 3 to 4, 3 : 4

A **rate** is a ratio of two quantities with different units.

$\frac{60 \text{ miles}}{2 \text{ hours}}$

A rate with a denominator of 1 is called a **unit rate**.

$\frac{30 \text{ miles}}{1 \text{ hour}}$

A complex fraction has at least one fraction in the numerator, denominator, or both. You may need to simplify complex fractions when finding ratios and rates by "multiplying the outter numbers and putting that over the inners"

$\frac{\frac{2}{3}}{\frac{4}{1}} = \frac{2 \times 1}{3 \times 4} = \frac{2}{12} = \frac{1}{6}$

1. **VOCABULARY** How can you tell when a rate is a unit rate?
2. **WRITING** Why do you think rates are usually written as unit rates?
3. **OPEN-ENDED** Write a real-life rate that applies to you.

Estimate the unit rate.

4. $74.75

5. $1.19

6. $2.35

Homework 5.1 Practice A #1-3

Find the product. List the units.

7. $8 \text{ h} \times \frac{\$9}{\text{h}}$
8. $8 \text{ lb} \times \frac{\$3.50}{\text{lb}}$
9. $\frac{29}{2} \text{ sec} \times \frac{60 \text{ MB}}{\text{sec}}$
10. $\frac{3}{4} \text{ h} \times \frac{19 \text{ mi}}{\frac{1}{4} \text{ h}}$

Homework 5.1 Practice A #4-6

Write the ratio as a fraction in simplest form.

11. 25 to 45
12. 63 : 28
13. 35 girls : 15 boys
14. 51 correct : 9 incorrect
15. 16 dogs to 12 cats
16. $2\frac{1}{3}$ feet : $4\frac{1}{2}$ feet

Homework
5.1 Practice A
#7-9

Find the unit rate.

17. 180 miles in 3 hours

18. 256 miles per 8 gallons

19. \$9.60 for 4 pounds

20. \$4.80 for 6 cans

21. 297 words in 5.5 minutes

22. $21\frac{3}{4}$ meters in $2\frac{1}{2}$ hours

Homework
5.1 Practice A
#10-11

Use the ratio table to find the unit rate with the specified units.

23. servings per package

Packages	3	6	9	12
Servings	13.5	27	40.5	54

24. feet per year

Years	2	6	10	14
Feet	7.2	21.6	36	50.4

Homework
5.1 Practice A
#12

25. **DOWNLOAD** At 1:00 P.M., you have 24 megabytes of a movie. At 1:15 P.M., you have 96 megabytes. What is the download rate in megabytes per minute?

A recipe used $\frac{2}{3}$ cup of sugar for every 2 teaspoons of vanilla. How much sugar was used per teaspoon of vanilla?

A recipe calls for $\frac{2}{3}$ cup of sugar for every 4 teaspoons of vanilla. How much vanilla should be used for every 1 cup of sugar?

A recipe calls for $\frac{2}{3}$ cup of sugar for every $\frac{1}{2}$ teaspoon of vanilla.

What is the unit rate of cups per teaspoon?

Ethan ran 11 miles in 2 hours. What is the unit rate of miles to hour?

MAFS.7.RP.1.2	Recognize and represent proportional relationships between quantities. • 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. • 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
Essential Question	How can proportions help you decide when things are fair? *In this lesson I am learning how to compare quatities so I can tell if they are proportional.*
5.2 Proportions	Proportion- a ratio equal to a ratio. The cross product of proportions are equal.
	1. **VOCABULARY** What does it mean for two ratios to form a proportion? 2. **VOCABULARY** What are two ways you can tell that two ratios form a proportion? 3. **OPEN-ENDED** Write two ratios that are equivalent to $\frac{3}{5}$. 4. **WHICH ONE DOESN'T BELONG?** Which ratio does *not* belong with the other three? Explain your reasoning. $\frac{4}{10}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{6}{15}$
Homework 5.2 Practice A #1-9, 15-17	**Tell whether the ratios form a proportion.** 5. $\frac{1}{3}, \frac{7}{21}$ 6. $\frac{1}{5}, \frac{6}{30}$ 7. $\frac{3}{4}, \frac{24}{18}$ 8. $\frac{2}{5}, \frac{40}{16}$ 9. $\frac{48}{9}, \frac{16}{3}$ 10. $\frac{18}{27}, \frac{33}{44}$ 11. $\frac{7}{2}, \frac{16}{6}$ 12. $\frac{12}{10}, \frac{14}{12}$
	Tell whether x and y are proportional. 13. | x | 1 | 2 | 3 | 4 | | y | 7 | 8 | 9 | 10 | 14. | x | 2 | 4 | 6 | 8 | | y | 5 | 10 | 15 | 20 |
Homework 5.2 Practice A #10-14	**Tell whether the two rates form a proportion.** 15. 7 inches in 9 hours; 42 inches in 54 hours 16. 12 players from 21 teams; 15 players from 24 teams 17. 440 calories in 4 servings; 300 calories in 3 servings

Kara mixes different colors of paint to create new colors. The table shows the amount of paint Kara mixes per batch.

Ounces of Paint

Batch	Blue	White	Yellow
1	2	1.5	1
2	5	3.5	2.5
3	7	5.5	3.5
4	6	4.5	3
5	4	3	2
6	3	2	1.5

Select all the batches that will create the same color as the first batch.

- [ ] Batch 2
- [ ] Batch 3
- [ ] Batch 4
- [ ] Batch 5
- [ ] Batch 6

Essential Question

How can you tell if a graph is proportional?

In this lesson I will learn what to look for so I can tell if a graph is proportional.

5.2 ext. Graphing Proportional Relationships

A graph is proportional if it is a straight line that goes through the origin (0,0).

Use a graph to tell whether x and y are in a proportional relationship.

1.

x	1	2	3	4
y	3	4	5	6

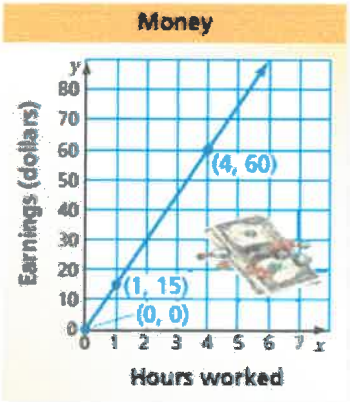
2.

x	1	3	5	7
y	0.5	1.5	2.5	3.5

Homework
5.2 ext.
Practice A
#1-2

Interpret each plotted point in the graph of the proportional relationship.

3.



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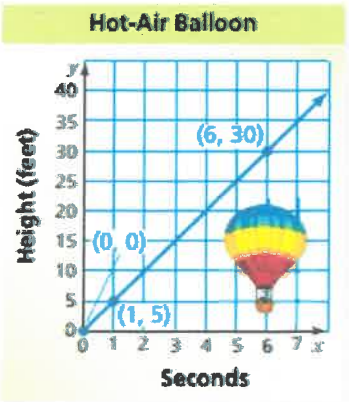


Tell whether x and y are in a proportional relationship. If so, find the unit rate.

5.

x (hours)	1	4	7	10
y (feet)	5	20	35	50

6. Let y be the temperature x hours after midnight. The temperature is 60°F at midnight and decreases 2°F every $\frac{1}{2}$ hour.

Homework
5.2 ext.
Practice A
#3-6

7. REASONING The graph of a proportional relationship passes through (12, 16) and (1, y). Find y.

8. MOVIE RENTAL You pay $1 to rent a movie plus an additional $0.50 per day until you return the movie. Your friend pays $1.25 per day to rent a movie.

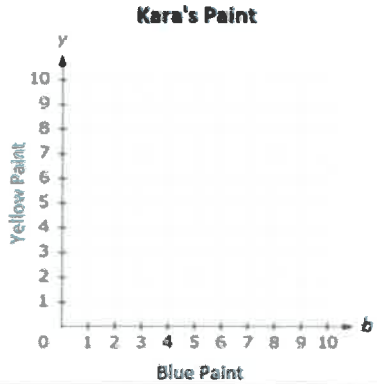
a. Make tables showing the costs to rent a movie up to 5 days.

b. Which person pays an amount proportional to the number of days rented?

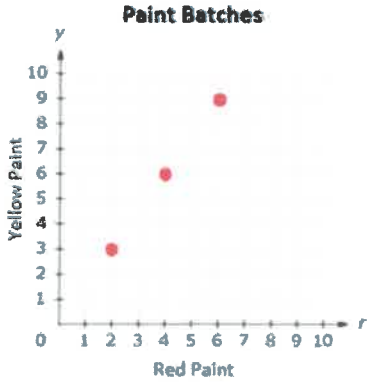
The ordered pair (1, 5) indicates the unit rate of books to cost on the graph shown.

What does the point on the graph represent?

Kara is mixing paint. Each batch has twice as much blue paint as yellow paint. Plot points to represent the amount of blue and yellow paint used in three different-sized batches.

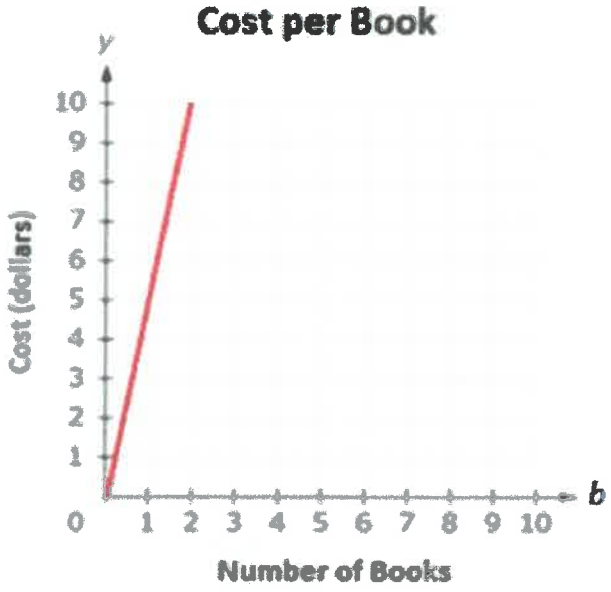


The points on the coordinate plane show the amount of red and yellow paint in each batch.



Write an equation to represent the relationship between red paint, r, and yellow paint, y, in each batch.

The graph below represents the rate for the cost of b books.



Write an equation to represent the cost, c.

MAFS.7.RP.1.2	Recognize and represent proportional relationships between quantities.
Essential Question	How can you write a proportion that solves a problem in real life? *In this lesson I will learn the ways I can write a proportion so I can use them to solve problems.*
5.3 Writing Proporions	
	1. **WRITING** Describe two ways you can use a table to write a proportion. 2. **WRITING** What is your first step when solving $\frac{x}{15} = \frac{3}{5}$? Explain. 3. **OPEN-ENDED** Write a proportion using an unknown value x and the ratio 5 : 6. Then solve it.
Homework 5.3 Practice A #1-4	**Write a proportion to find how many points a student needs to score on the test to get the given score.** 4. test worth 50 points; test score of 40% 5. test worth 50 points; test score of 78% 6. test worth 80 points; test score of 80% 7. test worth 150 points; test score of 96%
Homework 5.3 Practice A #5-6	**Use the table to write a proportion.** 8. 9. 10. 11.
	12. **ERROR ANALYSIS** Describe and correct the error in writing the proportion.
Homework 5.3 Practice A #7	13. **T-SHIRTS** You can buy 3 T-shirts for $24. Write a proportion that gives the cost c of buying 7 T-shirts.

8.

	Game 1	Game 2
Points	12	18
Shots	14	w

9.

	May	June
Winners	n	34
Entries	85	170

10.

	Today	Yesterday
Miles	15	m
Hours	2.5	4

11.

	Race 1	Race 2
Meters	100	200
Seconds	x	22.4

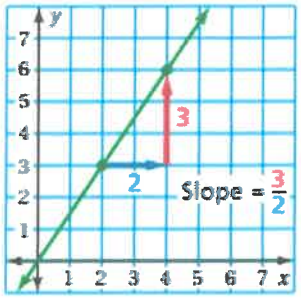
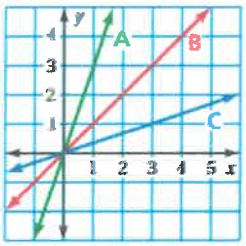
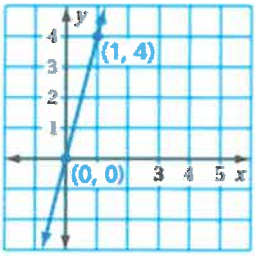
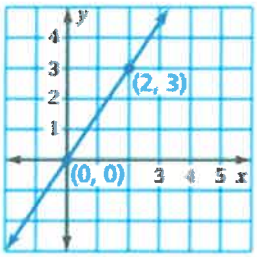
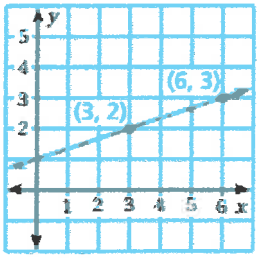
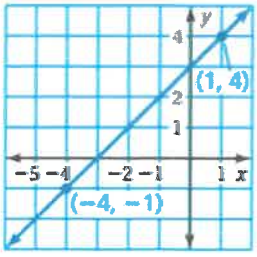
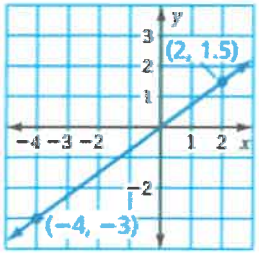
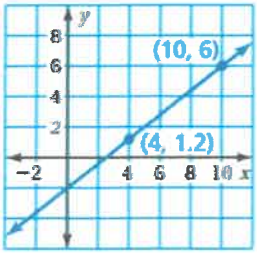
12.

	Monday	Tuesday
Dollars	2.08	d
Ounces	8	16

$\frac{2.08}{16} = \frac{d}{8}$

MAFS.7.RP.1.2	Recognize and represent proportional relationships between quantities. • Represent proportional relationships by equations.
Essential Question	What methods can you use to solve a proportion? *In this lesson I will learn how to use the cross products so I can solve proportions.*
5.4 Solving Proportions	**Solving Proportions** **Method 1** Use mental math. *(Section 5.3)* **Method 2** Use the Multiplication Property of Equality. *(Section 5.4)* **Method 3** Use the Cross Products Property. *(Section 5.4)*
	1. **WRITING** What are three ways you can solve a proportion? 2. **OPEN-ENDED** Which way would you choose to solve $\frac{3}{x} = \frac{6}{14}$? Explain your reasoning. 3. **NUMBER SENSE** Does $\frac{x}{4} = \frac{15}{3}$ have the same solution as $\frac{x}{15} = \frac{4}{3}$? Use the Cross Products Property to explain your answer.
Homework 5.4 Practice A #1-3	**Use multiplication to solve the proportion.** 4. $\frac{9}{5} = \frac{z}{20}$ 5. $\frac{h}{15} = \frac{16}{3}$ 6. $\frac{w}{4} = \frac{42}{24}$ 7. $\frac{35}{28} = \frac{n}{12}$ 8. $\frac{7}{16} = \frac{x}{4}$ 9. $\frac{y}{9} = \frac{44}{54}$
Homework 5.4 Practice A #4-6	**Use the Cross Products Property to solve the proportion.** 10. $\frac{a}{6} = \frac{15}{2}$ 11. $\frac{10}{7} = \frac{8}{k}$ 12. $\frac{3}{4} = \frac{v}{14}$ 13. $\frac{5}{n} = \frac{16}{32}$ 14. $\frac{36}{42} = \frac{24}{r}$ 15. $\frac{9}{10} = \frac{d}{6.4}$ 16. $\frac{x}{8} = \frac{3}{12}$ 17. $\frac{8}{m} = \frac{6}{15}$ 18. $\frac{4}{24} = \frac{c}{36}$ 19. $\frac{20}{16} = \frac{d}{12}$ 20. $\frac{30}{20} = \frac{w}{14}$ 21. $\frac{2.4}{1.8} = \frac{7.2}{k}$

	22. ERROR ANALYSIS Describe and correct the error in solving the proportion $\frac{m}{8} = \frac{15}{24}$. ✗ $\frac{m}{8} = \frac{15}{24}$ $8 \cdot m = 24 \cdot 15$ $m = 45$
Homework 5.4 Practice A #7-8	**23. PENS** Forty-eight pens are packaged in 4 boxes. How many pens are packaged in 9 boxes?
	24. PIZZA PARTY How much does it cost to buy 10 medium pizzas? 
Homework 5.4 Practice A #9-11	**Solve the proportion.** **25.** $\frac{2x}{5} = \frac{9}{15}$ **26.** $\frac{5}{2} = \frac{d-2}{4}$ **27.** $\frac{4}{k+3} = \frac{8}{14}$
	Write and solve a proportion to complete the statement. Round to the nearest hundredth if necessary. **28.** 6 km ≈ ____ mi **29.** 2.5 L ≈ ____ gal **30.** 90 lb ≈ ____ kg

MAFS.7.RP.1.2	Recognize and represent proportional relationships between quantities. • Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
Essential Question	How can you compare two rates using a graph? *In this lesson I will learn about slope so I can descirbe the steepness of a line.*
5.5 Slope	**Slope** **Slope** is the rate of change between any two points on a line. It is a measure of the *steepness* of a line. To find the slope of a line, find the ratio of the change in y (vertical change) to the change in x (horizontal change). $\text{slope} = \frac{\text{change in } y}{\text{change in } x}$ 
	1. **VOCABULARY** Is there a connection between rate and slope? Explain. 2. **REASONING** Which line has the greatest slope? 3. **REASONING** Is it more difficult to run up a ramp with a slope of $\frac{1}{5}$ or a ramp with a slope of 5? Explain. 
Homework 5.5 Practice A #1-4	**Find the slope of the line.** 4.  5.  6.  7.  8.  9. 

Homework 5.5 Practice A #5-6

Graph the data. Then find and interpret the slope of the line through the points.

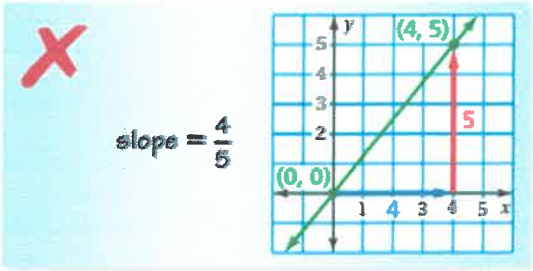
10.

Minutes, x	3	5	7	9
Words, y	135	225	315	405

11.

Gallons, x	5	10	15	20
Miles, y	162.5	325	487.5	650

12. ERROR ANALYSIS Describe and correct the error in finding the slope of the line passing through (0, 0) and (4, 5).



Homework 5.5 Practice A #7-9

Graph the line that passes through the two points. Then find the slope of the line.

13. $(0, 0), \left(\frac{1}{3}, \frac{7}{3}\right)$

14. $\left(-\frac{3}{2}, -\frac{3}{2}\right), \left(\frac{3}{2}, \frac{3}{2}\right)$

15. $\left(1, \frac{5}{2}\right), \left(-\frac{1}{2}, -\frac{1}{4}\right)$

Homework 5.5 Practice A #10

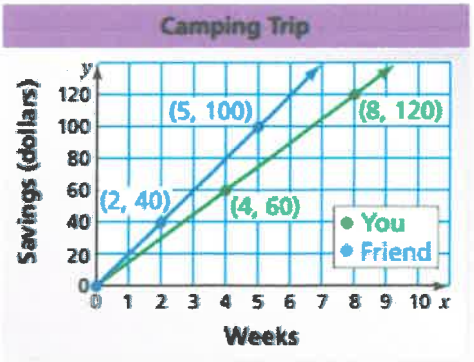
16. CAMPING The graph shows the amount of money you and a friend are saving for a camping trip.

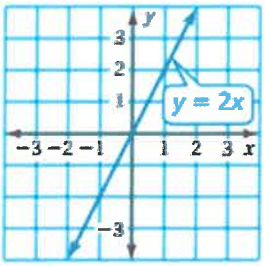
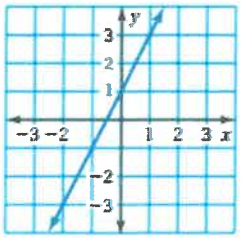
a. Compare the steepness of the lines. What does this mean in the context of the problem?

b. Find the slope of each line.

c. How much more money does your friend save each week than you?

d. The camping trip costs $165. How long will it take you to save enough money?



MAFS.7.RP.1.2	Recognize and represent proportional relationships between quantities. • Decide whether two quantities are in a proportional relationship • Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. • Represent proportional relationships by equations
Essential Question	How can you use a graph to show the relationship between two quantities that vary directly? How can you use an equation? *In this lesson I will learn about the graph and equation of quatities that are proportional so I can identify when two quatities are varying directly.*
5.6 Direct Variation	**Direct Variation** **Words** Two quantities x and y show **direct variation** when $y = kx$, where k is a number and $k \neq 0$. The number k is called the **constant of proportionality**. **Graph** The graph of $y = kx$ is a line with a slope of k that passes through the origin. So, two quantities that show direct variation are in a proportional relationship. 
	1. **VOCABULARY** What does it mean for x and y to vary directly? 2. **WRITING** What point is on the graph of every direct variation equation? 3. **DIFFERENT WORDS, SAME QUESTION** Which is different? Find "both" answers. Do x and y show direct variation? Are x and y in a proportional relationship? Is the graph of the relationship a line? Does y vary directly with x? 
Homework 5.6 Practice A #1-2	**Graph the ordered pairs in a coordinate plane. Do you think that graph shows that the quantities vary directly? Explain your reasoning.** 4. $(-1, -1), (0, 0), (1, 1), (2, 2)$ 5. $(-4, -2), (-2, 0), (0, 2), (2, 4)$

Homework 5.6 Practice A #3-4

Tell whether x and y show direct variation. Explain your reasoning. If so, find k.

6.

x	1	2	3	4
y	2	4	6	8

7.

x	−2	−1	0	1
y	0	2	4	6

8.

x	−1	0	1	2
y	−2	−1	0	1

9.

x	3	6	9	12
y	2	4	6	8

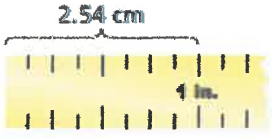
Homework 5.6 Practice A #5-7

10. $y - x = 4$ **11.** $x = \frac{2}{5}y$ **12.** $y + 3 = x + 6$ **13.** $y - 5 = 2x$

Homework 5.6 Practice A #9-11

The variables x and y vary directly. Use the values to find the constant of proportionality. Then write an equation that relates x and y.

20. $y = 72; x = 3$ **21.** $y = 20; x = 12$ **22.** $y = 45; x = 40$



23. **MEASUREMENT** Write a direct variation equation that relates x inches to y centimeters.