7th GRADE MATHEMATICS

UNIT 3

Ratios and Proportional Relationships

Worth County Middle School
2016 – 2017

Unit 3: Ratios and Proportional Relationships

Unit Essential Question: How do I analyze proportional relationships and use them represent and solve real-world and mathematical problems?

Topic	Unit Rates	Representing Proportional Relationships & Testing Equivalent Ratios	Constant of Proportionality & Multistep Ratio and % problems.	Scale Drawings
Essential Questions	What information do I get when I compare two numbers using a ratio? What kinds of problems can I solve by using ratios? How is the unit rate represented in tables, graphs, equations and diagrams? How is unit rate computed in real-world problems?	How are ratios and their relationships used to solve real world problems? What conditions help to recognize and represent proportional relationships between quantities?	How are proportional relationships used to solve multistep ratio and percent problems? How do equations represent proportional relationships?	What are the steps for solving problems involving scale drawings of geometric figures? What are the steps for computing actual lengths and areas from a scale drawing? How does one reproduce a scale drawing at a different scale?
Vocabulary	Unit rate Fraction Ratio Rate of change	Proportion Equivalent fractions	Constant of proportionality Percent rate of change	Scale drawings Similar figures Corresponding sides Corresponding angles
Standards	MGSE7.RP.1	MGSE7.RP.2a	MGSE7.RP.2b, c, d MGSE7.RP.3	MGSE7.G.1

Unit 3: Ratio and Proportional Relationships

Analyze proportional relationships and use them to solve real-world and mathematical problems.

MGSE7.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 1/2mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.

MGSE7.RP.2 Recognize and represent proportional relationships between quantities.

MGSE7.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.

MGSE7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

MGSE7.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 $t = pn$.

MGSE7.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.

MGSE7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, and fees.

MGSE7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

LESSON 1: Unit Rates

Rates and Unit Rates:

$\frac{60 \text{ miles}}{3 \text{ hours}} \mid \frac{20 \text{ miles}}{1 \text{ hour}} = 20 \text{ miles/hour}$

$\frac{40 \text{ words}}{2 \text{ min.}} \mid \frac{20 \text{ words}}{1 \text{ min.}} = 20$

Unit price for ribbon ($3.20 per foot)	$\frac{\$3.20}{1 \text{ ft}}$	Length
Unit price for carpet ($32 per square yard)	$\frac{\$32}{1 \text{ yd}^2}$	Area
Unit price for gas ($3.20 per gallon)	$\frac{\$3.20}{1 \text{ gal}}$	Volume
Unit price for peanuts ($3.20 per pound)	$\frac{\$3.20}{1 \text{ lb}}$	Weight
Unit price for eggs ($3.20 per dozen)	$\frac{\$3.20}{1 \text{ doz}}$	Quantity
Unit price for car rental ($32 per day)	$\frac{\$32}{1 \text{ day}}$	Time

Unit Rate

Unit Rate is a comparison of a number to one in different units. It is written as a fraction.
You **divide to simplify** and **always include units** in your answer.

1) 120 students in 4 classrooms

$\frac{120 \text{ students}}{4 \text{ classrooms}} \quad \boxed{\begin{matrix} \div 4 \\ \div 4 \end{matrix}} \quad = \frac{30 \text{ students}}{1 \text{ classroom}}$

2) 29 grams per cubic centimeter

$\frac{29 \text{ grams}}{1 \text{cm}^3}$ **Unit Rate** is a rate that is reduced to **1 unit**

Name _____ Date _____ Class _____

LESSON 7-1

Rates and Proportions

Practice A: Rates

1. To make 2 batches of brownies, Ed needs. 4 eggs. How many eggs are needed per batch of brownies?

   $\frac{4 \text{ eggs}}{2 \text{ batches}} = \frac{\text{eggs}}{1 \text{ batch}}$

   _____

2. Jenny drives 265 miles in 5 hours. What is her average rate of speed in miles per hour?

   $\frac{265 \text{ miles}}{5 \text{ hours}} = \frac{\text{miles}}{1 \text{ hour}}$

   _____

3. A job pays $56 for 8 hours of work. How much money does the job pay per hour?

   _____

4. Ned scores 84 points in 6 games. How many points per game does Ned score?

   _____

5. A 6-ounce blueberry muffin has 450 calories. How many calories are there per ounce?

   _____

6. A parking garage charges $21 for 6 hours. How much does the garage charge per hour?

   _____

7. The Rylands want to drive 360 miles in 8 hours. What is their average speed in miles per hour?

   _____

8. A plane travels 2,395 miles in 5 hours. What is the plane's average speed in miles per hour?

   _____

9. A 16-ounce bottle of fruit punch costs $2.40. A 24-ounce bottle of fruit punch costs $3.84. Which size costs less per ounce?

   $\frac{\$2.40}{16 \text{ oz}} = \frac{\$}{1 \text{ oz}}$ $\frac{\$3.84}{24 \text{ oz}} = \frac{\$}{1 \text{ oz}}$

   _____

Name _____ Date _____ Class _____

LESSON 7-1

Rates and Proportions

Practice B: Rates

1. A part-time job pays $237.50 for 25 hours of work. How much money does the job pay per hour? _____

2. A class trip consists of 84 students and 6 teachers. How many students per teacher are there? _____

3. A factory builds 960 cars in 5 days. What is the average number of cars the factory produces per day? _____

4. The Wireless Cafe charges $5.40 for 45 minutes of Internet access. How much money does The Wireless Cafe charge per minute? _____

5. A bowler scores 3,152 points in 16 games. What is his average score in points per game? _____

6. Melissa drives 238 miles in 5 hours. What is her average rate of speed? _____

7. An ocean liner travels 1,233 miles in 36 hours. What is the ocean liner's average rate of speed? _____

8. A plane is scheduled to complete a 1,792-mile flight in 3.5 hours. In order to complete the trip on time, what should be the plane's average rate of speed? _____

9. The Nuthouse sells macadamia nuts in three sizes. The 12 oz jar sells for $8.65, the 16 oz jar sells for $10.99, and the 24 oz gift tin costs $16.99. Which size costs less per ounce? _____

Name _____ Date _____ Class _____

LESSON 7-2

Rates and Proportions

Practice A: Identifying and Writing Proportions

Write the ratios in simplest form. Determine if the ratios are proportional by comparing them.

1. $\frac{1}{4}, \frac{3}{12}$ _____

2. $\frac{2}{3}, \frac{6}{9}$ _____

3. $\frac{4}{5}, \frac{15}{20}$ _____

4. $\frac{3}{6}, \frac{6}{12}$ _____

5. $\frac{5}{6}, \frac{16}{18}$ _____

6. $\frac{2}{5}, \frac{6}{15}$ _____

7. $\frac{1}{3}, \frac{3}{9}$ _____

8. $\frac{4}{6}, \frac{7}{12}$ _____

9. $\frac{3}{4}, \frac{18}{24}$ _____

10. $\frac{2}{3}, \frac{9}{15}$ _____

11. $\frac{2}{4}, \frac{9}{20}$ _____

12. $\frac{3}{5}, \frac{15}{25}$ _____

Find an equivalent ratio. Then write the proportion.

13. $\frac{1}{2}$ _____

14. $\frac{3}{4}$ _____

15. $\frac{5}{8}$ _____

16. $\frac{4}{6}$ _____

17. $\frac{1}{7}$ _____

18. $\frac{10}{25}$ _____

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Name _____ Date _____ Class _____

LESSON 7-2

Rates and Proportions

Practice B: Identifying and Writing Proportions

Determine whether the ratios are proportional.

1. $\frac{3}{4}, \frac{24}{32}$ _____

2. $\frac{5}{6}, \frac{15}{18}$ _____

3. $\frac{10}{12}, \frac{20}{32}$ _____

4. $\frac{7}{10}, \frac{22}{30}$ _____

5. $\frac{9}{6}, \frac{21}{14}$ _____

6. $\frac{7}{9}, \frac{24}{27}$ _____

7. $\frac{4}{10}, \frac{6}{15}$ _____

8. $\frac{7}{12}, \frac{13}{20}$ _____

9. $\frac{4}{9}, \frac{6}{12}$ _____

10. $\frac{7}{8}, \frac{14}{16}$ _____

11. $\frac{9}{10}, \frac{45}{50}$ _____

12. $\frac{3}{7}, \frac{10}{21}$ _____

Find a ratio equivalent to each ratio. Then use the ratios to write a proportion.

13. $\frac{7}{9}$ _____

14. $\frac{11}{12}$ _____

15. $\frac{14}{15}$ _____

16. $\frac{35}{55}$ _____

17. $\frac{14}{10}$ _____

18. $\frac{25}{18}$ _____

Name _____ Date _____ Class _____

LESSON 7-3

Rates and Proportions

Practice A: Solving Proportions

Find the cross products.

1. $\frac{1}{2} = \frac{x}{8}$ _____

2. $\frac{a}{6} = \frac{7}{9}$ _____

3. $\frac{5}{b} = \frac{8}{10}$ _____

Use cross products to solve each proportion.

4. $\frac{2}{5} = \frac{x}{10}$ _____

5. $\frac{1}{3} = \frac{z}{15}$ _____

6. $\frac{3}{8} = \frac{s}{16}$ _____

7. $\frac{4}{r} = \frac{1}{4}$ _____

8. $\frac{10}{h} = \frac{5}{6}$ _____

9. $\frac{1}{d} = \frac{4}{12}$ _____

10. $\frac{w}{9} = \frac{6}{18}$ _____

11. $\frac{t}{8} = \frac{3}{4}$ _____

12. $\frac{k}{5} = \frac{9}{15}$ _____

13. $\frac{3}{6} = \frac{1}{f}$ _____

14. $\frac{2}{7} = \frac{6}{d}$ _____

15. $\frac{2}{9} = \frac{4}{c}$ _____

16. $\frac{a}{20} = \frac{15}{10}$ _____

17. $\frac{21}{k} = \frac{7}{4}$ _____

18. $\frac{3}{8} = \frac{n}{40}$ _____

19. Yolanda drove 50 miles in 2 hours at a constant speed. Use a proportion to find how long it would take her to drive 150 miles at the same speed.

_____

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Name _____ Date _____ Class _____

LESSON 7-3

Rates and Proportions

Practice B: Solving Proportions

Use cross products to solve each proportion.

1. $\frac{2}{5} = \frac{x}{35}$ _____

2. $\frac{7}{r} = \frac{1}{4}$ _____

3. $\frac{k}{75} = \frac{9}{15}$ _____

4. $\frac{1}{3} = \frac{z}{27}$ _____

5. $\frac{2}{11} = \frac{12}{d}$ _____

6. $\frac{24}{s} = \frac{4}{12}$ _____

7. $\frac{w}{42} = \frac{6}{7}$ _____

8. $\frac{t}{54} = \frac{2}{9}$ _____

9. $\frac{3}{8} = \frac{a}{64}$ _____

10. $\frac{17}{34} = \frac{7}{f}$ _____

11. $\frac{15}{h} = \frac{5}{6}$ _____

12. $\frac{4}{15} = \frac{36}{c}$ _____

13. $\frac{z}{25} = \frac{12}{5}$ _____

14. $\frac{36}{k} = \frac{9}{4}$ _____

15. $\frac{5}{14} = \frac{n}{42}$ _____

16. $\frac{8}{9} = \frac{40}{m}$ _____

17. $\frac{7}{c} = \frac{63}{54}$ _____

18. $\frac{24}{21} = \frac{s}{35}$ _____

19. $\frac{e}{22} = \frac{6}{15}$ _____

20. $\frac{3}{v} = \frac{12}{17}$ _____

21. $\frac{5}{14} = \frac{4}{a}$ _____

22. Eight oranges cost $1.00. How much will 5 dozen oranges cost?

_____

23. A recipe calls for 2 eggs to make 10 pancakes. How many eggs will you need to make 35 pancakes?

_____

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NAME _____

Lesson 4.1 Unit Rates with Fractions

A **rate** is a special ratio in which two terms are in different units. A **unit rate** is when one of those terms is expressed as a value of 1. Rates can be calculated with whole numbers or with fractions.

Emily ate $\frac{1}{4}$ of an ice-cream cone in $\frac{1}{2}$ of a minute. How long would it take her to eat one ice-cream cone?

1. Set up equivalent ratios using the information from the problem and 1 to represent the ice cream cone. Let t represent the time. $\frac{\frac{1}{2}}{\frac{1}{4}} = \frac{t}{1}$
2. Use cross multiplication. $\frac{1}{4} \times t = \frac{1}{2} \times 1$
3. Isolate the variable. $\frac{1}{4} \times t \div \frac{1}{4} = \frac{1}{2} \times 1 \div \frac{1}{4}$
4. Solve. $t = 2$

SHOW YOUR WORK

Find the unit rate in each problem.

1. For Bill's birthday his mom is bringing donuts to school. She has a coupon to get $2\frac{1}{2}$ dozen donuts for $8.00. How much would just one dozen donuts cost at this price?

   Let c represent the cost of the donuts.

   Equivalent ratios: _____

   One dozen donuts would cost _____.

   1.

2. Jake ate $4\frac{1}{2}$ pounds of candy in one week. If he ate the same amount of candy every day, how much candy did he eat each day?

   Let c represent the amount of candy.

   Equivalent ratios: _____

   He ate _____ pounds of candy each day.

   2.

3. A bakery used $6\frac{1}{4}$ cups of flour this morning to make 5 batches of cookies. How much flour went into each batch of cookies?

   Let f represent the amount of flour.

   Equivalent ratios: _____

   Each batch of cookies used _____ cups of flour.

   3.

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NAME _____

Lesson 4.1 Unit Rates with Fractions

Using unit rates can help you compare two items.

Mike's car can travel 425 miles on $10\frac{1}{2}$ gallons of gas. Jason's car can travel 275 miles on $5\frac{4}{5}$ gallons of gas. Which car gets better gas mileage?

Let m represent Mike's car and j represent Jason's car.

Equivalent Ratio 1: $\frac{425}{10\frac{1}{2}} = \frac{m}{1}$ $\quad m = 40\frac{10}{21}$ miles per gallon

Equivalent Ratio 2: $\frac{275}{5\frac{4}{5}} = \frac{j}{1}$ $\quad j = 47\frac{12}{29}$ miles per gallon

Jason's car gets better gas mileage because it can go farther on one gallon of gas.

SHOW YOUR WORK

Calculate unit rates to solve each problem.

1. Cara can run 3 miles in $27\frac{1}{2}$ minutes. Melanie can run 6 miles in $53\frac{1}{3}$ minutes. Who can run faster?

Let c represent Cara's speed and m represent Melanie's speed.

Equivalent Ratio 1: _____

Equivalent Ratio 2: _____

_____ can run faster.

1.

2. Bob goes to Shop and Save and buys $3\frac{1}{3}$ pounds of turkey for \$10.50. Sonia goes to Quick Stop and buys $2\frac{1}{2}$ pounds of turkey for \$6.25. Who got a better deal?

Let b represent Bob's price and s represent Sonia's price.

Equivalent Ratio 1: _____

Equivalent Ratio 2: _____

_____ got a better deal on turkey.

2.

3. Thomas went for a long hike and burned 675 calories in $2\frac{1}{2}$ hours. Marvin decided to go for a bike ride and burned 1,035 calories in $3\frac{1}{4}$ hours. Who burned the most calories per hour?

Let t represent Thomas's calories burned and m represent Marvin's calories burned.

Equivalent Ratio 1: _____

Equivalent Ratio 2: _____

_____ burned the most calories per hour.

3.

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Name: _____

Date: _____ Per: ____

Due Date: _____

ratios and proportions

Grade: _____

1. Yesterday Haley sold 14 Strawberry Kiwi, 18 Tangerine, 8 Grape and 6 Mountain Berry suckers during the football game. Explain whether the ratio of Strawberry Kiwi to Tangerine or the ratio of Grape to Mountain Berry is greater.

2. Mikayla drove 621 miles in 11.5 hours. What was her average speed in miles per hour?

3. At the grocery store, Jack notices that a 7 oz. bag of raisins is $1.10 and a 9 oz. bag of raisins is $1.46. Which size bag has the lowest price per ounce?

find an equivalent ratio to each ratio.

4. $\frac{10}{16}$

5. $\frac{21}{28}$

6. $\frac{12}{25}$

7. $\frac{40}{48}$

use cross products t solve each proportion.

8. $\frac{N}{8} = \frac{15}{4}$

9. $\frac{20}{t} = \frac{2.5}{6}$

10. $\frac{6}{11} = \frac{0.12}{z}$

11. One dog year is said to equal 7 human years. If Alexis' dog is 5.5 years old in dog years, what is her dogs age in human years?

Creating Equivalent Ratios Name:

Fill in the blank to make an equivalent ratio.

1) 72 : 64 = 9 : ___

2) 2 : 6 = 14 : ___

3) ___ : 7 = 8 : 14

4) 32 : ___ = 12 : 24

5) ___ : 12 = 7 : 14

6) 30 : 36 = 5 : ___

7) ___ : 6 = 4 : 3

8) 1 : 2 = ___ : 4

9) 4 : 2 = 20 : ___

10) 6 : ___ = 12 : 18

11) 63 : ___ = 7 : 2

12) ___ : 5 = 18 : 30

13) 18 : 27 = 16 : ___

14) 6 : ___ = 9 : 12

15) 15 : 3 = ___ : 1

16) ___ : 4 = 30 : 24

17) ___ : 14 = 1 : 2

18) 6 : ___ = 54 : 27

19) 12 : 15 = ___ : 45

20) 6 : 2 = ___ : 18

Answers

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

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1-10	95	90	85	80	75	70	65	60	55	50
11-20	45	40	35	30	25	20	15	10	5	0

Creating Equivalent Ratios

Name:

Fill in the blank to make an equivalent ratio.

1) 20 : 35 = 16 : ___

2) 81 : 54 = ___ : 6

3) 6 : 12 = ___ : 2

4) 35 : 56 = ___ : 8

5) ___ : 35 = 2 : 7

6) ___ : 6 = 28 : 24

7) 2 : 4 = ___ : 10

8) ___ : 10 = 18 : 30

9) 18 : 12 = ___ : 4

10) 10 : 20 = 2 : ___

11) 2 : 4 = ___ : 20

12) ___ : 12 = 6 : 4

13) 5 : 4 = 30 : ___

14) ___ : 4 = 3 : 1

15) 9 : 1 = 36 : ___

16) 1 : 5 = 6 : ___

17) 2 : 1 = ___ : 8

18) 7 : 14 = ___ : 10

19) 1 : ___ = 2 : 4

20) ___ : 48 = 30 : 36

Answers

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

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100	95	90	85	80	75	70	65	60	55	50
11-20	45	40	35	30	25	20	15	10	5	0

Creating Equivalent Ratios

Name:

Fill in the blank to make an equivalent ratio.

1) 1 : ___ = 2 : 8

2) 18 : ___ = 14 : 56

3) 14 : 28 = 10 : ___

4) 18 : 24 = ___ : 32

5) ___ : 6 = 4 : 1

6) 1 : 3 = 6 : ___

7) ___ : 4 = 1 : 2

8) 10 : 30 = ___ : 6

9) 45 : ___ = 9 : 4

10) 5 : ___ = 20 : 4

11) 9 : ___ = 63 : 28

12) 1 : 3 = 9 : ___

13) 8 : 16 = ___ : 6

14) 6 : 24 = ___ : 48

15) 7 : ___ = 1 : 6

16) 24 : 16 = 3 : ___

17) 14 : 21 = 18 : ___

18) ___ : 36 = 21 : 28

19) 6 : ___ = 48 : 8

20) 4 : 6 = 16 : ___

Answers

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

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1-10	95	90	85	80	75	70	65	60	55	50

Name: _____

Date: _____ Per: ____

Due Date: _____

Grade: _____

Show your work for each problem. Don't stress over a question, simply move on and come back to it.

proportions and scale factors quiz

1. Write a ratio of two servings of fruit to 4 servings of vegetables in all three ratio forms.

   _____ _____ _____

2. There are 3 students wearing red shirts, 4 students wearing yellow shirts and 10 students wearing black shirts. What would the ratio of red shirts to total shirts be? _____

3. Using the same information from problem 2, demonstrate whether the ratio of yellow shirts to total shirts or red shirts to black shirts is greater. _____

4. On a trip to David's, Blayne sees a 60 oz. bag of Starburst on sale for $8.85. She also sees a 48 oz. bag of Starburst on sale for $6.25. Which would be the better buy? _____

5. Casey rode a bus for 540 miles in 9 hours. What was his average rate of speed during his trip? _____

6. Determine whether 5/12 and 3/9 are proportional.

7. Find a ratio equivalent to 10/12.

8. Find a ratio equivalent to 3/5.

Use cross products to solve the following proportions.

9. $\frac{4}{6} = \frac{h}{3}$ 10. $\frac{2}{a} = \frac{5}{15}$ 11. $\frac{16}{11} = \frac{96}{m}$

Vocabulary:

12. _____ figures have the same shape but not necessarily the same size.

13. A _____ is a comparison of two numbers, and a _____ is a ratio that compares two quantities measured in different units.

14. The ratio used to enlarge or reduce similar figures is called _____ _____.

Explain:

15. How do you determine if two figures are similar?

_____

_____

_____

_____

_____

Name: _____ Date: _____ Period: _____

Analyzing and Applying Unit Rate

Finding and interpreting the unit rate **Sheet 1**

In each problem record both possible rates, use division to find the unit rates, than write a short sentence explaining each unit rate.

1. 6 bags of flour weigh 30 pounds.

RATE	UNIT RATE	INTERPRETATION

2. 9 tennis balls come in 3 cans.

RATE	UNIT RATE	INTERPRETATION

3. 5 gallons of gas cost $6.50.

RATE	UNIT RATE	INTERPRETATION

4. In 25 minutes Jenny can run 10 laps

RATE	UNIT RATE	INTERPRETATION

Applying the Unit Rate Approach **Sheet 2**

In each problem, record the rate appropriate for the question asked, find the corresponding unit rate, write a short sentence interpreting the unit rate, and use this rate to find the solution to the problem.

1. Anne is painting her house light blue. To make the color she wants, she must add 3 cans of white paint to every 2 cans of blue paint. How many cans of white paint will she need to mix with 6 cans of blue?

   Rate needed (white/ blue) _____

   Unit Rate _____

   Interpretation of unit rate _____

   Solution:

2. Ryan is making a fruit drink. The directions say to mix 5 cups of water with 2 scoops of powdered fruit mix. How many cups of water should he use with 9 scoops of fruit mix?

   Rate needed _____

   Unit Rate _____

   Interpretation of Unit Rate _____

   Solution:

3. Donna is running around a track. It takes her 10 minutes to run 6 laps. If she keeps running at the same speed, how long will it take her to run 5 laps?

   Rate needed _____

   Unit rate _____

   Interpretation of unit rate _____

   Solution:

4. Mark's model train can go 12 laps around its track in 4 minutes. If it runs at the same speed, how many laps can the train go in 9 minutes?

   Rate needed _____

   Unit Rate _____

   Interpretation of Unit Rate _____
   Solution:

**SE What is the Unit Rate?

Selecting the Appropriate Unit Rate

Based on your understanding of the models given from sheet 1, how would you explain or define a unit rate?

At Ralph's fruit stand 3 apples cost 90 cents. You want to buy 7 apples. How much will they cost?

1. What are the two possible rates for this problem?

2. Show each rate as a unit rate.

3. What does each unit rate tell you?

4. Which unit rate will help you solve the problem?

5. If it costs 30 cents to buy 1 apple, how much will 2 apples cost? 4 apples? Complete the table below. Then, describe the pattern you see in the chart.

APPLES	COST IN CENTS
1	30
2	
3	
4	
5	

6. Since you know the unit price, write a number sentence for the cost of seven apples. Write an equation for the cost of any number of apples.

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LESSON 2: Representing Proportional Relationships & Testing Equivalent Ratios

Proportions

What are proportions?

- If two ratios are equal, they form a proportion. Proportions can be used in geometry when working with similar figures. $\frac{1}{2} = \frac{4}{8}$ 1:3 = 3:9

What do we mean by similar?

- Similar describes things which have the same shape but are not the same size.

Equivalent Fractions

Examples

$\frac{1}{2}$ *is equivalent to* $\frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}, \frac{6}{12}, \frac{7}{14} \ldots$

$\frac{1}{3}$ *is equivalent to* $\frac{2}{6}, \frac{3}{9}, \frac{4}{12}, \frac{5}{15}, \frac{6}{18}, \frac{7}{21} \ldots$

$\frac{1}{4}$ *is equivalent to* $\frac{2}{8}, \frac{3}{12}, \frac{4}{16}, \frac{5}{20}, \frac{6}{24}, \frac{7}{28} \ldots$

$\frac{1}{5}$ *is equivalent to* $\frac{2}{10}, \frac{3}{15}, \frac{4}{20}, \frac{5}{25}, \frac{6}{30}, \frac{7}{35} \ldots$

Identifying Equivalent Fractions

Let's look at these two fractions below.

$$\frac{12}{40} = \frac{12 \div 4}{40 \div 4} = \frac{3}{10}$$

Step 1: Simplify both fractions

Divide the numerator and denominator by the common factor.

$$\frac{21}{30} = \frac{21 \div 3}{30 \div 3} = \frac{7}{10}$$

Step 2: Are the two simplified fractions the same? If no, then they are not equivalent.

Look at the numerator and denominator of both simplified fractions.

These fractions ARE NOT EQUIVALENT!!!

NAME _____

Lesson 4.2 Testing Proportional Relationships

A **ratio** is a comparison of two numbers. A **proportion** expresses the equality of two ratios.

A ratio can be expressed as 1 to 2, 1:2, or $\frac{1}{2}$, and it means that for every 1 of the first item, there are 2 of the other item.

Cross-multiply to determine if two ratios are equal.

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

Circle the ratios that are equal. Show your work.

	a	b	c
1.	$\frac{1}{3}, \frac{2}{6}$	$\frac{3}{8}, \frac{1}{4}$	$\frac{3}{5}, \frac{9}{15}$
2.	$\frac{3}{4}, \frac{9}{12}$	$\frac{1}{2}, \frac{4}{8}$	$\frac{5}{6}, \frac{15}{18}$
3.	$\frac{5}{8}, \frac{4}{7}$	$\frac{1}{2}, \frac{1}{4}$	$\frac{4}{3}, \frac{16}{12}$
4.	$\frac{6}{18}, \frac{2}{6}$	$\frac{3}{25}, \frac{6}{50}$	$\frac{1}{8}, \frac{2}{10}$
5.	$\frac{1}{4}, \frac{2}{4}$	$\frac{5}{10}, \frac{3}{6}$	$\frac{4}{24}, \frac{7}{42}$
6.	$\frac{3}{5}, \frac{5}{3}$	$\frac{7}{8}, \frac{21}{24}$	$\frac{8}{23}, \frac{9}{46}$
7.	$\frac{7}{4}, \frac{28}{16}$	$\frac{3}{9}, \frac{1}{3}$	$\frac{16}{20}, \frac{9}{10}$
8.	$\frac{8}{100}, \frac{80}{50}$	$\frac{8}{12}, \frac{10}{14}$	$\frac{15}{20}, \frac{3}{4}$
9.	$\frac{9}{2}, \frac{12}{3}$	$\frac{6}{3}, \frac{8}{4}$	$\frac{1}{3}, \frac{11}{33}$
10.	$\frac{12}{7}, \frac{36}{21}$	$\frac{10}{12}, \frac{15}{20}$	$\frac{3}{4}, \frac{9}{16}$

NAME _____

Lesson 4.2 Testing Proportional Relationships

Cross-multiply to check each proportion. Circle the ratios that are true.

	a	b	c
1.	$\frac{4}{3} = \frac{6}{4}$ _____	$\frac{1}{4} = \frac{3}{12}$ _____	$\frac{4}{5} = \frac{16}{20}$ _____
2.	$\frac{8}{12} = \frac{2}{3}$ _____	$\frac{30}{25} = \frac{6}{5}$ _____	$\frac{7}{3} = \frac{5}{2}$ _____
3.	$\frac{9}{1} = \frac{18}{3}$ _____	$\frac{15}{4} = \frac{45}{12}$ _____	$\frac{2}{5} = \frac{4}{12}$ _____
4.	$\frac{7}{4} = \frac{21}{12}$ _____	$\frac{9}{2} = \frac{18}{6}$ _____	$\frac{5}{6} = \frac{15}{18}$ _____
5.	$\frac{5}{9} = \frac{10}{19}$ _____	$\frac{4}{3} = \frac{16}{12}$ _____	$\frac{7}{4} = \frac{14}{10}$ _____
6.	$\frac{12}{8} = \frac{18}{12}$ _____	$\frac{14}{7} = \frac{6}{3}$ _____	$\frac{1}{5} = \frac{3}{16}$ _____
7.	$\frac{2}{1} = \frac{6}{2}$ _____	$\frac{8}{6} = \frac{12}{8}$ _____	$\frac{5}{4} = \frac{10}{8}$ _____
8.	$\frac{2}{5} = \frac{6}{15}$ _____	$\frac{14}{6} = \frac{21}{8}$ _____	$\frac{4}{5} = \frac{10}{16}$ _____
9.	$\frac{3}{5} = \frac{9}{20}$ _____	$\frac{1}{3} = \frac{4}{12}$ _____	$\frac{9}{6} = \frac{12}{8}$ _____
10.	$\frac{7}{5} = \frac{28}{20}$ _____	$\frac{5}{4} = \frac{25}{16}$ _____	$\frac{10}{13} = \frac{30}{26}$ _____
11.	$\frac{4}{5} = \frac{20}{22}$ _____	$\frac{1}{5} = \frac{3}{18}$ _____	$\frac{6}{7} = \frac{78}{91}$ _____
12.	$\frac{2}{9} = \frac{30}{135}$ _____	$\frac{8}{3} = \frac{96}{36}$ _____	$\frac{5}{2} = \frac{75}{20}$ _____

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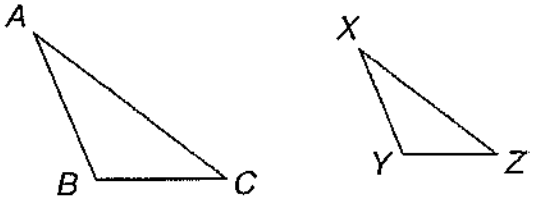
Name _____ Date _____ Class _____

LESSON 8-1

Similar Figures and Scale Drawings

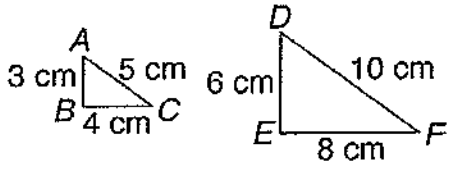
Practice A: Similar Figures and Proportions

Identify the corresponding sides.



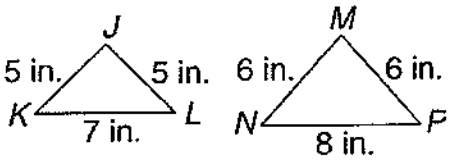
1. *AB* corresponds to _____.
2. *BC* corresponds to _____.
3. *AC* corresponds to _____.

Identify the corresponding sides. Then use ratios to determine whether the triangles are similar.

4. 

_____

_____

5. 

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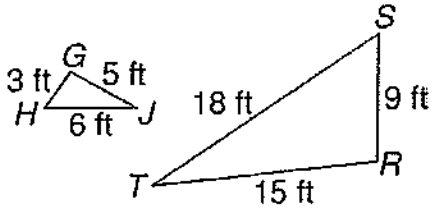
_____

6. 

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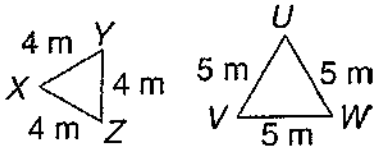
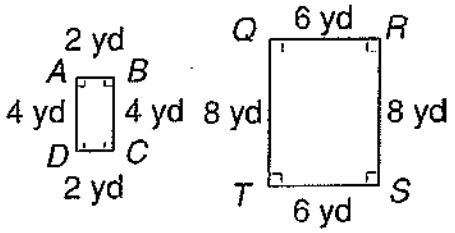
7. 

_____

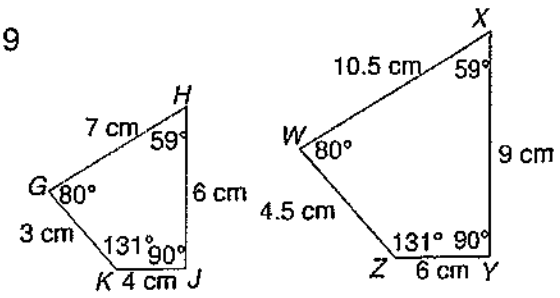
_____

Use the properties of similarity to determine whether the figures are similar.

8. 

_____

_____

9 

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_____

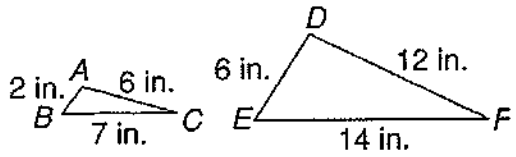
Name _____ Date _____ Class _____

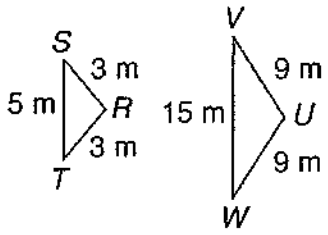
LESSON 8-1

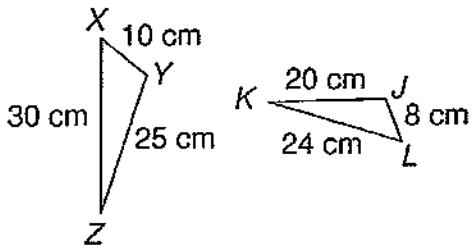
Similar Figures and Scale Drawings

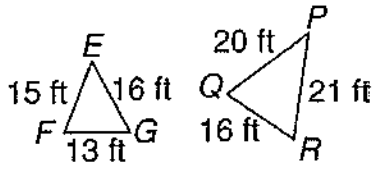
Practice B: Similar Figures and Proportions

Tell whether the triangles are similar.

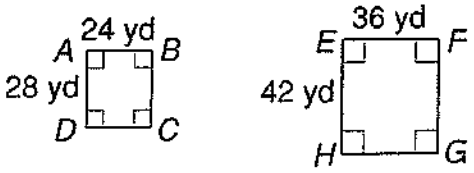
1. 

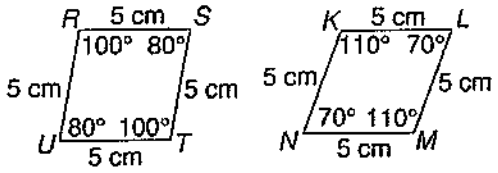
2. 

3. 

4. 

Tell whether the figures are similar.

5. 

6. 

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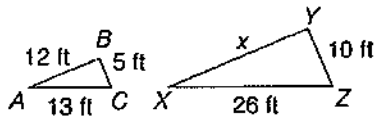
Name _____ Date _____ Class _____

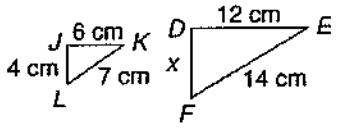
LESSON 8-2

Similar Figures and Scale Drawings

Practice A: Using Similar Figures

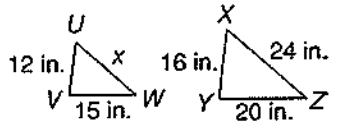
For each pair of similar figures write a proportion containing the unknown length. Then solve.

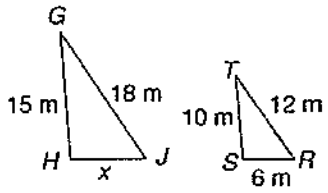
1. 

2. 

_____

_____

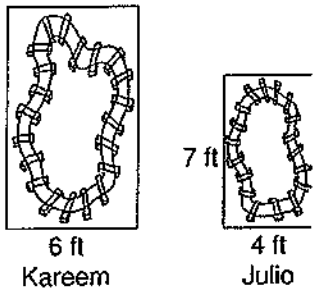
3. 

4. 

_____

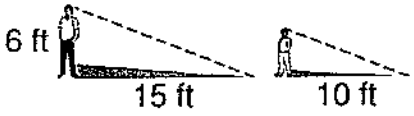
_____

5. Kareem and Julio have rectangular model train layouts that are similar to each other. Julio's layout is 4 feet by 7 feet. Kareem's layout is 6 feet wide. What is the length of Kareem's layout?



_____

6. A 6-foot-tall adult casts a shadow that is 15 feet long. Estimate the height of a child who casts a 10-foot shadow.



_____

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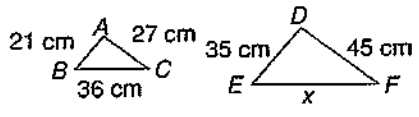
Name _____ Date _____ Class _____

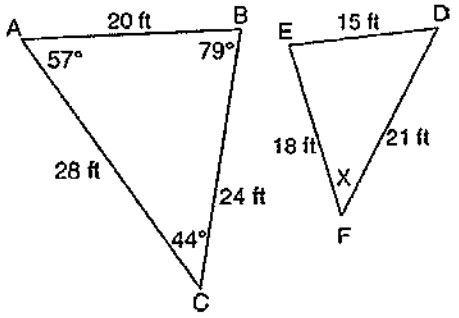
LESSON 8-2

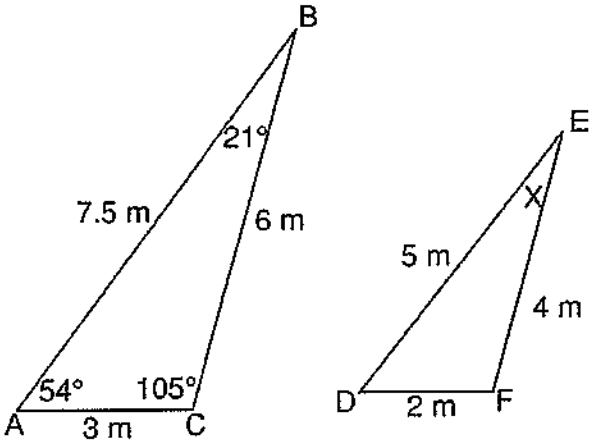
Similar Figures and Scale Drawings

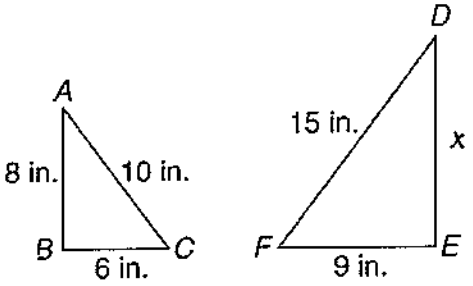
Practice B: Using Similar Figures

$\triangle ABC \sim \triangle DEF$ in each pair. Find the unknown measures.

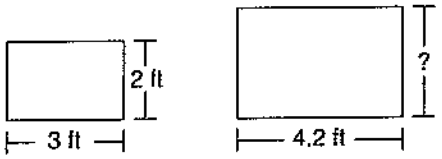
1. 

2. 

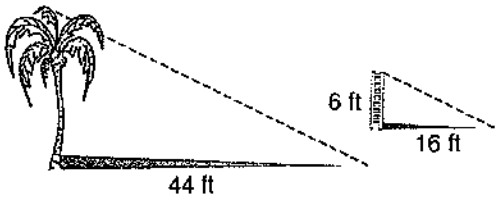
3. 

4. 

5. The two rectangular picture frames at the right are similar. What is the height of the larger picture frame?



6. A palm tree casts a shadow that is 44 feet long. A 6-foot ladder casts a shadow that is 16 feet long. Estimate the height of the palm tree.



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Name _____ Date _____ Class _____

LESSON 8-3

Similar Figures and Scale Drawings

Practice A: Scale Drawings and Scale Models

Identify the scale factor. Choose the best answer.

1. Person: 72 inches
   Action figure: 6 inches

   A $\frac{1}{7}$ C $\frac{1}{12}$

   B $\frac{1}{10}$ D $\frac{1}{15}$

2. Dog: 24 inches
   Stuffed animal: 8 inches

   F $\frac{1}{3}$ H $\frac{1}{5}$

   G $\frac{1}{4}$ J $\frac{1}{6}$

3. Fish: 16 inches
   Fishing lure: 2 inches

   A $\frac{1}{6}$ C $\frac{1}{12}$

   B $\frac{1}{8}$ D $\frac{1}{14}$

4. House: 30 feet
   Dollhouse: 3 feet

   F $\frac{1}{3}$ H $\frac{1}{27}$

   G $\frac{1}{10}$ J $\frac{1}{33}$

Identify the scale factor.

5.

	Guitar	Ukulele
Length (in.)	36	18

_____

6.

	Car	Toy Car
Length (ft)	12	3

_____

7.

	Flute	Piccolo
Length (in.)	30	10

_____

8.

	Poodle	Toy Poodle
Height (in.)	56	8

_____

9. On a road map of New York, the distance from New York City to Albany is 3 inches. The map scale is 1 in:50 mi. What is the actual distance between the cities?

_____

10. On a scale drawing, a bookshelf is 8 inches tall. The scale factor is $\frac{1}{8}$. What is the height of the bookshelf?

_____

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Name _____ Date _____ Class _____

LESSON 8-3

Similar Figures and Scale Drawings

Practice B: Scale Drawings and Scale Models

Identify the scale factor.

1.

	Alligator	Toy Alligator
Length (in.)	175	7

_____

2.

	Airplane	Model
Length (ft)	24	3

_____

3.

	Car	Toy Car
Length (ft.)	13.5	1.5

_____

4.

	Person	Action Figure
Height (in.)	66	6

_____

5.

	Boat	Model
Length (in.)	128	8

_____

6.

	Fish	Fishing Lure
Length (in.)	18	2

_____

7.

	Tiger	Stuffed Animal
Length (in.)	70	14

_____

8.

	House	Dollhouse
Height (ft)	39.2	2.8

_____

9. On a scale drawing, a school is 1.6 feet tall. The scale factor is $\frac{1}{22}$. Find the height of the school. _____

10. On a road map of Pennsylvania, the distance from Philadelphia to Washington, D.C., is 6.8 centimeters. The map scale is 2 cm:40 mi. What is the actual distance between the cities? _____

11. On a scale drawing, a bicycle is $6\frac{4}{5}$ inches tall. The scale factor is $\frac{1}{6}$. Find the height of the bicycle. _____

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Trip to the Movies
Learning Task

Name: _____ Date: _____ Period: _____

Directions: Read the passage for each part and answer the questions. Follow all instructions and show all your work. Answer in complete sentences when necessary.

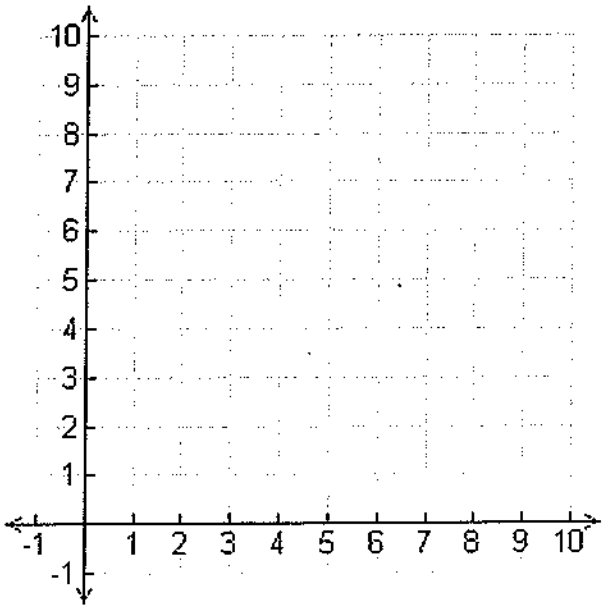
A. The Popcorn Maker: The hot air popcorn maker used at the movie theater produces 14 cups of popcorn in 2.5 minutes.

1. What is the unit rate per minute?

2. Using the unit rate you found in question 1, complete the table below:

Minutes	Amount of Popcorn (cups)
0	
1	
2	
3	
4	

3. Use the table you created in question 2 to graph a line representing the amount of popcorn produced.



4. Is there a proportional relationship between the amount of popcorn produced and the time it takes to make it? Justify your answer by writing in complete sentences.

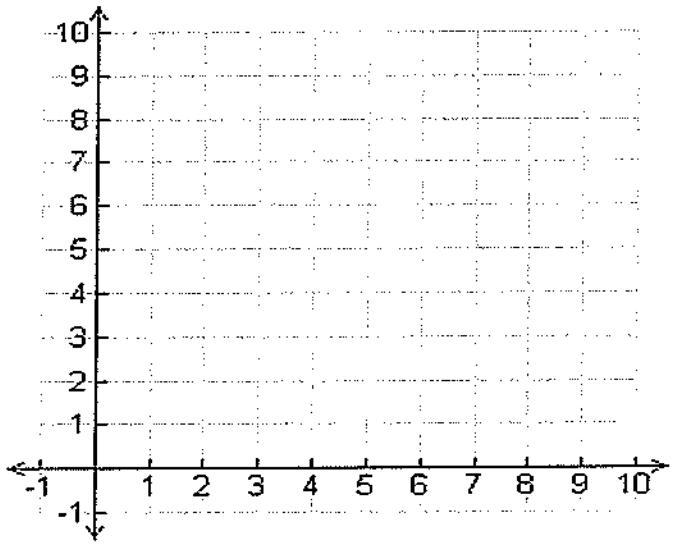
B. Combo Choices: The Carmike Cinema offers three combo choices: small, medium, and large. The small combo offers 4.5 cups of popcorn and a large drink at $6.50. The medium combo offers 5.5 cups of popcorn and a large drink at $8.00. The large combo offers 6.5 cups of popcorn and a large drink at $9.50.

1. What is the unit rate (price per cup)?

2. Complete the table with the values expressed in the problem.

Price of Combo	Cups of Popcorn
	0
	4.5
	5.5
	6.5

3. Graph the prices on the coordinate plane below.



4. Is there a proportional relationship between the size of the combo and the price? Justify your answer in complete sentences.

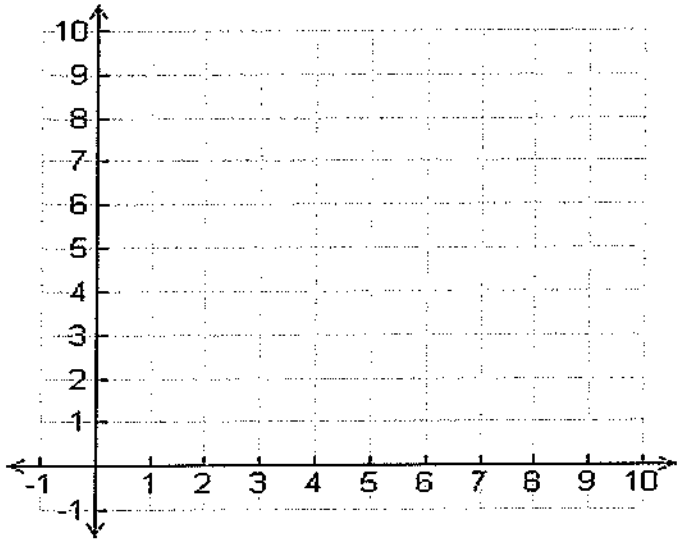
C. Movie Tickets: A group of 5 teenagers go to see *Thor* on its opening night. The total cost of their tickets is $40.

1. What is the unit rate (price per person)?

2. Complete the table using the unit rate.

Ticket Price	Number of People
	0
	1
	2
	3
	4

3. Graph the prices on the coordinate plane below.



4. Is there a proportional relationship between the number of tickets sold and the price? Justify your answer using complete sentences

Trip to the Movies Task Rubric				
	4	3	2	1
Completion	The student completed all parts of the task and justified answers using complete sentences.	The student completed most of the task and justified answers using complete sentences.	The student completed half of the task OR the student did not write in complete sentences when justifying answers.	The student completed less than half of the task OR did not justify his/her answers.
Computing Unit Rate:	The student accurately computed the unit rate in each problem.	The student usually computed the unit rate correctly.	The student computed the unit rate correctly half of the time.	The student shows signs of struggle while computing unit rates.
Proportional Ratios:	The student completed the tables in each section correctly with the found rate.	The student completed the tables in each section with few mistakes in applying the rate.	The student could sometimes apply the rate correctly to fill in the tables in each section.	The student shows signs of struggle in applying a rate to fill in a table and finding proportional ratios.
Graphs	The student correctly graphed the information in the tables.	The student usually graphed information from the tables correctly.	The student sometimes graphed information from the tables correctly.	The student shows signs of struggle when asked to graph information.
Recognizing Proportional Relationships	The student can identify proportional relationships and justify why a relationship is or is not proportional.	The student can identify proportional relationships and can usually justify why a relationship is or is not proportional.	The student can identify proportional relationships, but has difficulty explaining why a relationship is or is not proportional.	The student shows signs of struggle in identifying and explaining proportional relationships.

Name _____ Date _____

Recognizing Proportional Relationships - Independent Practice Worksheet

Solve all the problems.

1) Drew is an artist. He paints portraits. The table below shows the number of portraits painted in hours. Do the numbers in the table represent a proportional relationship?

Number of portraits	Time (In Hours)
1	5
2	10
3	15
4	20

2) This table shows the amount earned by Harry for selling cups of ice cream. Do the numbers in the table represent a proportional relationship?

Cups sold (km)	Earnings ($)
3	12
5	20
7	28
9	36

3) Fred wrote notes during an examination. The table below shows number of pages written in relation to the time it took to make the notes (in hours). Does the table represent a proportional relationship?

Notes (pages)	Time (In Hours)
8	16
9	18
10	20
11	23

Name _____ Date _____

4) Alice went to market and bought comics. The table below shows the price for different numbers of comics. Do the numbers in the table represent a proportional relationship?

Number of Comics	Price (Dollars)
2	6
4	12
6	16
8	24

5) A ferry has to transport bikes on an island. The table below shows the number of bikes transported and the number of trips made by ferry. Do the numbers in the table represent a proportional relationship?

Number of bikes	Number of trips
10	5
12	6
14	7
16	8

6) The table below gives the distance covered by a train over time. Do the numbers in the table represent a proportional relationship?

Distance (km)	Time (In Hours)
50	10
60	12
70	14
80	16

7) Daisy made an envelope from sheets of paper. The table below shows the number of envelopes made by the number of sheets. Do the numbers in the table represent a proportional relationship?

Number of envelopes	Number of sheets
1	2
2	4
3	6
4	12

Name _____ Date _____

8) Joe made a fruit pie. The table below displays the number of fruits he used to make the pies. State "Yes", if the table represents a proportional relationship?

Number of pie	Number of fruit
2	10
3	15
4	24
5	25

9) Betty makes omelettes. The table below shows number of omelettes made and the number of eggs used. Does table represent a proportional relationship?

Number omelette	Number of eggs
5	10
6	12
7	14
8	24

10) Kelly goes on a morning walk. The table below shows the number of meters ran by Kelly over time. Do the numbers in the table represent a proportional relationship?

Distance (m)	Time (In minutes)
3	12
4	16
5	20
6	24

LESSON 3: Constant of Proportionality & Multistep Ratio and % problems.

Time t in hours	*Speed* $r = \frac{240}{t}$
2	120
3	80
4	60
5	48

$$k = constant\ of\ proportionality$$

$$k = \frac{\text{Distance}}{\text{time}}$$

$$k = \frac{90 \text{ miles}}{2 \text{ hours}}$$

$$k = 45 \text{ miles per hour}$$

How much money did Denzel put into her savings account?

Formula for simple interest: $I = prt$

$I = \$243$
$p = ?$
$r = 9\% = 0.09$
$t = 18 \text{ mo}$
$= 1.5 \text{ yrs}$

$243 = p(0.09)(1.5)$
$243 = p(0.135)$
$\$1800 = p$

EXAMPLE 5 Solve a multi-step problem

b. To simplify a ratio with unlike units, multiply by a conversion factor.

$$\frac{560 \text{ ft}}{10 \text{ in.}} = \frac{560 \text{ ft}}{10 \text{ in.}} \cdot \frac{12 \text{ in.}}{1 \text{ ft}} = 672$$

ANSWER

The actual building is 672 times as tall as the model.

KEY CONCEPT — For Your Notebook

Percent of Change

The percent of change is the ratio of the amount of increase or decrease to the original amount.

$$\text{Percent of change, } p\% = \frac{\text{Amount of increase or decrease}}{\text{Original amount}}$$

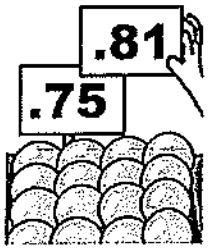
The amount of increase is the new amount minus the original amount. The amount of decrease is the original amount minus the new amount.

CONCEPT SUMMARY — For Your Notebook

Types of Percent Problems

Percent problem	Example	Equation
Find a percent.	What percent of 136 is 51?	$51 = p\% \cdot 136$
Find part of a base.	What number is 15% of 88?	$a = 15\% \cdot 88$
Find a base.	20 is 12.5% of what number?	$20 = 12.5\% \cdot b$

At a supermarket, a certain item has increased from 75 cents per pound to 81 cents per pound. What is the percent increase in the cost of the item?



$$\text{Percent Change} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100$$

$$\text{Percent Change} = \frac{81 - 75}{75} \times 100 = \frac{6}{75} \times 100 = 0.08 \times 100 = 8\%$$

There was an 8% increase in the cost of the item.

Name _____ Date _____ Class _____

LESSON 9-1

Proportional Relationships and Percents

Practice A: Direct Variation

Tell whether each equation represents a direct variation. If so, identify the constant of variation.

1. $y = 4x$ _____

2. $y = \frac{2}{3}x$ _____

3. $y = 6.3x$ _____

4. $y = 2x + 2$ _____

5. $y = x - 4$ _____

6. $3y = 6x$ _____

Tell whether each set of data represents a direct variation. If so, identify the constant of variation and write the equation.

7.

x	1	2	3
y	3	6	9

_____

8.

Volume (oz)	1	2	3
Price ($)	0.25	0.50	0.75

_____

9.

x	–1	–2	–3
y	1	2	3

_____

10.

x	–2	8	14
y	3	6	9

_____

11.

Boxes of crayons	3	5	8
Number of cartons	1	4	5

_____

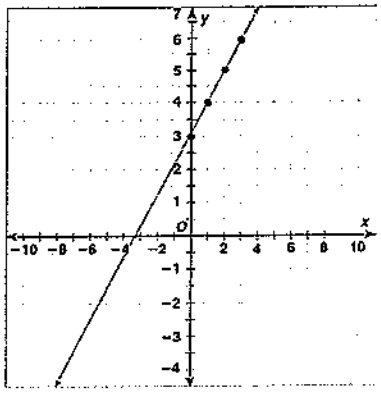
12.

Time (h)	2	4	6
Pay ($)	15	30	45

_____

Tell whether each graph represents a direct variation. If so, identify the constant of variation and write the equation.

13.



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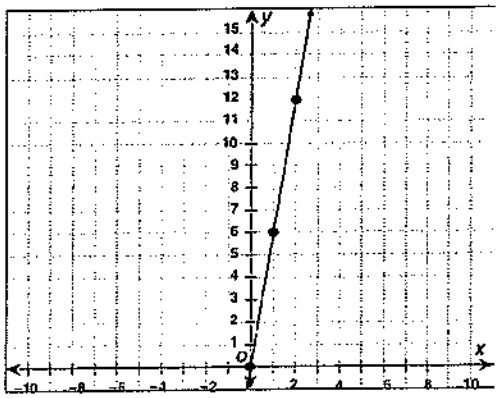
14.



_____

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Name _____ Date _____ Class _____

LESSON 9-1

Proportional Relationships and Percents

Practice B: Direct Variation

Tell whether each equation represents a direct variation. If so, identify the constant of variation.

1. $y = 7x$ _____

2. $y = 0.04x$ _____

3. $3y = 2x + 5$ _____

4. $y = 13x + 0$ _____

5. $4y = 2x$ _____

6. $8y = 4x - 12$ _____

Tell whether each set of data represents a direct variation. If so, identify the constant of variation and then write the direct variation equation.

7.

x	10	20	30
y	2	4	6

_____

8.

x	2	4	6
y	5	10	15

_____

9.

Times at Bat	3	6	12
Hits	1	2	4

_____

10.

x	–2	8	14
y	3	6	9

_____

11.

School days	18	36	54
Days Roy was out sick	2.5	6	7

_____

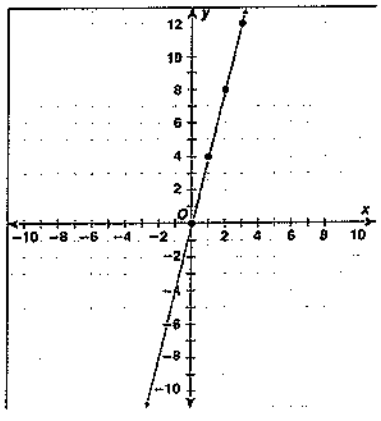
12.

Time (Days)	1	1.3	1.6
Distance (k)	640	870	1,095

_____

Tell whether each graph represents a direct variation. If so, identify the constant of variation and then write the direct variation equation.

13.



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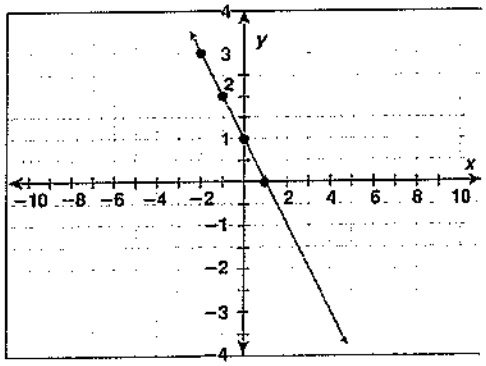
14.



_____

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Name _____ Date _____ Class _____

LESSON 9-2

Proportional Relationships and Percents

Practice A: Percent of Change

Complete the table.

	Problem	Amount of Change	Original Amount	% of Change
1.	25 is decreased to 17			
2.	24 is increased to 36			
3.	50 is decreased to 40			
4.	40 is increased to 56			

Find each percent of change. Round answers to the nearest tenth, if necessary.

5. 60 is decreased to 15 _____

6. 15 is increased to 21 _____

7. 12 is increased to 48 _____

8. 100 is decreased to 25 _____

9. 60 is decreased to 40 _____

10. 80 is increased to 152 _____

11. 15 is increased to 24 _____

12. 72 is decreased to 64 _____

13. The Big Bike Shop has in-line skates on sale for 15% off the regular price. A pair of in-line skates usually costs $89. Find the amount of the discount and the sale price.

_____

14. In 1935, there were 15,295 banks in the United States. In 2003, there were 9,182 banks. What is the percent of change? Is it a percent increase or decrease?

_____

15. A jewelry store is having a going-out-of-business sale. All merchandise is marked 40% off the regular price. The regular price of a watch is $59.95. Find the amount of the discount and the sale price.

_____

16. Last year, there were 381 students at Woodland Middle School. This year, there are 419 students. What is the percent of change? Is it a percent increase or decrease?

_____

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Name _____ Date _____ Class _____

LESSON 9-2

Proportional Relationships and Percents

Practice B: Percent of Change

Find each percent of change. Round answers to the nearest tenth, if necessary.

1. 20 is decreased to 11 _____
2. 24 is increased to 30 _____
3. 56 is decreased to 14 _____
4. 25 is increased to 100 _____
5. 18 is increased to 45 _____
6. 90 is decreased to 75 _____
7. 126 is decreased to 48 _____
8. 65 is increased to 144 _____
9. 42 is increased to 72 _____
10. 84 is decreased to 8 _____
11. 95 is increased to 145 _____
12. 248 is decreased to 200 _____
13. 105 is decreased to 32 _____
14. 75 is increased to 350 _____
15. 93 is decreased to 90 _____
16. 16 is decreased to 2 _____

17. A backpack that normally sells for $39 is on sale for 33% off. Find the amount of the discount and the sale price.

_____

18. A sporting goods store is having a closeout on a certain style of running shoes. They are marked 55% off the regular price. The regular price is $79.95. Find the amount of the discount and the sale price.

_____

19. A gallery owner purchased a very old painting for $3,000. The painting sells at a 325% increase in price. What is the retail price of the painting?

_____

20. In August, the Simons' water bill was $48. In September, it was 15% lower. What was the Simons' water bill in September?

_____

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Name _____ Date _____ Class _____

LESSON 9-3

Proportional Relationships and Percents

Practice A: Applications of Percents

Let c = the commission amount and write an equation to find the commission for the following. Do not solve.

1. 10% commission on $4000

2. 6% commission on $8450

3. 8% commission on $3575

4. 12% commission on $12,750

5. 5.5% commission on $60,000

6. $6\frac{1}{4}$% commission on $85,900

Write a proportion to represent the following. Do not solve.

7. What percent of 14 is 7?

8. 7 is what percent of 25?

9. What number is 12.5% of 16?

10. 21 is 35% of what number?

Solve.

11. 45 is 25% of what number?

12. What percent of 288 is 36?

13. A financial investment broker earns 4% on each customer dollar invested. If the broker invests $50,000, what is the commission on the investment? _____

14. Sharlene bought 4 CDs at the music store. Each cost $14.95. She was charged 5% sales tax on her purchase. What was the total cost of her purchase? _____

15. Isaac earned $1,800 last month. He put $270 into savings. What percent of his earnings did Isaac put in savings? _____

16. Edel works for a company that pays a 15% commission on her total sales. If she wants to earn $450 in commissions, how much do her total sales have to be? _____

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Name _____ Date _____ Class _____

LESSON 9-3

Proportional Relationships and Percents

Practice B: Applications of Percents

Complete the table to find the amount of sales tax for each sale amount to the nearest cent.

1.

Sale amount	5% sales tax	8% sales tax	6.5% sales tax
$67.50			
$98.75			
$399.79			
$1250.00			

Complete the table to find the commission for each sale amount to the nearest cent.

2.

Sale amount	6% commission	9% commission	8.5% commission
$475.00			
$2450.00			
$12,500.00			
$98,900.00			

3. Alice earns a monthly salary of $315 plus a commission on her total sales. Last month her total sales were $9640, and she earned a total of $1182.60. What is her commission rate? _____

4. Phillipe works for a computer store that pays a 12% commission and no salary. What will Phillipe's weekly sales have to be for him to earn $360? _____

5. The purchase price of a book is $35.85. The sales tax rate is 6.5%. How much is the sales tax to the nearest cent? What is the total cost of the book?

_____

6. Who made more commission this month? How much did she make? Salesperson A made 11% of $67,530. Salesperson B made 8% of $85,740.

_____

7. Jon earned $38,000 last year. He paid $6,840 towards entertainment. What percent of his earnings did Jon pay in entertainment expenses? _____

8. The Cougars won 62% of their games. They won 93 games. How many games did they lose? _____

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Name _____ Date _____ Class _____

LESSON 9-4

Proportional Relationships and Percents

Practice A: Simple Interest

Write the formula to compute the missing value. Do not solve.

1. principal = $100
   rate = 4%
   time = 2 years
   interest = ?

   _____

2. principal = $150
   rate = ?
   time = 2 years
   interest = $9

   _____

3. principal = $200
   rate = 5%
   time = ?
   interest = $10

   _____

4. principal = ?
   rate = 3%
   time = 4 years
   interest = 30

   _____

5. Jules borrowed $500 for 3 years at a simple interest rate of 6%. How much interest will be due at the end of 3 years? How much will Jules have to repay?

   _____

6. Karin maintained a balance of $250 in her savings account for 8 years. The financial institution paid simple interest of 4%. What was the amount of interest earned?

   _____

Complete the table.

	Principal	Rate	Time	Interest
7.	$300	3%	4 years	
8.	$450		3 years	$67.50
9.	$500	4.5%		$112.50
10.		8%	2 years	$108
11.	$700	4%	3 years	
12.	$750		2 years	$90
13.	$800	2.5%		$100

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Name _____ Date _____ Class _____

LESSON 9-4

Proportional Relationships and Percents

Practice B: Simple Interest

Find the missing value.

1. principal = $125
   rate = 4%
   time = 2 years
   interest = ?

   _____

2. principal = ?
   rate = 5%
   time = 4 years
   interest = $90

   _____

3. principal = $150
   rate = 6%
   time = ? years
   interest = $54

   _____

4. principal = $200
   rate = ?%
   time = 3 years
   interest = $30

   _____

5. principal = $550
   rate = ?%
   time = 3 years
   interest = $57.75

   _____

6. principal = ?
   rate = $3\frac{1}{4}\%$
   time = 2 years
   interest = $63.05

   _____

7. Kwang deposits money in an account that earns 5% simple interest. He earned $546 in interest 2 years later. How much did he deposit? _____

8. Simon opened a certificate of deposit with the money from his bonus check. The bank offered 4.5% interest for 3 years of deposit. Simon calculated that he would earn $87.75 interest in that time. How much did Simon deposit to open the account? _____

9. Douglas borrowed $1000 from Patricia. He agreed to repay her $1150 after 3 years. What was the interest rate of the loan? _____

10. What is the interest paid for a loan of $800 at 5% annual interest for 9 months? _____

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Name _____ Date _____ Class _____

LESSON 9-4

Proportional Relationships and Percents

Review for Mastery: Simple Interest

Interest is money paid on an investment.
A borrower pays the interest. An investor earns the interest.

Simple interest, I, is earned when an amount of money, the *principal* P, is borrowed or invested at a *rate of interest* r for a *period of time* t.

Interest = Principal • Rate • Time
$I = P \cdot r \cdot t$

Situation 1: Find I given P, r, and t.

Calculate the simple interest on a loan of $3500 for a period of 6 months at a yearly rate of 5%.

Write the interest rate as a decimal. 5% = 0.05
Write the time period in terms of years. 6 months = 0.5 year

$I = P \cdot r \cdot t$
$I = 3500 \cdot 0.05 \cdot 0.5 = \$87.50$ ← interest earned

Find the interest in each case.

1. principal $P = \$5000$; time $t = 2$ years; interest rate $r = 6\%$
   $I = P \cdot r \cdot t =$ _____ $\cdot$ 0.06 $\cdot$ _____ = $ _____
2. principal $P = \$2500$; time $t = 3$ months; interest rate $r = 8\%$
   $I = P \cdot r \cdot t =$ _____ $\cdot$ _____ $\cdot$ _____ = $ _____

Situation 2: Find t given I, P, and r.

An investment of $3000 at a yearly rate of 6.5% earned $390 in interest. Find the period of time for which the money was invested.

The investment was for 2 years.

$I = P \cdot r \cdot t$
$390 = 3000 \cdot 0.065 \cdot t$
$390 = 195t$
$\frac{390}{195} = \frac{195t}{195}$
$2 = t$

Find the time in each case.

3. $I = \$1120$; $P = \$4000$; $r = 7\%$
   $I = P \cdot r \cdot t$
   $1120 =$ _____ $\cdot 0.07 \cdot t$
   $1120 =$ _____ t
   _____ = _____
   _____ _____
   _____ years = t

4. $I = \$812.50$; $P = \$5000$; $r = 6.5\%$
   $I = P \cdot r \cdot t$
   $812.50 =$ _____ $\cdot$ _____ $\cdot t$
   $812.50 =$ _____ t
   _____ = _____
   _____ _____
   _____ years = t

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Name _____ Date _____ Class _____

LESSON 9-4

Proportional Relationships and Percents

Review for Mastery: Simple Interest (continued)

Situation 3: Find r given I, P, and t.
$2500 was invested for 3 years and earned $450 in interest. Find the rate of interest.

$$I = P \cdot r \cdot t$$
$$450 = 2500 \cdot r \cdot 3$$
$$450 = 7500r$$
$$\frac{450}{7500} = \frac{7500r}{7500}$$
$$0.06 = r$$

The interest rate was 6%.

Find the interest rate in each case.

5. $I = \$1200$; $P = \$6000$; $t = 4$ years

$I = P \cdot r \cdot t$

$1200 = \_\_\_\_ \cdot r \cdot 4$

$1200 = \_\_\_\_ r$

$\frac{\_\_\_\_}{\_\_\_\_} = \frac{\_\_\_\_ r}{\_\_\_\_ t}$

$\_\_\_\_ = \_\_\_\_$

$\_\_\_\_ = r$

The interest rate was _____ %

6. $I = \$325$; $P = \$2000$; $t = 2.5$ years

$I = P \cdot r \cdot t$

$325 = \_\_\_\_ \cdot r \cdot \_\_\_\_$

$325 = \_\_\_\_ r$

$\frac{\_\_\_\_}{\_\_\_\_} = \frac{\_\_\_\_ r}{\_\_\_\_ t}$

$\_\_\_\_ = \_\_\_\_$

$\_\_\_\_ = r$

The interest rate was _____ %.

The total amount A of money in an account after interest has been earned, is the sum of the principal P and the interest I.

Amount = Principal + Interest
$A = P + I$

Find the amount of money in the account after $3500 has been invested for 3 years at a yearly rate of 6%.

First, find the interest earned.

$I = P \cdot r \cdot t$

$I = 3500 \cdot 0.06 \cdot 3 = \$630$ ← interest earned

Then, add the interest to the principal. $3500 + 630 = 4130$

So, the total amount in the account after 3 years is $4130.

Find the total amount in the account.

7. principal $P = \$4500$; time $t = 2.5$ years; interest rate $r = 5.5\%$

$I = P \cdot r \cdot t =$ _____ $\cdot$ _____ $\cdot$ _____ $= \$$ _____

Total Amount $= P + I = 4500 +$ _____ $=$ _____

So, after 2.5 years, the total amount in the account was $ _____.

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NAME _____

Lesson 4.3 Constants of Proportionality

A unit rate can also be called a **constant of proportionality**. The constant of proportionality describes the rate at which variables in an equation change.

x	2	3	5	6
y	6	9	15	18

Step 1: Set up an equation in which the constant (k) is equal to $x \div y$.

Step 2: Check the equation across multiple points to verify the constant.

Step 3: $2 \div 6 = \frac{1}{3}$; $3 \div 9 = \frac{1}{3}$; $5 \div 15 = \frac{1}{3}$; $k = \frac{1}{3}$

Find the constant of proportionality for each set of values.

a

1.

x	1.5	3	4.5	12
y	1	2	3	8

$k =$ _____

b

x	2	4	7	9
y	0.4	0.8	1.4	1.8

$k =$ _____

2.

x	2	4	5	7
y	1	2	2.5	3.5

$k =$ _____

x	7.5	10	17.5	20
y	4.5	6	10.5	12

$k =$ _____

3.

x	1	2	3	4
y	2	4	6	8

$k =$ _____

x	2	4	6	8
y	10	20	30	40

$k =$ _____

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NAME _____

Lesson 4.3 Constants of Proportionality

Find the constant of proportionality for each set of values.

1. a

x	2	4	6	8
y	1	2	3	4

$k =$ _____

b

x	2	4	6	8
y	3	6	9	12

$k =$ _____

2.

x	1	3	5	7
y	5	15	25	35

$k =$ _____

x	4	8	12	20
y	5	10	15	25

$k =$ _____

3.

x	3	5	7	9
y	18	30	42	54

$k =$ _____

x	0.5	2	6	8
y	0.25	1	3	4

$k =$ _____

4.

x	1	2	3	4
y	4	8	12	16

$k =$ _____

x	3	6	9	12
y	4	8	12	16

$k =$ _____

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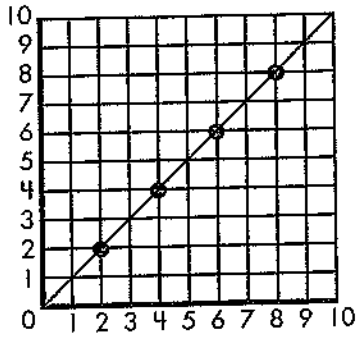
NAME _____

Lesson 4.5 Proportional Relationships on the Coordinate Plane

When proportional relationships are graphed, the points the line runs through can be used to find the constant of proportionality.



This line runs through points (2, 2), (4, 4), (6, 6), and (8, 8).

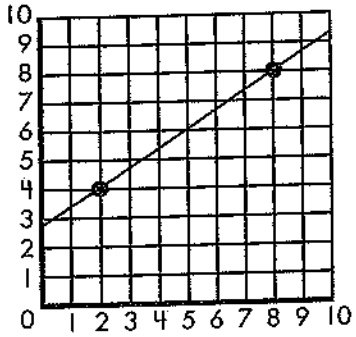
First, find the proportion of this relationship by choosing one point and inserting its coordinates into the proportion equation.

$k = \frac{x_1 - x_2}{y_1 - y_2}$ or $k = \frac{4-2}{4-2} = \frac{2}{2} = 1$

The constant of proportionality for this line is 1.

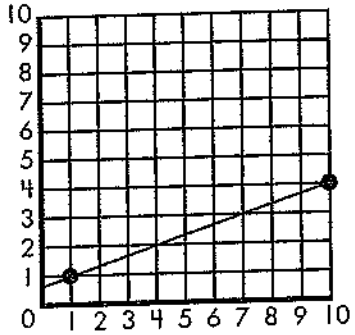
Find the constant of proportionality for each graph.

a

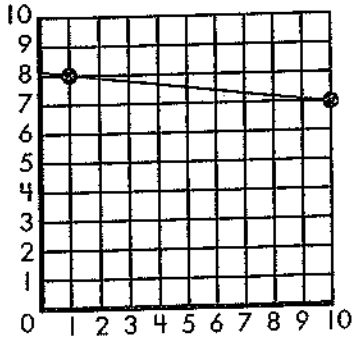
1. 

$k =$ _____

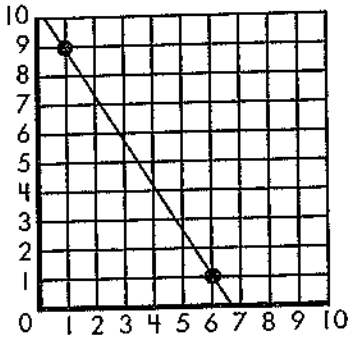
b



$k =$ _____

2. 

$k =$ _____



$k =$ _____

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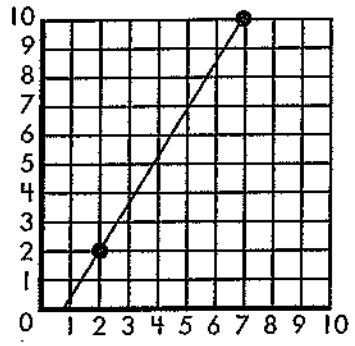
NAME _____

Lesson 4.5 Proportional Relationships on the Coordinate Plane

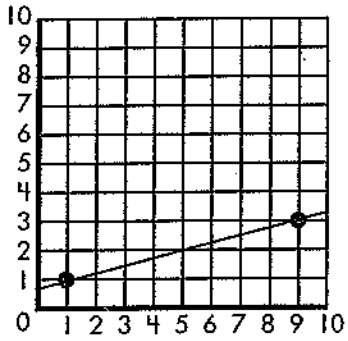
Find the constant of proportionality for each graph.

a **b**

1.

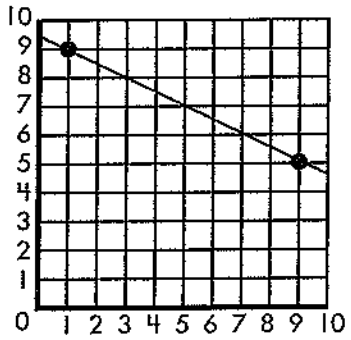


$k =$ _____

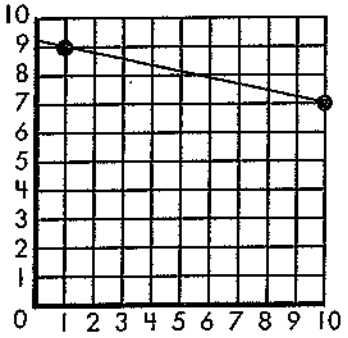


$k =$ _____

2.

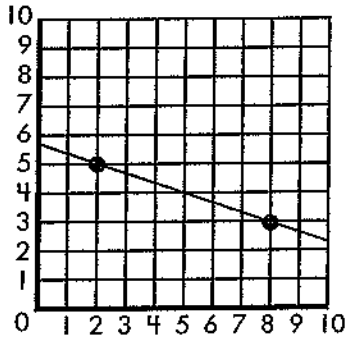


$k =$ _____

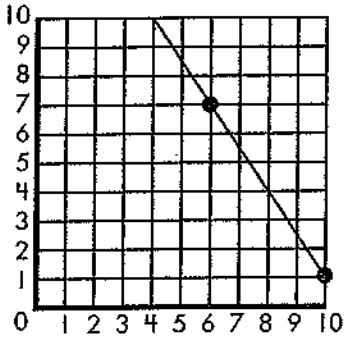


$k =$ _____

3.



$k =$ _____



$k =$ _____

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NAME _____

Lesson 4.6 Problem Solving

SHOW YOUR WORK

Solve each problem.

1. Mr. Johnson borrowed $750 for 1 year. He has to pay 6% simple interest. How much interest will he pay?

   Mr. Johnson will pay _____ in interest.

1.

2. Mrs. Soto invested in a certificate of deposit that pays 8% interest. Her investment was $325. How much interest will she receive in 1 year?

   Mrs. Soto will receive _____ in interest.

2.

3. Andrea put $52 in a savings account that pays 4% interest. How much interest will she earn in 1 year?

   Andrea will earn _____ in interest.

3.

4. Jonas purchased a 42-month ($3\frac{1}{2}$ year) certificate of deposit. It cost $600 and pays 7% interest each year. How much interest will he get? How much will the certificate be worth when he cashes it in?

   Jonas will get _____ in interest.

   The certificate will be worth _____.

4.

5. Rick borrowed $50 from his sister for 3 months ($\frac{1}{4}$ year). She charged him 14% interest. How much does Rick have to pay to his sister?

   Rick must pay his sister a total of _____.

5.

6. The grocery store borrowed $15,000 to remodel. The term is 7 years and the yearly interest rate is $4\frac{1}{4}$%. How much interest will the store pay? What is the total amount to be repaid?

   The store will pay _____ in interest.

   The total amount to be repaid is _____.

6.

Pg. 55

NAME _____

Check What You Learned

Ratios and Proportional Relationships

CHAPTER 4 POSTTEST

Solve each proportion.

	a	b	c
1.	$\frac{3}{2} = \frac{n}{6}$ _____	$\frac{17}{34} = \frac{1}{n}$ _____	$\frac{n}{16} = \frac{6}{4}$ _____
2.	$\frac{7}{n} = \frac{21}{12}$ _____	$\frac{5}{8} = \frac{n}{40}$ _____	$\frac{1}{2} = \frac{56}{n}$ _____

Circle the ratios that are equal. Show your work.

3. $\frac{15}{20}$, $\frac{3}{4}$ $\quad$ $\frac{8}{12}$, $\frac{10}{14}$ $\quad$ $\frac{4}{3}$, $\frac{16}{12}$

Find the constant of proportionality for each set of values.

4. a

x	1	2	3	4
y	5	10	15	20

$k =$ _____

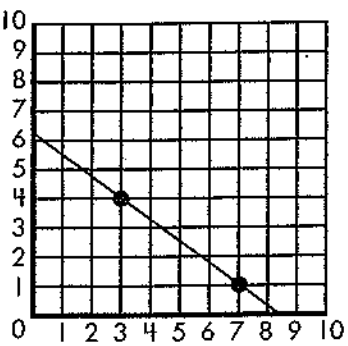
b

x	2	4	6	8
y	10	20	30	40

$k =$ _____

Find the constant of proportionality.

5.



$k =$ _____

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NAME _____

Check What You Learned

SHOW YOUR WORK

Ratios and Proportional Relationships

Solve each problem.

6. Lisa ran $3\frac{1}{2}$ miles in 21 minutes. At that rate, how long would it take her to run 5 miles?

It would take Lisa _____ minutes to run 5 miles.

6.

7. Manuel biked $12\frac{1}{4}$ miles in 45 minutes. At that rate, how far could he go in 1 hour?

Manuel could bike _____ miles in 1 hour.

7.

8. A recipe to make 5 cupcakes calls for 10 tablespoons of sugar. Alicia wants to make 10 cupcakes using this recipe. What equation will she need to use to find out how many tablespoons of sugar to use?

Equation: _____

8.

9. Luis has $660 in his savings account earning $4\frac{1}{2}$ % interest. How much interest will he earn in 2 years? How much money will be in the account?

Luis will earn _____ in interest.

He will have a total of _____ in his account.

9.

10. Mrs. Cole borrowed $1,200 for 6 months ($\frac{1}{2}$ year) at $3\frac{1}{4}$ % interest. How much interest will she pay? What is the total amount she will pay?

Mrs. Cole will pay _____ in interest.

She will pay a total of _____.

10.

11. Flo worked for 9 hours and has earned $108.00. She is planning to work 40 hours this week. What equation will she need to use to find out how much she will be paid?

Equation: _____

11.

12. Ansley went for a long hike and burned 452 calories in $2\frac{1}{4}$ hours. Bobbi decided to go for a jog and burned 1,045 calories in $3\frac{1}{2}$ hours. Who burned the most calories per hour?

Let *a* represent Ansley's and *b* represent Bobbi's calories burned.

Equivalent Ratio 1: _____

Equivalent Ratio 2: _____

_____ burned the most calories per hour.

12.

CHAPTER 4 POSTTEST

NAME _____

Check What You Know

Proportion, Percent, and Interest

Circle the proportions that are true. Show your work.

	a	b	c
1.	$\frac{6}{8} = \frac{12}{16}$	$\frac{3}{7} = \frac{9}{24}$	$\frac{4}{5} = \frac{20}{25}$
2.	$\frac{5}{3} = \frac{16}{9}$	$\frac{3}{5} = \frac{21}{35}$	$\frac{9}{10} = \frac{15}{20}$

Solve for *n* in each proportion.

3.	$\frac{4}{n} = \frac{28}{35}$ _____	$\frac{2}{3} = \frac{16}{n}$ _____	$\frac{n}{9} = \frac{45}{81}$ _____
4.	$\frac{11}{12} = \frac{n}{36}$ _____	$\frac{10}{n} = \frac{18}{27}$ _____	$\frac{42}{24} = \frac{7}{n}$ _____
5.	$\frac{7}{5} = \frac{28}{n}$ _____	$\frac{4}{6} = \frac{n}{21}$ _____	$\frac{6}{n} = \frac{15}{20}$ _____
6.	$\frac{n}{9} = \frac{14}{18}$ _____	$\frac{15}{18} = \frac{10}{n}$ _____	$\frac{n}{30} = \frac{13}{10}$ _____
7.	$\frac{10}{8} = \frac{n}{24}$ _____	$\frac{11}{12} = \frac{44}{n}$ _____	$\frac{n}{2} = \frac{9}{6}$ _____
8.	$\frac{12}{n} = \frac{4}{5}$ _____	$\frac{10}{14} = \frac{n}{35}$ _____	$\frac{10}{n} = \frac{25}{15}$ _____

For each fraction or decimal, write the equivalent percent form.

	a	b	c
9.	$\frac{3}{25} =$ _____	$0.01 =$ _____	$\frac{2}{5} =$ _____
10.	$4.06 =$ _____	$\frac{1}{8} =$ _____	$0.6 =$ _____

NAME _____

Check What You Know

Proportion, Percent, and Interest

Solve each problem.

11. Isabel biked 4 miles in 15 minutes. At that rate, how far will she bike in 45 minutes?

She will bike _____ miles in 45 minutes.

12. All shirts on the clearance rack are 60% off. If one of the shirts was originally $29.95, how much does it cost now?

The shirt costs $_____ now.

13. The sales tax on the purchase of a refrigerator that costs $695 is 7 percent. What is the amount of sales tax?

The amount of sales tax is _____.

14. A stove that costs $695 will be on sale next week for 28 percent off its regular price. What is the amount of savings?

The savings will be _____.

Fill in the missing information about each loan.

	Principal	Rate	Time	Compounded	Interest	Total Amount
15.	$4,000	_____	2 years	no	$320	$4,320
16.	$1,500	$6\frac{1}{2}\%$	_____	no	$292.50	$1,792.50
17.	$600	7%	4 years	no	_____	_____
18.	_____	5%	$2\frac{1}{2}$ years	no	$437.50	_____
19.	$2,000	$4\frac{1}{4}\%$	3 years	annually	_____	_____
20.	$800	2%	2 years	semi-annually	_____	_____

NAME _____

Lesson 5.5 Figuring Simple Interest

Interest is the amount paid on borrowed money, or the amount earned on invested money. **Principal** is the amount borrowed or invested. Use this formula to figure simple interest:

interest = *principal* × *rate* × *time* (in years).

Carla got a $3,000 car loan to be paid in 2 years. The interest rate is 6%. What will the interest be at the end of the 2 years?

$i = \$3{,}000 \times 0.06 \times 2 = \$360$

Toni got a loan for 2 years. The interest rate was 6%. She paid $120 in interest. How much was the principal?

$120 = p \times 0.06 \times 2 \quad 120 = p \times 0.12$

$\frac{120}{0.12} = p \quad \$1{,}000 = p$

Hector got a $500 loan for $1\frac{1}{2}$ years. He paid $60 in interest. What was the interest rate?

$60 = 500 \times r \times 1.5 \quad 60 = 750r \quad \frac{60}{750} = r$

$0.08 = r \quad 8\% = r$

David got a loan for $1,700. The interest rate was 5%. He paid $212.50 in interest. What was the length of the loan?

$212.5 = 1{,}700 \times 0.05 \times t$

$212.5 = 85t \quad 2.5 = t$

Fill in the missing information about each loan.

	Principal	Rate	Time	Interest
1.	$5,000	_____	3 years	$750
2.	$2,500	3%	_____	$112.50
3.	$800	$5\frac{1}{2}\%$	4 years	_____
4.	_____	4%	$2\frac{1}{2}$ years	$650

Solve each problem.

5. Monica got a $4,500 car loan to be paid in 3 years. The interest rate is 5%. What will the interest be at the end of the 3 years?

The interest will be $_____.

6. Gabriel got a loan for $1\frac{1}{2}$ years. The interest rate was 4%. He paid interest of $240. How much was the principal?

The principal was $_____.

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NAME _____

Lesson 5.6 Figuring Compound Interest

Compound interest is interest paid on principal and interest already earned.

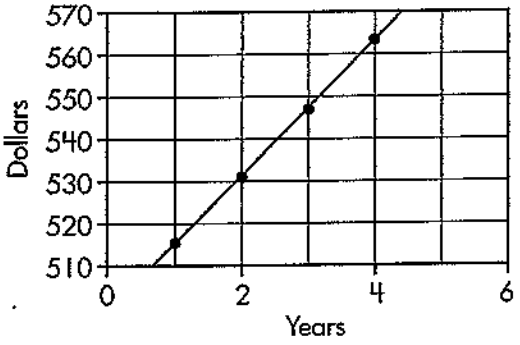
A savings account earns 3% interest, compounded annually. If the amount in the account is $500 at the start of the loan, how much will be in the account after 4 years?

Year 1: $500 + (500 \times 0.03) = 515$ Year 2: $515 + (515 \times 0.03) = 530.45$

Year 3: $530.45 + (530.45 \times 0.03) = 546.36$ Year 4: $546.36 + (546.36 \times 0.03) = 562.75$

The graph below shows the compounding interest.

$500 with 3% Interest Compounded Annually



If interest is compounded more than once a year, divide the amount compounded each time by the number of times it is compounded annually.

For interest compounded:	Divide by:
semi-annually	2
quarterly	4
monthly	12

An account of $500 pays 5% compounded monthly. At the end of Month 1, the account will have:
$500 + ($500 \times 0.05 \div 12) = 502.08

Find the total amount in each account after the given time. Round to cents.

	Principal	Rate	Time	Compounded	Total Amount
1.	$2,500	8%	4 years	annually	_____
2.	$3,000	$5\frac{1}{2}\%$	3 years	annually	_____
3.	$1,500	$3\frac{1}{2}\%$	2 years	semi-annually	_____
4.	$700	5%	1 year	quarterly	_____

Solve the problem below.

5. Elena has $500 to invest. She can put it in an account that earns 4% compounded semi-annually or in an account that earns 5% simple interest. After 2 years, how much will be in each account, including the principal?

The 4% account will have _____. The 5% account will have _____.

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Lesson 4: Scale Drawings

5-9 Scale Drawings and Scale Models

Example 1: Finding a Scale Factor

Identify the scale factor.

	Room	Blueprint
Length (in.)	144	18
Width (in.)	108	13.5

$\frac{\text{blueprint length}}{\text{room length}} = \frac{18}{144}$ Write a ratio using one of the dimensions.

$= \frac{1}{8}$ Simplify.

The scale factor is $\frac{1}{8}$.

Scale Drawings

- Some examples of scales that are drawn larger than the object in real life are shown below:
- 2:1 - 2 units on drawing = 1 in real life
- 3:2 - 3 units on drawing = 2 in real life
- 5:1 - 5 units on drawing = 1 in real life
- 50:1 - 50 units on drawing = 1 in real life

Designed by Barry Forbes

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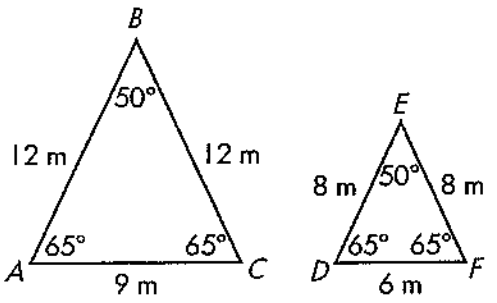
NAME _____

Lesson 5.1 Scale Drawings

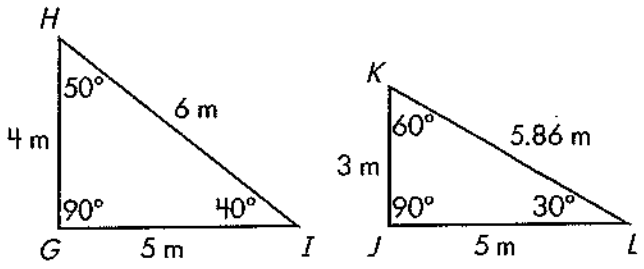
Two triangles are **similar** if their corresponding (matching) angles are congruent (have the same measure) and the lengths of their corresponding sides are proportional.



These triangles are similar. All the sides are proportional.

$\frac{AB}{DE} = \frac{12}{8} = \frac{3}{2}$ $\frac{BC}{EF} = \frac{12}{8} = \frac{3}{2}$ $\frac{AC}{DF} = \frac{9}{6} = \frac{3}{2}$

The angle measures are congruent.

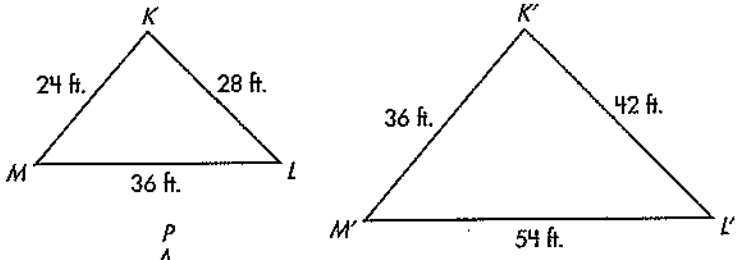


These triangles are not similar. The sides are not proportional. They do not all create the same ratio. The angle measures are not all congruent.

$\frac{GH}{JK} = \frac{4}{3}$ $\frac{HI}{KL} = \frac{6}{5.86}$ $\frac{GI}{JL} = \frac{5}{5} = \frac{1}{1}$

For each pair of triangles, check that their sides are proportional. Circle *similar* or *not similar*.

1.

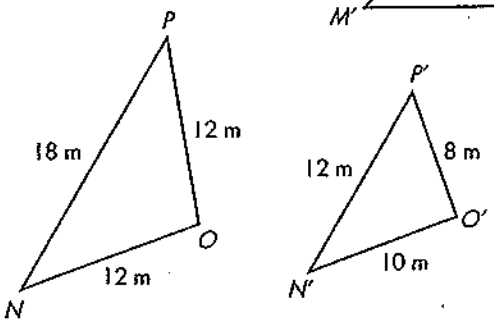


$\frac{KM}{K'M'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

$\frac{KL}{K'L'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ similar

$\frac{ML}{M'L'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ not similar

2.

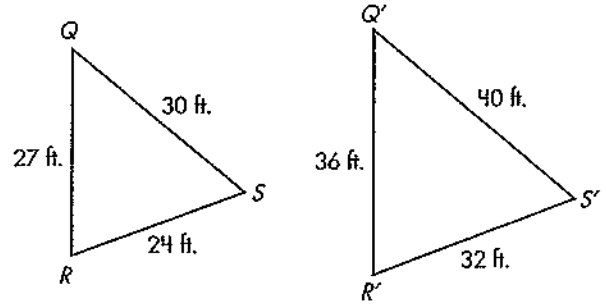


$\frac{PN}{P'N'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

$\frac{PO}{P'O'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ similar

$\frac{NO}{N'O'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ not similar

3.



$\frac{QS}{Q'S'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

$\frac{QR}{Q'R'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ similar

$\frac{RS}{R'S'} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ not similar

NAME _____

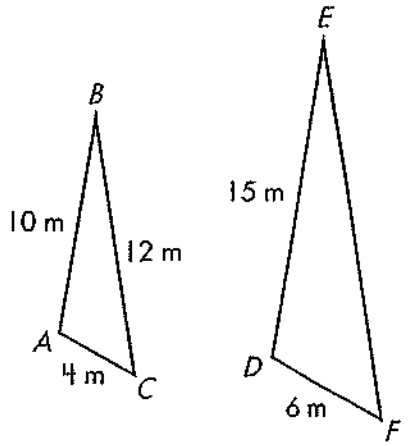
Lesson 5.1 Scale Drawings

When you know that two triangles are similar, you can use the ratio of the known lengths of the sides to figure the unknown length.

What is the length of *EF*?

$\frac{AC}{DF} = \frac{BC}{EF}$ $\frac{4}{6} = \frac{12}{n}$ Use a proportion.

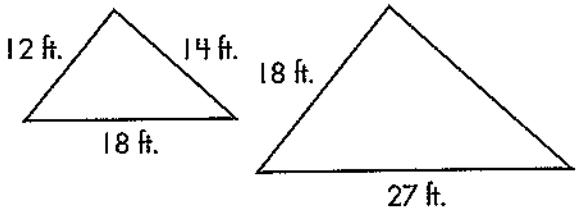
$4n = 72$ $n = 18$ Cross multiply.

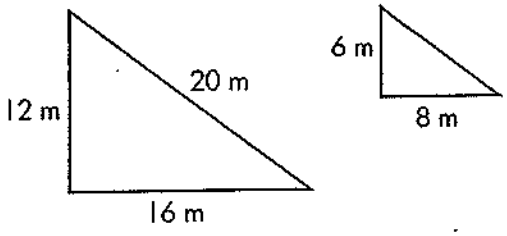


Find the length of the missing side for each pair of similar triangles. Label the side with its length.

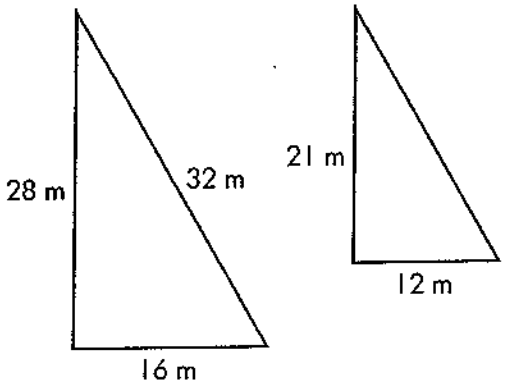
a **b**

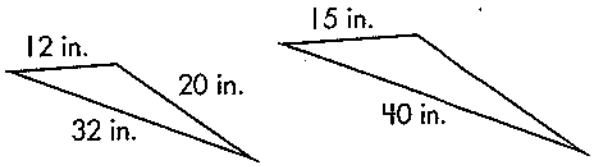
1.



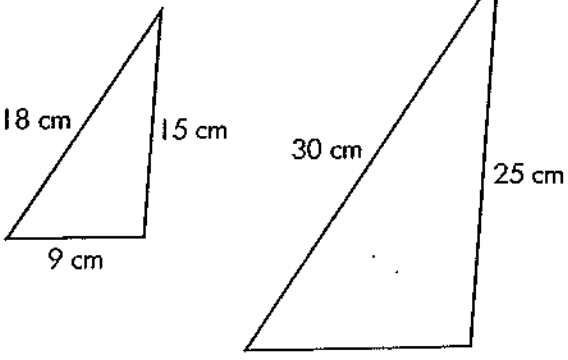


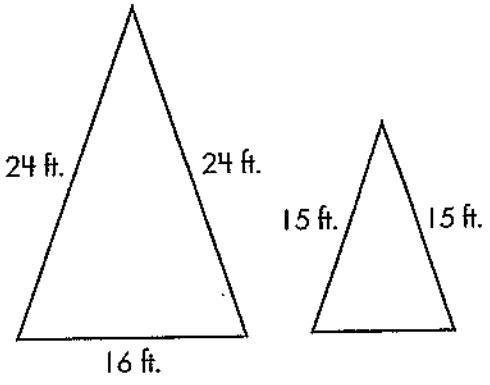
2.





3.

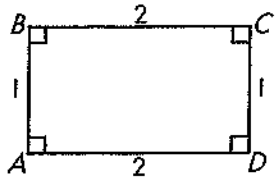


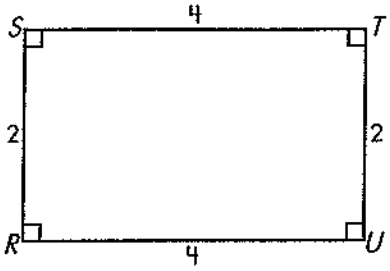


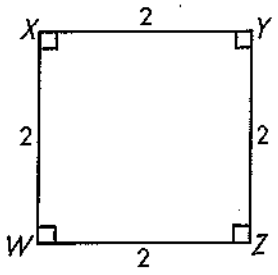
NAME _____

Lesson 5.1 Scale Drawings

Two figures are **similar** if their corresponding angles are congruent and the lengths of their corresponding sides are proportional. Write a ratio to determine if the sides are proportional.







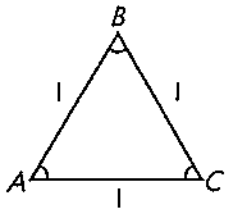
$\frac{AB}{SR} = \frac{BC}{ST}$? $\frac{1}{2} = \frac{2}{4}$ similar

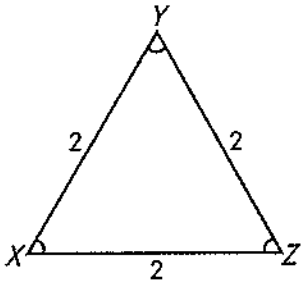
$\frac{AB}{WX} = \frac{BC}{XY}$? $\frac{1}{2} \neq \frac{2}{4}$ not similar

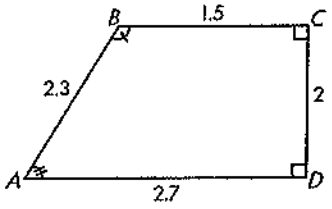
In the following figures, the angle marks indicate which angles are congruent. Use the measures given for the lengths of the sides. Write ratios to determine if the sides are proportional. Then, write *similar* or *not similar* for each pair of figures.

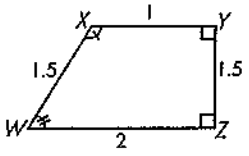
a **b**

1.



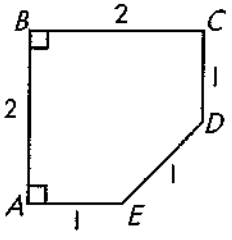


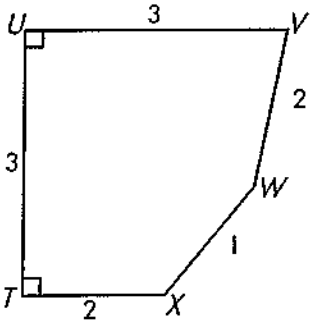


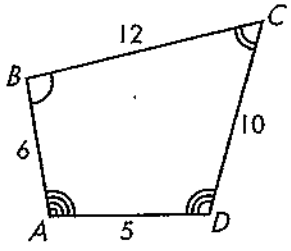


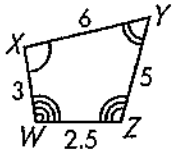
_____ _____

2.









_____ _____

7th Grade Unit 3 Study Guide

1. Sassy Jeans are $90 a pair. If they are 40% off today, how much will they cost? GSE.7.RP.3

2. The old pool held 70 gallons of water. The new pool holds 20% more than the old one. How much water does the new pool hold? GSE.7.RP.3

3. Who makes the least money per hour? GSE.7.RP.1

4. Who makes the most per hour?

Person	Hours	Money
Ann	20	$200.00
Bob	10	$105.00
Cal	16	$184.00

5. Rare Shoes had a regular price of $95, but Jay found them on sale for 50% off. Including the 8% sales tax, what did Jay pay for the shoes? GSE.7.RP.3

6. Use the table to determine how many people ate if 426 grapes were used? GSE.7.RP.2b

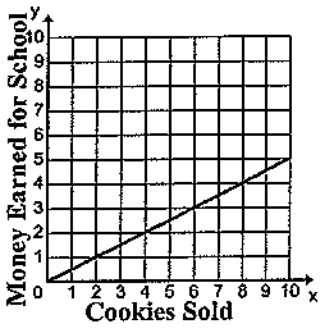
people	*grapes*
1	6
5	30
?	426

7. A store pays $45 for a radio. The store marks the radio up 30%. What is the selling price for the radio? GSE.7.RP.3

8. Ted earns $7.50 an hour. How many hours must he work to earn $90? GSE.7.RP.1

9. Which of the following scenarios is represented by the graph? GSE.7.RP.2d

A. For every cookie sold, the school earns $0.25.
B. For every cookie sold, the school earns $0.50.
C. For every cookie sold, the school earns $1.00.
D. For every cookie sold, the school earns $2.00.



10. Which equation represents the relationship between the number of miles traveled and how much it cost? GSE.7.RP.2c

A. $y = x$ B. $y = 2x$
C. $y = 3x$ D. $y = 4x$

miles (x)	cost (y)
1	$4
2	$8
3	$12
4	$16

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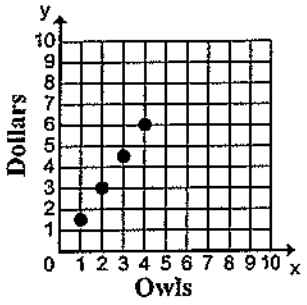
11. Ari borrowed $2000 and paid it back over 3 years. The simple interest rate was 2% annually. How much interest did Ari pay over the three years? GSE.7.RP.3

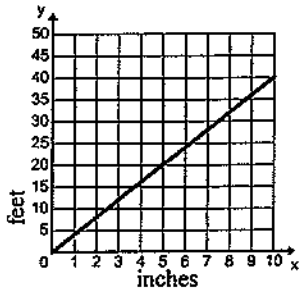
12. Bo bought a few items for $93.84, not including tax. If the tax rate was 7%, what was the total cost of these items, including tax? GSE.7.RP.3

13. The graph represents the relationship between x (the number of owls fed) and y (the number of dollars spent). What is the amount of money that will be spent to feed 10 owls? GSE.7.RP.2

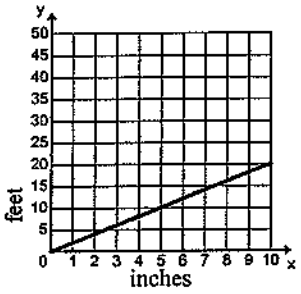


14. A model plane is at the scale of 1 inch = 4 feet. Which graph represents this? GSE.7.RP.2

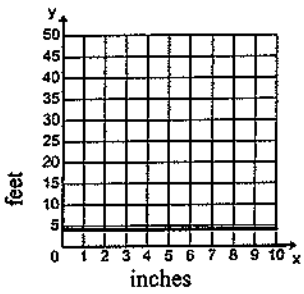
A.



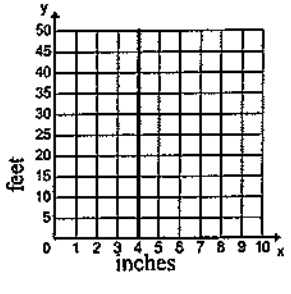
B.



C.



D.



15. It is 75¾ miles from my house to the Georgia Aquarium. On my map it measures 1½ inches. What is the scale of the map? GSE.7.G.1

16. Tony's bill at the restaurant was $9.52. If he wants to leave a 20% tip, how much is that? GSE.7.RP.3

Use the information in the box to answer questions 17 & 18.

Lunch for 4 people only $39.50

17. They want to leave a 20% tip. How much should they leave for the tip? GSE.7.RP.3

18. If the sales tax is 5%, how much tax do they owe? GSE.7.RP.3

19. The results of the first 100 students who voted are represented in the table. There are still 50 more students left to vote. Based on the early results, how many **MORE** votes do you expect Dan to get out of the 50 late voters? C.7.RP.3

President	# Votes
Bob	25
Carol	65
Dan	10

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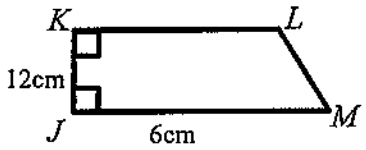
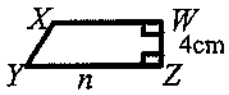
20. A $300 phone is on sale for 20% and you have a coupon for an extra 10% off. How much will you pay for the phone? (no tax) ? GSE.7.RP.3

21. Pat borrowed $2,000 to help pay college expenses. The interest rate was 5% annually, and she will repay the loan in 4 years. How much total interest will she pay during the 4 years? GSE.7.RP.3





22. In the diagram above, figure *JKLM* is similar to figure *ZWXY*. Which of the following proportions can be used to find the value of *n*? GSE.7.G.1

A. $\frac{4}{n} = \frac{6}{12}$ B. $\frac{n}{4} = \frac{12}{6}$ C. $\frac{6}{n} = \frac{2}{4}$ D. $\frac{6}{n} = \frac{12}{4}$

23. The scale on a road map is **1 inch = 40 miles.**
What is the actual length of a road that measures $2\frac{1}{4}$ inches on the map? GSE.7.G.1

24. Billy Bob earns a 4% commission for each car he sells. He sells a car for $18,750.
How much commission does he make for selling that car? GSE.7.RP.3

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