Name _____

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Chapter 5 Ratios and Proportions

Parent Signature _____ **Date** _____

Student Signature _____ **Date** _____

Teacher Signature _____ **Date** _____

Name _____ Class Period _____

Evaluation of Notes

Criteria	10 – Unsatisfactory	20 – Satisfactory	25 – Good	30 – Excellent	Score
Set-up and Neatness	• No name • Paper appears to have been scrunched, put through a blender, or used as a napkin	• Name • Handwriting is hard to read.	• Name and class period • Some extra notes added	• Name and class period • Many extra notes added	____
Completion of practice	• One or more sections are blank	• Some practice is not complete • Not all work is shown	• All practice is complete • Some work not shown	• All practice complete • All work shown	____
Text marking	• None of the notes are highlighted or underlined	• One or more sections are missing highlighting or underlining	• Each section contains highlighting or underlining.	• Every key point is highlighted or underlined and it is done so neatly.	____
Completed on time or within one day of being absent? +10 points!					____
				Total Score	

Evaluation of Homework

Criteria	0 – Unsatisfactory	30 – Satisfactory	40 – Good	50 – Excellent	Score
Set-up and Neatness	• No name • Paper appears to have been scrunched, put through a blender, or used as a napkin	• Name • Handwriting is hard to read.	• Name and class period • Some answers are boxed	• Name and class period • All answers are boxed	____
Completion of practice	• The homework is not done or attempted.	• Some problems are not done. • Not all work is shown	• All practice is complete • Some work not shown	• All practice complete • All work shown	____
				Total Score	

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?

Name_____ Date_____

5.1 Practice A

Find the product. List the units.

1. $12 \text{ h} \times \frac{\$5}{\text{h}}$
2. $6 \text{ oz} \times \frac{\$0.59}{\text{oz}}$
3. $9 \text{ h} \times \frac{70 \text{ mi}}{\text{h}}$

Write the ratio as a fraction in simplest form.

4. 12 to 15
5. 24 : 9
6. 14 tetras : 6 angelfish

Find the unit rate.

7. 360 miles in 6 hours
8. 18 bowlers on 6 lanes
9. $28 for 7 people

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

10. Laps per minute

Minutes	0	2	4	6
Laps	0	1	2	3

11. Grams of protein per serving

Servings	0	1	2	3
Grams of Protein	0	15	30	45

12. At 9 A.M. you have run 2 miles. At 9:24 A.M. you have run 5 miles. What is your running rate in minutes per mile?

13. Are the two statements equivalent? Explain your reasoning.
    - The ratio of orange to blue is 3 to 4.
    - The ratio of blue to orange is 12 to 9.

14. There are 234 students in 9 different classrooms. What is the ratio of students to classrooms?

15. Dishwasher detergent is sold in individual packs. It is sold in 20-, 60-, and 90-pack containers.
    a. Which container do you think has the lowest unit rate of dollars per pack? Why?
    b. The 20-pack container sells for $5.49. What is the unit rate in dollars per pack? Round your answer to the nearest cent.
    c. The 60-pack container sells for $10.97. What is the unit rate in dollars per pack? Round your answer to the nearest cent.
    d. The 90-pack container sells for $18.95. What is the unit rate in dollars per pack? Round your answer to the nearest cent.
    e. Which container has the lowest unit rate? How does this compare with your answer in part (a)?

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

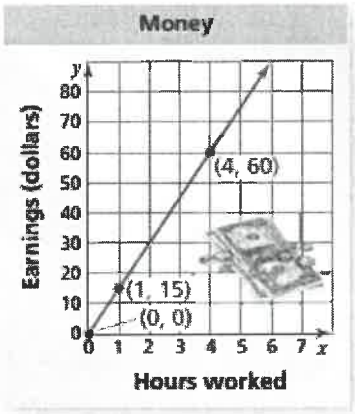
2.

x	1	3	5	7
y	0.5	1.5	2.5	3.5

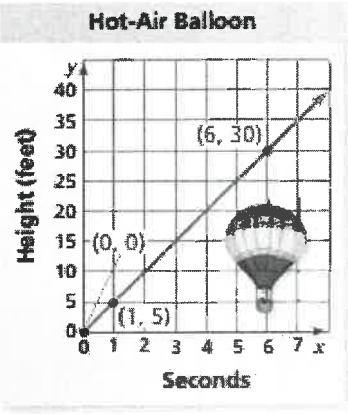
Homework
5.2 ext.
Practice A
#1-2

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

3.



4.



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

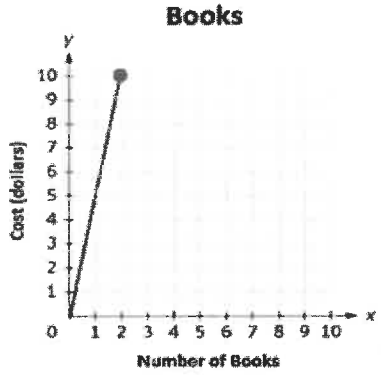
7. REASONING The graph of a proportional relationship passes through (12, 16) and (1, y). Find y.

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.

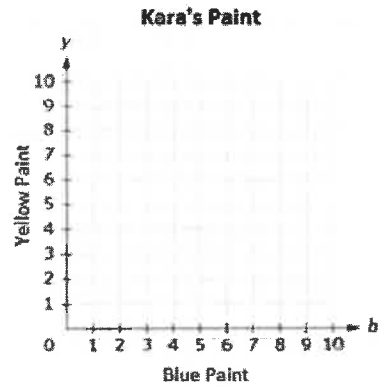
   b. Which person pays an amount proportional to the number of days rented?

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.



Name_____ Date_____

5.2 Practice A

Tell whether the ratios form a proportion.

1. $\frac{1}{4}, \frac{3}{12}$
2. $\frac{1}{7}, \frac{4}{28}$
3. $\frac{2}{5}, \frac{30}{80}$
4. $\frac{18}{24}, \frac{15}{20}$
5. $\frac{35}{16}, \frac{5}{2}$
6. $\frac{5}{7}, \frac{35}{49}$
7. $\frac{15}{21}, \frac{45}{63}$
8. $\frac{33}{63}, \frac{26}{42}$
9. $\frac{54}{10}, \frac{81}{15}$

Tell whether the two rates form a proportion.

10. 8 feet in 15 seconds; 16 feet in 40 seconds
11. 28 people in 4 rooms; 63 people in 9 rooms
12. 14 girls to 6 boys; 35 girls to 15 boys
13. 45 marbles in 9 bags; 150 marbles in 36 bags
14. You can run 4 laps in 10 minutes. Your friend can run 6 laps in 15 minutes. Are these rates proportional? Explain.

Tell whether the ratios form a proportion.

15. $\frac{7}{4}, \frac{17.5}{10}$
16. $\frac{1.5}{6}, \frac{2}{8}$
17. $\frac{8}{5}, \frac{68}{45}$
18. You get \$27 to spend at the mall for doing 6 chores. Your friend gets \$36 for doing 8 chores.
    a. What is your pay rate?
    b. What is your friend's pay rate?
    c. Are the pay rates equivalent? Explain.
19. You can buy 4 tickets for \$75 or 5 tickets for \$94. Are the costs proportional? If not, rewrite one of the rates so the costs are proportional.
20. A recipe requires a ratio of 4 potatoes to 6 carrots. You accidentally use 5 potatoes with 6 carrots. What is the least number of potatoes and carrots that you can add to get the correct ratio of potatoes to carrots?

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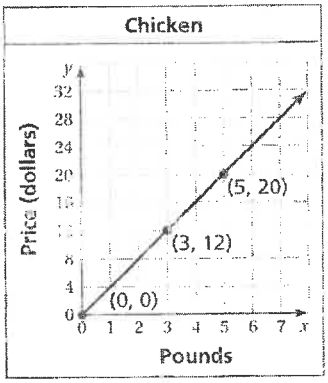
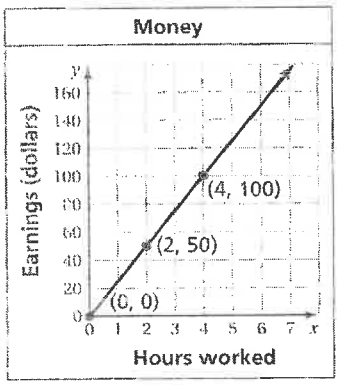
Extension 5.2 Practice

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

1.



2.



The graph of a proportional relationship passes through the given points. Find *y*.

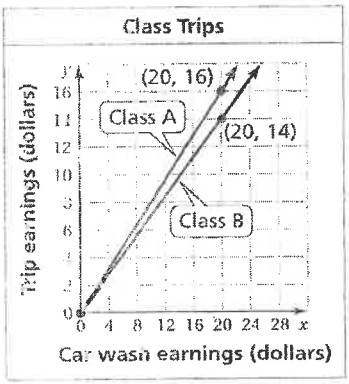
3. $(4, 8), (1, y)$

4. $(3, 21), (1, y)$

5. $(1.5, 9), (1, y)$

6. $(3.5, 14), (1, y)$

7. Two classes have car washes to raise money for class trips. A portion of the earnings will pay for using the two locations for the car washes. The graph shows that the trip earnings of the two classes are proportional to the car wash earnings.



a. Express the trip earnings rate for each class as a percent.

b. What trip earnings does Class A receive for earning $75 from the car wash?

c. How much less does Class B receive than Class A for earning $75 from the car wash?

11

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.

	Game 1	Game 2
Points	12	18
Shots	14	w

9.

	May	June
Winners	n	34
Entries	85	170

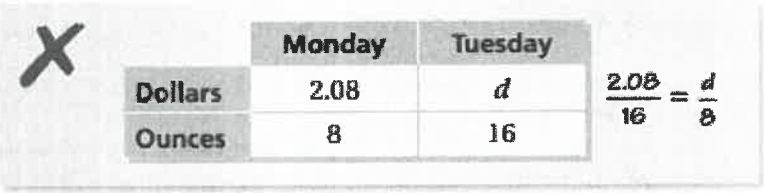
10.

	Today	Yesterday
Miles	15	m
Hours	2.5	4

11.

	Race 1	Race 2
Meters	100	200
Seconds	x	22.4

12. **ERROR ANALYSIS** Describe and correct the error in writing the proportion.



	Monday	Tuesday
Dollars	2.08	d
Ounces	8	16

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

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.

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5.3 Practice A

Write a proportion to find how many points a student needs to earn on the test to get the given score.

1. test worth 70 points; test score of 90%
2. test worth 30 points; test score of 72%

Write a proportion to find how many free throws a player needs to get the given score.

3. 15 free-throw attempts; free-throw score of 60%
4. 24 free throw attempts; free-throw score of 75%

Use the table to write a proportion.

5.

	August	September
Hurricanes	2	1
Storms	6	n

6.

	Day 1	Day 2
Wins	w	8
Races	21	12

7. The county requires 2 teachers for every 45 students. Write a proportion that gives the number t of teachers needed for 315 students.

Solve the proportion.

8. $\frac{2}{3} = \frac{a}{15}$
9. $\frac{4}{7} = \frac{44}{m}$
10. $\frac{d}{6} = \frac{72}{48}$

11. A paint color requires the ratio of green paint to yellow paint to be 4 : 9.
    a. A container of this paint has 36 pints of yellow paint. Write a proportion that gives the number g of pints of green paint in the container.
    b. How many pints of green paint are in the container?
    c. How many *gallons* of paint are in the container altogether?
12. An orchestra has 10 cellists.
    a. There are 3 violin players for every cellist in the orchestra. How many violin players are there?
    b. There are 6 viola players for every 5 cellists in the orchestra. How many viola players are there?
    c. What is the ratio of viola players to violin players? Give your answer in simplest form.
13. Give two possible pairs of values for p and q: $\frac{2}{5} = \frac{p}{q}$.

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

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5.4 Practice A

Use multiplication to solve the proportion.

1. $\frac{7}{4} = \frac{y}{28}$

2. $\frac{d}{48} = \frac{3}{4}$

3. $\frac{j}{8} = \frac{35}{56}$

Use the Cross Products Property to solve the proportion.

4. $\frac{14}{21} = \frac{b}{9}$

5. $\frac{10}{p} = \frac{6}{9}$

6. $\frac{55}{4} = \frac{h}{6}$

7. Eighteen oranges are packaged in 3 containers. How many oranges are packaged in 7 containers?

8. It costs $270 for 3 people to go on a fishing trip. How much does it cost for 10 people to go on the fishing trip?

Solve the proportion.

9. $\frac{3x}{10} = \frac{9}{4}$

10. $\frac{5x}{3} = \frac{80}{12}$

11. $\frac{7}{2} = \frac{x+1}{6}$

12. Tell whether the statement is *true* or *false*. Explain.

If $\frac{p}{q} = \frac{3}{5}$, then $\frac{5}{p} = \frac{3}{q}$.

13. The dimensions of a miniature model are proportional to the dimensions of the actual building.

    a. A wall that is 12 feet high on the building is 36 centimeters high on the model. Find the height on the model of a door that is 9 feet high on the building.

    b. Use a different method than the one you used in part (a) to find the number of centimeters on the model for a window that is 3 feet wide.

14. The ratio of men to women at a lecture is 2 to 5. A total of 63 people are at the lecture. How many are men? Explain how you found your answer.

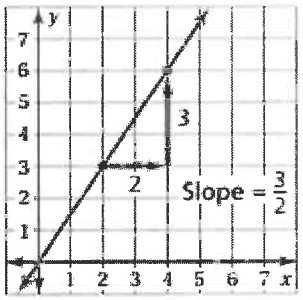
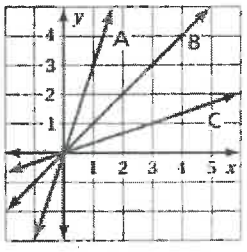
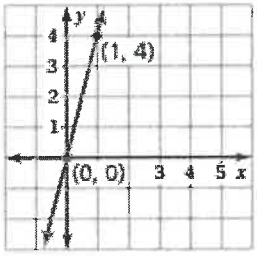
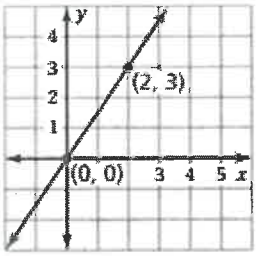
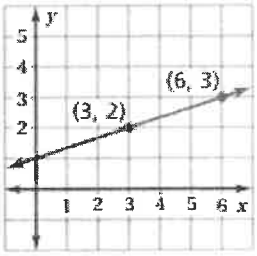
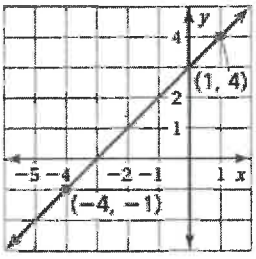
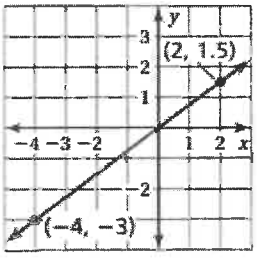
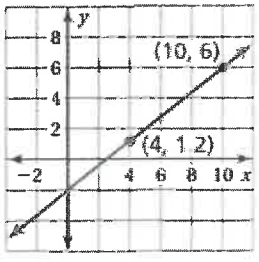
15. The distance traveled (in feet) is proportional to the number of seconds. Find the values of x, y, and z.

Feet	3	x	15	z
Seconds	5	65	y	3.5

16. You train for a race by running at a speed of 6 miles per hour.

    a. At this speed, how many *minutes* does it take you to run 3.2 miles?

    b. On race day, you run 3.2 miles in 30 minutes. What is your speed in miles per hour?

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. 

20

Homework 5.5 Practice A #5-6

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

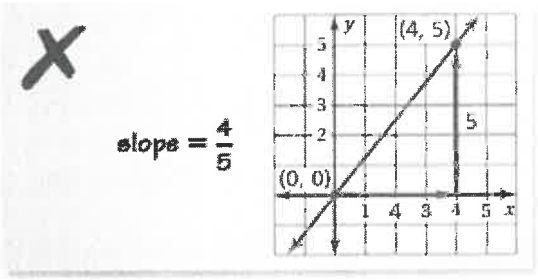
10.

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

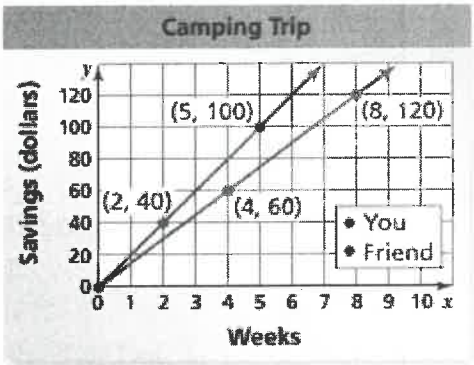
16. CAMPING The graph shows the amount of money you and a friend are saving for a camping trip.

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?

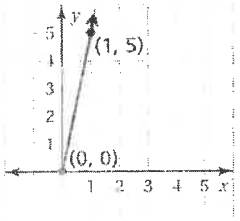
d. The camping trip costs $165. How long will it take you to save enough money?

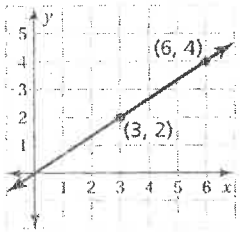


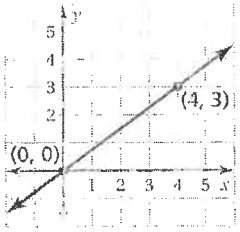
Name _____ Date _____

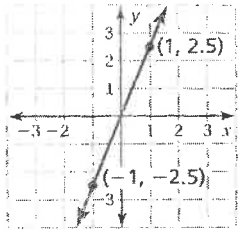
5.5 Practice A

Find the slope of the line.

1. 

2. 

3. 

4. 

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

5.

Days, x	2	4	6	8
Pages, y	80	160	240	320

6.

Seconds, x	10	20	30	40
Feet, y	22	44	66	88

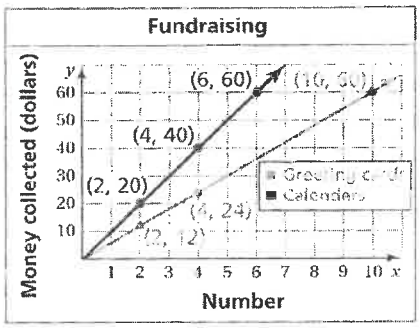
Graph the line that passes through the two points. Then find the slope of the line.

7. $(0, 0), (4, 3)$

8. $(-1, -2), (2, 4)$

9. $(-4, -1), (8, 2)$

10. The graph shows the amounts that you are collecting for selling calendars and boxes of greeting cards to raise money for the school band.

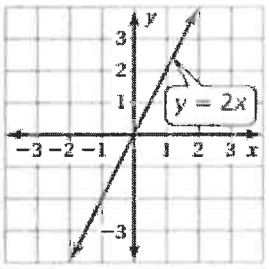
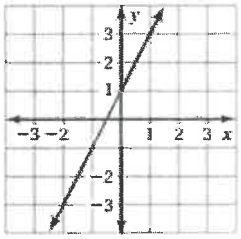


   a. Compare the steepness of the lines. What does this mean in the context of the problem?

   b. Find the slope of each line. What does each slope mean in the context of the problem?

   c. How much more does it cost to buy 3 calendars than 4 boxes of greeting cards?

   d. Find two different ways that you could collect exactly $36.

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

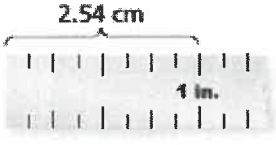
Homework 5.6 Practice A #5-7

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.

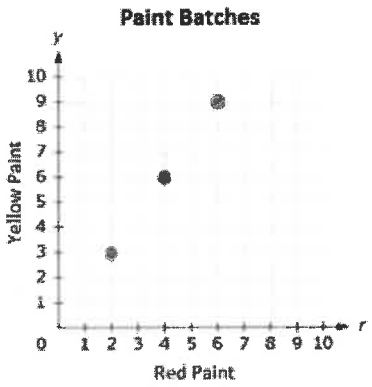
20. $y = 72; x = 3$ **21.** $y = 20; x = 12$ **22.** $y = 45; x = 40$



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

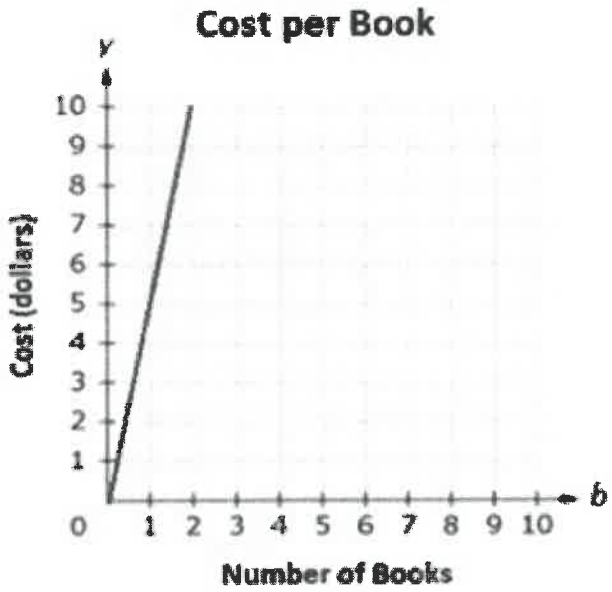
25

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.

20

Name _____ Date _____

5.6 Practice A

Graph the ordered pairs in a coordinate plane. Do you think that graph shows that the quantities vary directly? Explain your reasoning.

1. $(-2, -2), (0, 0), (2, 2), (4, 4)$

2. $(-1, -4), (0, -1), (1, 2), (2, 5)$

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

3.

	0	1	2
	0	2	4

4.

x	2	4	6	8
y	1	2	3	4

5. $y - 2 = 3x - 2$

6. $y + 3 = x$

7. $xy = 5$

8. The table shows the grams of fiber y for the grams of protein x. Graph the data. Tell whether x and y show direct variation. If so, write an equation that represents the line.

Grams of protein, x	3	6	9	12
Grams of fiber, y	2	4	6	8

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

9. $y = 6; x = 2$

10. $y = 15; x = 3$

11. $y = 40; x = 10$

12. To prepare an aquarium for use, you can clean it with a saltwater solution. The amount of salt varies directly with the volume of the water. The solution has 2 teaspoons of aquarium salt for every gallon of water.

    a. How many teaspoons of aquarium salt are needed for 5 gallons of water?

    b. Write an equation that relates x gallons of water to y teaspoons of salt.

    c. Use the equation to find the number of gallons of water to use for 12 teaspoons of salt.

13. The total cost of football tickets varies directly with the number of tickets purchased. Four tickets cost $32. How many tickets can you buy for $56?

14. One quart is equivalent to 0.95 liter

    a. Write a direct variation equation that relates x quarts to y liters.

    b. Write a direct variation equation that relates x gallons to y liters.

    c. Write a direct variation equation that relates x liters to y quarts.

    d. What is the relationship between the values of k in the direct variation equations in parts (a) and (c)?

Name _____ Date _____

Chapter 5

Take Home Quiz #1

For use after Section 5.3

Write the ratio as a fraction in simplest form.

1. 24 messages : 10 messages
2. 5 meters to 20 meters

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

3. miles per gallon

Gallons	0	2	4	6
Miles	0	31	62	93

4. cost per box

Boxes	3	6	9
Cost	$3.60	$7.20	$10.80

Tell whether the ratios form a proportion.

5. $\frac{4}{7}, \frac{24}{35}$
6. $\frac{11}{12}, \frac{33}{36}$

Tell whether the two rates form a proportion.

7. 25 cars in 5 days; 60 cars in 12 days
8. 14 books in 2 boxes; 20 books in 3 boxes

Use the table to write a proportion.

9.

	Cashews	Peanuts
Dollars	12	16
Pounds	3	p

10.

	Monday	Tuesday
Emails	e	30
Hours	8	10

Solve the proportion.

11. $\frac{x}{10} = \frac{4}{5}$
12. $\frac{8}{9} = \frac{p}{81}$
13. The number of pictures your printer can print are shown in the table. Find the rate in pictures per minute.

Minutes	2	4	6	8
Pictures	16	32	48	64

14. On Monday, you swim 12 laps in 30 minutes. On Tuesday, you swim 15 laps in 45 minutes. Are these rates proportional? Explain.
15. A chemical compound requires 8 ounces of Chemical A and 12 ounces of Chemical B. A mixture contains 24 ounces of Chemical A and 30 ounces of Chemical B. How can you fix the mixture to make the chemical compound?
16. In an animal shelter, the ratio of dogs to cats is 5 to 3. There are 25 dogs. Write and solve a proportion to find the number c of cats.

Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

29

Name _____ Date _____

Chapter 5 Take Home Quiz #2

For use after Section 5.6

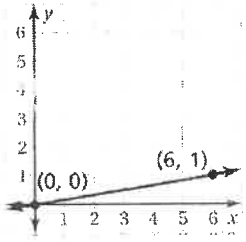
Solve the proportion.

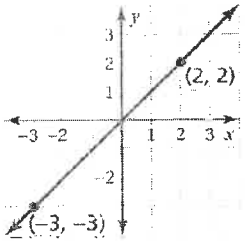
1. $\frac{7}{3} = \frac{b}{18}$

2. $\frac{10}{9} = \frac{5}{k}$

3. $\frac{3.6}{m} = \frac{1.2}{3.6}$

Find the slope of the line.

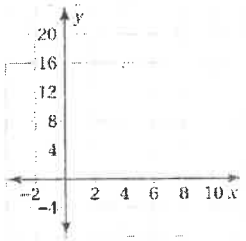
4. 

5. 

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

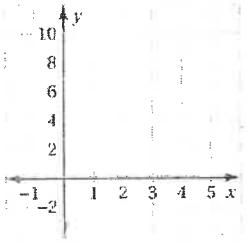
6.

Day, x	0	2	4	6
Inches, y	0	8	16	24



7.

Pounds, x	3	4	5	6
Cost, y	6	8	10	12



Tell whether x and y show direct variation. Explain your reasoning.

8. $xy = 5$

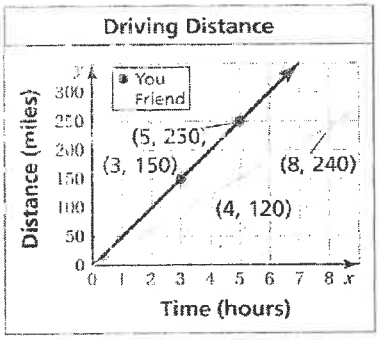
9. $2x = 3y$

10. There are 25 students in a classroom. The ratio of girls to boys is 3 to 2. How many boys and how many girls are there in the classroom?

11. The graph shows the distance you and your friend drive on a trip.

    a. Find and interpret the slope of each line.

    b. How much faster are you traveling than your friend?



Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. See left.
7. See left.
8. _____
9. _____
10. _____
11. a. _____

    b. _____

30

Name _____ Date _____

Chapter 5 Ms. Abadie's Test Review

Write the ratio as a fraction in simplest form.

1. 48 worksheets : 12 students

2. 35 frogs to 21 lizards

Find the unit rate.

3. 240 kilometers in 2.5 hours

4. $15 for 4 quarts

Tell whether the ratios form a proportion.

5. $\frac{56}{20}, \frac{24}{10}$

6. $\frac{5}{8}, \frac{42.5}{68}$

Tell whether *x* and *y* are proportional.

7.

x	5	10	15	20
y	1	3	5	7

8.

x	2	3	4	5
y	5	7.5	10	12.5

9. The table shows the different rates to ship books through the mail. Are the rates proportional? Explain.

Pounds	Cost
4	$3.55
6	$4.33
8	$5.11

Use the table to write a proportion.

10.

	512 MB MP3 Player	2 GB MP3 Player
Hours	17	68
Songs	*s*	1000

11.

	Tank A	Tank B
Fish	6	*f*
Gallons	10	55

12. You can buy 5 pounds of grapes for $9.95. Write a proportion that gives the cost *c* if you buy 4 pounds of grapes.

Solve the proportion.

13. $\frac{w}{84} = \frac{5}{7}$

14. $\frac{2.3}{1.8} = \frac{a}{18}$

15. $\frac{8}{25} = \frac{3}{d}$

16. $\frac{t}{6.5} = \frac{1.2}{1.3}$

17. $\frac{3x}{7} = \frac{8}{21}$

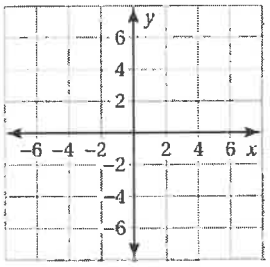
18. $\frac{16}{10} = \frac{n+2}{5}$

Name _____ Date _____

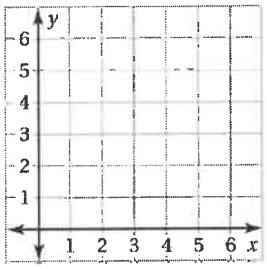
Chapter 5

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

19. $(-4, -3), (4, 3)$



20. $(2, 1), (6, 3)$



Tell whether *x* and *y* show direct variation. Explain your reasoning.

21. $5x - 3y = 0$

22. $x = \frac{y - 2}{9}$

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

23. $y = 4; x = 6$

24. $y = 2; x = 10$

25. As part of a pancake recipe, you mix $\frac{3}{4}$ cup of milk for every 1 cup of flour to make 7 cups of batter. How much of each ingredient do you use?

26. You earn \$102 for doing 12 hours of yard work. Your friend earns \$120 working at a store for 15 hours.

a. Who has a greater hourly rate of pay?

b. What would you earn if you did 15 hours of yard work and were paid at your same hourly rate?

27. A line has a slope of 5. It passes through the points $(1, 4)$ and $(6, y)$. What is the value of y? Explain how you found your answer.

32