

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples								
What is a Ratio?	A comparison of two values.								
Writing Ratios	<p>Given quantity a and quantity b, the ratio of a to b can be written in three ways:</p> <p><u>$a:b$</u> , <u>a to b</u> , <u>$\frac{a}{b}$</u></p> <p>Like fractions, ratios should always be written in <u>simplest form</u> !</p> <p>Simplifying Fractions Review :</p> <ul style="list-style-type: none"> Find the <u>greatest common factor</u> of the numerator and denominator. Divide both the numerator and denominator by this number. <p>Example : Simplify $\frac{16}{30} \div 2 = \frac{8}{15}$</p>								
Examples	<p>Directions: Write each ratio in simplest form in two different ways.</p> <table> <tr> <td> <p>1. 9 board games to 3 video games</p> <p>$\frac{9}{3} = \frac{3}{1}$ $3:1$ 3 to 1</p> </td><td> <p>2. 18 soccer players to 30 football players</p> <p>$\frac{18}{30} = \frac{3}{5}$ $3:5$ 3 to 5</p> </td></tr> <tr> <td> <p>3. 40 horses to 6 cows</p> <p>$\frac{40}{6} = \frac{20}{3}$ $20:3$ 20 to 3</p> </td><td> <p>4. 5 teachers to 90 students</p> <p>$\frac{5}{90} = \frac{1}{18}$ $1:18$ 1 to 18</p> </td></tr> <tr> <td> <p>5. 49 swimmers to 21 runners</p> <p>$\frac{49}{21} = \frac{7}{3}$ $7:3$ 7 to 3</p> </td><td> <p>6. 75 cupcakes to 15 cookies</p> <p>$\frac{75}{15} = \frac{5}{1}$ $5:1$ 5 to 1</p> </td></tr> <tr> <td> <p>7. 36 crayons to 80 colored pencils</p> <p>$\frac{36}{80} = \frac{9}{20}$ $9:20$ 9 to 20</p> </td><td> <p>8. 16 folders to 40 notebooks</p> <p>$\frac{16}{40} = \frac{2}{5}$ $2:5$ 2 to 5</p> </td></tr> </table>	<p>1. 9 board games to 3 video games</p> <p>$\frac{9}{3} = \frac{3}{1}$ $3:1$ 3 to 1</p>	<p>2. 18 soccer players to 30 football players</p> <p>$\frac{18}{30} = \frac{3}{5}$ $3:5$ 3 to 5</p>	<p>3. 40 horses to 6 cows</p> <p>$\frac{40}{6} = \frac{20}{3}$ $20:3$ 20 to 3</p>	<p>4. 5 teachers to 90 students</p> <p>$\frac{5}{90} = \frac{1}{18}$ $1:18$ 1 to 18</p>	<p>5. 49 swimmers to 21 runners</p> <p>$\frac{49}{21} = \frac{7}{3}$ $7:3$ 7 to 3</p>	<p>6. 75 cupcakes to 15 cookies</p> <p>$\frac{75}{15} = \frac{5}{1}$ $5:1$ 5 to 1</p>	<p>7. 36 crayons to 80 colored pencils</p> <p>$\frac{36}{80} = \frac{9}{20}$ $9:20$ 9 to 20</p>	<p>8. 16 folders to 40 notebooks</p> <p>$\frac{16}{40} = \frac{2}{5}$ $2:5$ 2 to 5</p>
<p>1. 9 board games to 3 video games</p> <p>$\frac{9}{3} = \frac{3}{1}$ $3:1$ 3 to 1</p>	<p>2. 18 soccer players to 30 football players</p> <p>$\frac{18}{30} = \frac{3}{5}$ $3:5$ 3 to 5</p>								
<p>3. 40 horses to 6 cows</p> <p>$\frac{40}{6} = \frac{20}{3}$ $20:3$ 20 to 3</p>	<p>4. 5 teachers to 90 students</p> <p>$\frac{5}{90} = \frac{1}{18}$ $1:18$ 1 to 18</p>								
<p>5. 49 swimmers to 21 runners</p> <p>$\frac{49}{21} = \frac{7}{3}$ $7:3$ 7 to 3</p>	<p>6. 75 cupcakes to 15 cookies</p> <p>$\frac{75}{15} = \frac{5}{1}$ $5:1$ 5 to 1</p>								
<p>7. 36 crayons to 80 colored pencils</p> <p>$\frac{36}{80} = \frac{9}{20}$ $9:20$ 9 to 20</p>	<p>8. 16 folders to 40 notebooks</p> <p>$\frac{16}{40} = \frac{2}{5}$ $2:5$ 2 to 5</p>								

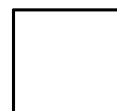
Applications	<p>9. Mr. Jacobs has 5 math classes. He teaches a total of 36 girls and 42 boys. Express each ratio as a fraction in simplest form.</p>	
	<p>a) boys to girls</p> $\frac{42}{36} = \frac{7}{6}$	<p>b) girls to total number of students</p> $\frac{36}{78} = \frac{6}{13}$
	<p>10. A recipe for banana bread calls for 3 bananas for every 6 cups of sugar. What is the ratio of bananas to sugar?</p> $\frac{3}{6} = \frac{1}{2}$	
	<p>11. Ms. Morgan is the cafeteria manager. She keeps track of how many students select each type of drink. Today during breakfast, 32 children picked milk while 44 children picked juice. What is the ratio of the number of children who picked juice to those who picked milk?</p> $\frac{44}{32} = \frac{11}{8}$	
	<p>12. Anne works at a large farm. 60 of those animals are horses. There are 30 more cows than horses. What is the ratio of the number of cows to horses?</p> $\frac{90}{60} = \frac{3}{2}$	
	<p>13. Dave has a collection of 60 DVDs. One quarter of them are action movies. What is the ratio of the number of action DVDs to all other genres?</p> $\frac{15}{45} = \frac{1}{3}$	
	<p>14. Rafael bought a bag of candy that contains 50 pieces. 30 of those pieces are chocolate and 5 are caramel. Write a ratio that compares the number of chocolate pieces to the number of pieces that are not either chocolate or caramel.</p> $\frac{30}{15} = \frac{2}{1}$	
	<p>15. Maria is reading a book for her English class. She has read 60 pages and has another 80 pages left to read. What is the ratio of the number of pages she has read to the number of pages in the entire book?</p> $\frac{60}{140} = \frac{3}{7}$	

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 1: Ratios

**Directions:** Write each ratio in simplest form.

1. 27 red markers to 12 blue markers

$$\frac{27}{12} = \frac{9}{4}$$

2. 16 chaperones to 48 students

$$\frac{16}{48} = \frac{1}{3}$$

3. 52 plates to 24 bowls

$$\frac{52}{24} = \frac{13}{6}$$

4. 18 apples to 42 bananas

$$\frac{18}{42} = \frac{3}{7}$$

5. 24 dogs to 56 cats

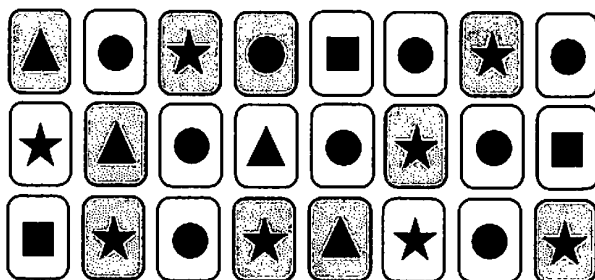
$$\frac{24}{56} = \frac{3}{7}$$

6. 56 magazines to 35 books

$$\frac{56}{35} = \frac{8}{5}$$

Use for questions 7-10:

A board game comes with the set of cards shown below. Find each ratio in simplest form.



7. shaded cards to unshaded cards

$$\frac{10}{14} = \frac{5}{7}$$

8. stars to triangles

$$\frac{8}{4} = \frac{2}{1}$$

9. squares to shaded stars

$$\frac{3}{6} = \frac{1}{2}$$

10. circles to total number of cards

$$\frac{9}{24} = \frac{3}{8}$$

11. There are 15 neon tetras and 12 betta fish in a fish tank. What is the ratio of betta fish to the total number of fish?

$$\frac{12}{27} = \frac{4}{9}$$

12. Jack burned 150 calories on the elliptical and 210 calories on the treadmill. What is the ratio of calories burned on the elliptical to calories burned on the treadmill?

$$\frac{150}{210} = \frac{5}{7}$$

13. Ari read 28 pages of her book on Friday. On Saturday, she read 20 more pages than she did on Friday. What is the ratio of pages read Friday night to Saturday night?

$$\frac{28}{48} = \frac{7}{12}$$

14. Combined, Natalie and Ellie sold 90 boxes of Girl Scout cookies. If Natalie sold one-third of this, find the ratio of the boxes of cookies that Natalie sold to the number of boxes that Ellie sold.

$$\frac{30}{60} = \frac{1}{2}$$

15. Bryson drove 42 miles on Monday. On Tuesday, he drove 12 miles less than he did on Monday. Find the ratio of miles driven on Tuesday to the total miles driven on Monday and Tuesday.

$$\frac{30}{72} = \frac{5}{12}$$

16. Kaci has \$760 in her savings account and \$200 in her checking account. If she withdraws \$40 from her checking account, find the ratio of her checking account balance to her savings account balance.

$$\frac{160}{760} = \frac{4}{19}$$

Name:

Date:

Topic:

Class:

Main Ideas/Questions

Notes/Examples

RATES

A ratio that compares two different quantities

Example: 60 miles : 3 gallons

UNIT RATES

- A unit rate is a rate with a denominator of 1.
- To change a rate to a unit rate, divide the numerator by the denominator.

EXAMPLES

Write rates using the symbol:

/

This is read as
per**Directions:** Express each rate as a unit rate. Round to the nearest tenth when necessary.

1. 175 children in 5 classes

$$\frac{175}{5} = 35 \text{ children/class}$$

2. 3,000 marbles in 200 jars

$$\frac{3000}{200} = 15 \text{ marbles/jar}$$

3. 228 magazines in 4 boxes

$$\frac{228}{4} = 57 \text{ magazines/box}$$

4. 138 cups of flour used in 46 dozen brownies.

$$\frac{138}{46} = 3 \text{ cups/dozen}$$

5. $3\frac{1}{2}$ cups of sugar for $5\frac{1}{4}$ cups of lemonade.

$$\frac{\frac{7}{2}}{\frac{21}{4}} = \frac{7}{2} \cdot \frac{4}{21} = \frac{2}{3} \approx \frac{0.7 \text{ c sugar}}{1 \text{ c lemonade}}$$

6. Ben walked for $8\frac{1}{2}$ minutes and covered $\frac{3}{4}$ of a mile.

$$\frac{\frac{17}{2}}{\frac{3}{4}} = \frac{17}{2} \cdot \frac{4}{3} = \frac{34}{3} \approx 11.3 \text{ min/mile}$$

7. The table below shows the number of cupcakes and the number of cakes made by each of four bakeries each day. Which bakery makes the most cupcakes per cake?

Tamira's; 15 cup/cake

Bakery	Cakes	Cupcakes	
Sue's Sweets	28	360	≈ 12.9
Millie's Bake Shop	35	400	≈ 11.4
Tamira's Treat Shop	25	375	$= 15$
Creative Cakes	30	385	≈ 12.8

8. Four members of the track team ran over the weekend. Who ran the fastest per mile?

Marcus; 8.1 min/mile

Name	Miles Ran	Time (in minutes)	
Marcus	13	105	≈ 8.1
Joseph	18	153	≈ 8.5
Harper	20	176	≈ 8.8
Nikki	15	140	≈ 9.3

UNIT RATES <i>with price</i>	Unit prices give the cost per 1 unit. This is especially helpful when comparison shopping in order to find the best deal. When finding a unit price, always <u>divide</u> the <u>price</u> by the <u>quantity</u> .	
EXAMPLES	Directions: Express each rate as a unit rate. Round to the nearest cent when necessary.	
	9. \$19.20 for 6 feet of ribbon $\frac{\$19.20}{6} = \$3.20/\text{ft}$	10. \$63.21 for seven hours of work $\frac{\$63.21}{7} = \$9.03/\text{hr}$
	11. \$1.44 for 12 pencils $\frac{\$1.44}{12} = \$0.12/\text{pencil}$	12. \$4.50 for three hotdogs $\frac{\$4.50}{3} = \$1.50/\text{hot dog}$
	13. 16 ounces of potato chips for \$4.96 $\frac{\$4.96}{16} = \$0.31/\text{ounce}$	14. 9 ounces of dish soap for \$1.71 $\frac{\$1.71}{9} = \$0.19/\text{ounce}$
	15. 15 boxes of tissues for \$33.45 $\frac{\$33.45}{15} = \$2.23/\text{box}$	16. \$1.95 for a pack of 5 pens $\frac{\$1.95}{5} = \$0.39/\text{pen}$
	17. $\frac{3}{8}$ of a pound of fruit for \$15 $\frac{\$15}{\frac{3}{8}} = 15 \cdot \frac{8}{3} = \$40/\text{lb}$	18. $2\frac{1}{5}$ feet of fabric for \$3.30 $\frac{\$3.30}{\frac{11}{5}} = 3.30 \cdot \frac{5}{11} = \$1.50/\text{ft}$
	Directions: Determine whether option A or option B is the better deal.	
	19. <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <input type="checkbox"/> Option A: 15 pizzas for \$195 \$13/pizza </div> <div> <input checked="" type="checkbox"/> Option B: 10 pizzas for \$120 \$12/pizza </div> </div>	
	20. <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <input type="checkbox"/> Option A: 12 binders for \$30 \$2.50/binder </div> <div> <input checked="" type="checkbox"/> Option B: 7 binders for \$16.80 \$2.40/binder </div> </div>	
	21. <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <input type="checkbox"/> Option A: 12 ounces for \$0.60 \$.05/ounce </div> <div> <input checked="" type="checkbox"/> Option B: 20 ounces for \$0.95 \$.0475/ounce </div> </div>	
	22. <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <input checked="" type="checkbox"/> Option A: 3 apples for \$1.80 \$0.60/apple </div> <div> <input type="checkbox"/> Option B: 15 apples for \$13.50 \$0.90/apple </div> </div>	

Name: _____

Unit 4: Ratio, Proportion, & Percent



Date: _____ Per: _____

Homework 2: Rates & Unit Rates

Directions: Express each rate as a unit rate.

1. 108 pencils to 27 students $\frac{108}{27} = 4 \text{ pencils/student}$	2. 450 calories in 6 cupcakes $\frac{450}{6} = 75 \text{ cal/cupcake}$	3. 21 hot dogs eaten in 60 seconds $\frac{21}{60} = 0.35 \text{ hot dogs/sec}$
4. 5 points scored in 4 quarters $\frac{5}{4} = 1.25 \text{ pts/quarter}$	5. 9 inches of snow in 15 hours $\frac{9}{15} = 0.6 \text{ in/hour}$	6. 378 miles to 15 gallons of gas $\frac{378}{15} = 25.2 \text{ mi/gal}$

7. $1\frac{1}{2}$ cups of sugar for every $\frac{2}{3}$ cup of flour

$$\frac{\frac{3}{2}}{\frac{2}{3}} = \frac{3}{2} \cdot \frac{3}{2} = \frac{9}{4} = 2.25 \text{ c sugar / c flour}$$

9. The table below shows the amount of time in minutes it took to drain four different tanks. Which tank drained the fastest per minute?

Tank	Capacity (gal)	Time (m)	
A	80	24	≈ 3.3
B	64	18	≈ 3.5
C	96	28	≈ 3.4
D	50	16	≈ 3.1

Tank B; 3.5 gal/min

8. $3\frac{1}{3}$ miles ran in $28\frac{1}{3}$ minutes

$$\frac{\frac{85}{3}}{\frac{16}{3}} = \frac{85}{3} \cdot \frac{3}{16} = \frac{85}{16} = 8.5 \text{ min / mile}$$

10. Karen walked three miles in 48 minutes. Bob walked one mile further than Karen. If it took Bob 1 hour and 5 minutes to complete his walk, who walked at a faster rate?

Karen: $\frac{48}{3} = 16 \text{ min/mile}$

Bob: $\frac{65}{4} = 16.25 \text{ min/mile}$

Karen was faster

Directions: Express each rate as a unit rate. Round to the nearest cent if necessary.

11. Six tubs of frosting for \$5 $\frac{\$5}{6} = \$0.83/\text{tub}$	12. \$7.90 for 50 ounces of laundry soap $\frac{\$7.90}{50} = \$0.16/\text{ounce}$	13. 24 water bottles for \$2.95 $\frac{\$2.95}{24} = \$0.12/\text{bottle}$
14. \$200 for 12 piano lessons $\frac{\$200}{12} = \$16.67/\text{lesson}$	15. \$14.40 for 4.5 pounds of beef $\frac{\$14.40}{4.5} = \$3.2/\text{lb}$	16. $2\frac{3}{4}$ yards of fabric for \$22 $\frac{\$22}{\frac{11}{4}} = 22 \cdot \frac{4}{11} = \$8/\text{yd}$

Directions: Determine whether option A or option B is the better deal.

17. <input type="checkbox"/> Option A: \$9.95 for 30 oz. of coffee $\$0.33/\text{oz}$ <input checked="" type="checkbox"/> Option B: \$3.50 for 12 oz. of coffee $\$0.29/\text{oz}$	18. <input checked="" type="checkbox"/> Option A: 40 trash bags for \$6.29 $\$.157/\text{bag}$ <input type="checkbox"/> Option B: 24 trash bags for \$3.89 $\$.162/\text{bag}$
--	--

Name:	Date:
-------	-------

Topic:	Class:
--------	--------

Main Ideas/Questions	Notes/Examples																														
Proportional vs. Nonproportional Relationships	<ul style="list-style-type: none">If the ratios or rates of two quantities are <u>equal</u>, then the quantities are <u>proportional</u>.If the ratios or rates of two quantities are <u>not equal</u>, then the quantities are <u>non proportional</u>.																														
EXAMPLE	<p>Jasmin is baking cookies and mini cupcakes for a competition. The tables below show the number of cups of sugar she has used for each dessert after the every three dozen made. Complete each table and determine the type of relationship.</p> <div><table><caption>Cookies</caption><thead><tr><th>Dozen</th><th>Cups of Sugar</th><th>Rate</th></tr></thead><tbody><tr><td>3</td><td>12</td><td>4</td></tr><tr><td>6</td><td>22</td><td>3.6</td></tr><tr><td>9</td><td>36</td><td>4</td></tr><tr><td>12</td><td>45</td><td>3.75</td></tr></tbody></table><table><caption>Mini Cupcakes</caption><thead><tr><th>Dozen</th><th>Cups of Sugar</th><th>Rate</th></tr></thead><tbody><tr><td>3</td><td>9</td><td>3</td></tr><tr><td>6</td><td>18</td><td>3</td></tr><tr><td>9</td><td>27</td><td>3</td></tr><tr><td>12</td><td>36</td><td>3</td></tr></tbody></table></div> <p>► The sugar used in the cookies is <u>nonproportional</u> to the number of dozen baked because <u>the rate of the Sugar per dozen is not equal</u>.</p> <p>► The sugar used in the mini cupcakes is <u>proportional</u> to the number of dozen baked because <u>the rate of the Sugar per dozen is equal</u>.</p>	Dozen	Cups of Sugar	Rate	3	12	4	6	22	3.6	9	36	4	12	45	3.75	Dozen	Cups of Sugar	Rate	3	9	3	6	18	3	9	27	3	12	36	3
Dozen	Cups of Sugar	Rate																													
3	12	4																													
6	22	3.6																													
9	36	4																													
12	45	3.75																													
Dozen	Cups of Sugar	Rate																													
3	9	3																													
6	18	3																													
9	27	3																													
12	36	3																													
MORE PRACTICE	<p>Directions: Determine whether the quantities in each table represent a proportional relationship. If yes, give the constant rate.</p> <p>1.</p> <table><tr><td>Number of Items Sold</td><td>5</td><td>10</td><td>15</td><td>20</td></tr><tr><td>Amount Raised (\$)</td><td>\$30</td><td>\$60</td><td>\$90</td><td>\$120</td></tr></table> <p style="text-align: right;">Yes; \$6/item</p> <p>2.</p> <table><tr><td>Hours of Snow</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Total Accumulation</td><td>3.5</td><td>6</td><td>8.5</td><td>12</td></tr></table> <p style="text-align: right;">No</p>	Number of Items Sold	5	10	15	20	Amount Raised (\$)	\$30	\$60	\$90	\$120	Hours of Snow	1	2	3	4	Total Accumulation	3.5	6	8.5	12										
Number of Items Sold	5	10	15	20																											
Amount Raised (\$)	\$30	\$60	\$90	\$120																											
Hours of Snow	1	2	3	4																											
Total Accumulation	3.5	6	8.5	12																											

3.

Green Marbles	8	10	12	14
Red Marbles	10	12	14	16

1.25 1.2 1.17 1.14

No

4.

Pounds of Fudge	5	6	7	8
Cost (\$)	\$4.00	\$4.80	\$5.60	\$6.40

.80 .80 .80 .80

Yes;
\$.80/lb

5.

Distance Walked (Miles)	1	2	3	4
Time (Minutes)	12	26	30	44

12 13 10 11

No

6.

Making Lemonade				
Lemons	3	4	5	6
Cups of Sugar	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3

.5 .5 .5 .5

Yes;
0.5 c / lemonCOMPLETING
TABLES**Directions:** If the following tables represent a proportional relationship, complete the table.

7. Lucy spends \$1.75 on a cup of coffee each day.

Days	1	3	5	7
Money Spent (\$)	1.75	5.25	8.75	12.25

8. A car travels 52 miles each hour.

Hours	1	2	5	8
Miles	52	104	260	416

9. Jose' uses $1\frac{2}{3}$ bags of grass seed for every 400 square feet of his yard.

Square Feet	400	800	1,200	1,600
Bags of Grass Seed	$1\frac{2}{3}$	$3\frac{1}{3}$	5	$6\frac{2}{3}$

10. An umbrella company can make 75 umbrellas a day. Complete the chart, then determine how many umbrellas they make in two weeks.

Days	2	4	6	8
Umbrellas Made	150	300	450	600

14.75 = 1050

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 3: Proportional Relationships

Directions: Determine whether the quantities in each table represent a proportional relationship. If yes, give the constant rate.

1.

Wages	
Hours	Pay
1	\$9.50
2	\$19.00
3	\$28.50
4	\$38.00

Yes; \$9.50/hr

2.

Gallons	Miles Driven
2	50
3	72
4	96
5	125

No

3.

Rain Accumulation	
Hours	Inches
4	1.2
9	2.7
10	3
15	4.5

Yes; 0.3 in/hr

4.

Green Paint Mix (oz)	
Blue	Yellow
5	7.5
12	18
18	27
24	36

1.5 yellow/blue

5.

Flour (c)	Sugar (c)
$\frac{1}{2}$	1
$1\frac{3}{4}$	$3\frac{1}{2}$
2	4
$2\frac{1}{3}$	$4\frac{2}{3}$

Yes; 2 Sugar / flour

6.

Customer Service Calls	
Calls	Duration (min)
3	27
4	35
5	48
6	54

No

Directions: Complete the table given each proportional relationship.

7. Kiera pays \$1.95 per song she downloads.

Songs	Total Cost
1	\$1.95
2	\$3.90
3	\$5.85
4	\$7.8

8. A bake shop uses $1\frac{1}{3}$ cup of milk for each batch of cupcakes.

Batches	Milk (c)
1	$1\frac{1}{3}$ (1.3)
2	$2\frac{2}{3}$ (2.6)
3	4
4	$5\frac{1}{3}$ (5.3)

9. Alec averaged 62 miles per hour on a recent road trip.

Hours	Distance (mi)
1	62
4	248
7	434
9	558

10. Grapes are on sale for \$2.36 per pound.

Pounds	Total Cost
0.75	\$1.77
1.25	\$2.95
2	\$4.72
2.5	\$5.9

11. A plant is growing at a rate of 0.8 inches per week.

Weeks	Height (in)
2	1.6
4	3.2
6	4.8
8	6.4

12. Each quilt requires $3\frac{7}{8}$ yards of fabric.

Quilts	Fabric (yds)
1	$3\frac{7}{8}$ (3.875)
2	$7\frac{7}{8}$ (7.75)
3	$11\frac{5}{8}$ (11.625)
4	$15\frac{1}{2}$ (15.5)

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
PROPORTIONS	<ul style="list-style-type: none"> A proportion is an equation that states that two ratios are <u>equal</u>. To determine whether a pair of ratios forms a proportion, check their <u>Cross products</u>: If $\frac{a}{b} = \frac{c}{d}$, then <u>$ad = bc$</u>. 	
	Directions: Determine whether the pair of ratios forms a proportion.	
	1. $\frac{7}{12}, \frac{21}{36}$ $7 \cdot 36 = 12 \cdot 21$ $252 = 252$ <u>Yes</u>	2. $\frac{8}{15}, \frac{2}{3}$ $8 \cdot 3 = 15 \cdot 2$ $24 \neq 30$ <u>No</u>
	3. $\frac{3}{5}, \frac{1.5}{2.5}$ $3 \cdot 2.5 = 5 \cdot 1.5$ $7.5 = 7.5$ <u>Yes</u>	4. $\frac{24}{36}, \frac{60}{90}$ $24 \cdot 90 = 36 \cdot 60$ $2160 = 2160$ <u>Yes</u>
SOLVING PROPORTIONS	To solve proportions, you will cross multiply to create a one-step equation. Follow the steps below to solve the given proportion.	
	Steps	Solve for x: $\frac{x}{6} = \frac{35}{14}$
	Step 1: Use the cross-products property to set up an equation.	$x \cdot 14 = 6 \cdot 35$ $14x = 210$
	Step 2: Divide to solve the equation.	$\frac{14x}{14} = \frac{210}{14}$ $x = 15$
	Step 3: Check your answer.	$\frac{15}{6} = \frac{35}{14}$ $210 = 210 \checkmark$
	Directions: Solve each proportion. Check all solutions.	
	5. $\frac{x}{8} = \frac{15}{24}$ $x \cdot 24 = 8 \cdot 15$ $24x = 120$ $\frac{24x}{24} = \frac{120}{24}$ $x = 5$ $\frac{5}{8} = \frac{15}{24}$ $120 = 120 \checkmark$	6. $\frac{40}{y} = \frac{4}{5}$ $40 \cdot 5 = y \cdot 4$ $200 = 4y$ $\frac{200}{4} = \frac{4y}{4}$ $50 = y$ $\frac{40}{50} = \frac{4}{5}$ $200 = 200 \checkmark$

$$7. \frac{6}{2} = \frac{n}{14}$$

$$6 \cdot 14 = 2 \cdot n$$

$$\frac{84}{2} = \frac{2n}{2}$$

$$\boxed{42 = n}$$

$$\frac{6}{2} = \frac{42}{14} \Rightarrow 84 = 84 \checkmark$$

$$8. \frac{4}{10} = \frac{32}{k}$$

$$4 \cdot k = 10 \cdot 32$$

$$\frac{4k}{4} = \frac{320}{4}$$

$$\boxed{k = 80}$$

$$\frac{4}{10} = \frac{32}{80} \Rightarrow 320 = 320 \checkmark$$

$$9. \frac{m}{3} = \frac{126}{18}$$

$$m \cdot 18 = 3 \cdot 126$$

$$\frac{18m}{18} = \frac{378}{18}$$

$$\boxed{m = 21}$$

$$\frac{21}{3} = \frac{126}{18} \Rightarrow 378 = 378 \checkmark$$

$$10. \frac{15}{21} = \frac{10}{e}$$

$$15 \cdot e = 21 \cdot 10$$

$$\frac{15e}{15} = \frac{210}{15}$$

$$\boxed{e = 14}$$

$$\frac{15}{21} = \frac{10}{14} \Rightarrow 210 = 210 \checkmark$$

$$11. \frac{9}{6} = \frac{c}{10}$$

$$9 \cdot 10 = 6 \cdot c$$

$$\frac{90}{6} = \frac{6c}{6}$$

$$\boxed{15 = c}$$

$$\frac{9}{6} = \frac{15}{10} \Rightarrow 90 = 90 \checkmark$$

$$12. \frac{6}{4} = \frac{21}{r}$$

$$6 \cdot r = 4 \cdot 21$$

$$\frac{6r}{6} = \frac{84}{6}$$

$$\boxed{r = 14}$$

$$\frac{6}{4} = \frac{21}{14} \Rightarrow 84 = 84 \checkmark$$

GIVEN TABLES

Directions: If the values in the table represent a proportional relationship, find the missing value.

13.

	Paint 1	Paint 2
Blue (oz.)	6	20
Red (oz.)	15	x

$$\frac{6}{20} = \frac{15}{x}$$

$$\frac{6x}{6} = \frac{300}{6}$$

$$\boxed{x = 50}$$

14.

	Soda 1	Soda 2
Ounces	16	a
Cost (\$)	\$1.12	\$1.26

$$\frac{16}{a} = \frac{1.12}{1.26}$$

$$\frac{20 \cdot 16}{1.12} = \frac{1.12a}{1.12}$$

$$\boxed{18 = a}$$

15.

	Car 1	Car 2
Miles	m	135
Time (hours)	1.5	2.5

$$\frac{m}{135} = \frac{1.5}{2.5}$$

$$\frac{2.5m}{2.5} = \frac{202.5}{2.5}$$

$$\boxed{m = 81}$$

16.

	Theater 1	Theater 2
# of Tickets	11	6
Cost (\$)	\$93.50	c

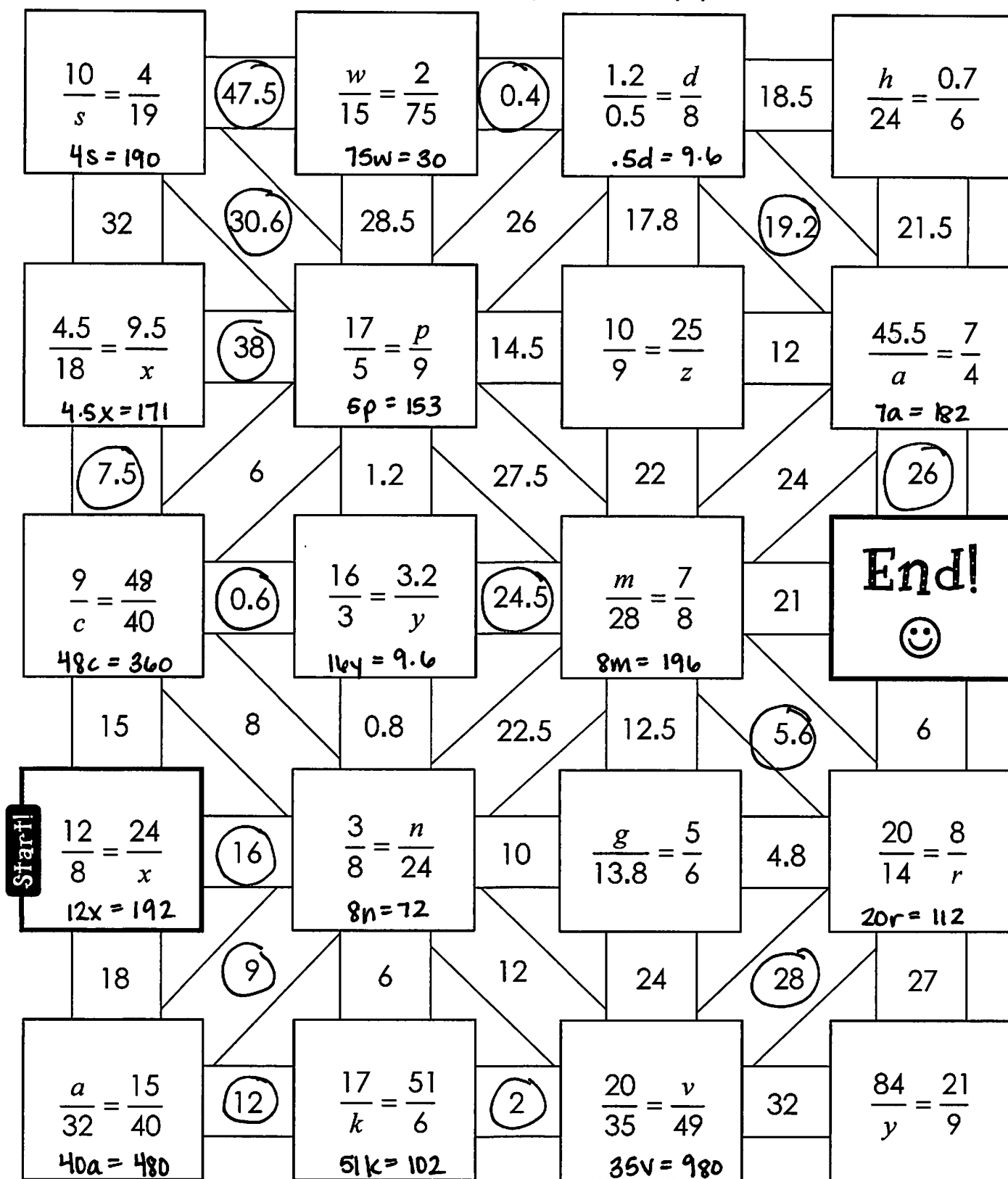
$$\frac{11}{6} = \frac{93.50}{c}$$

$$\frac{11c}{11} = \frac{541}{11}$$

$$\boxed{c = 51}$$

Proportions Maze!

Directions: Solve each proportion. Use your solutions to navigate through the maze.
SHOW ALL WORK on a separate sheet of paper!



Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 4: Solving Proportions

Directions: Determine whether each pair of ratios forms a proportion.

1. $\frac{5}{12}, \frac{20}{48}$

$5 \cdot 48 = 12 \cdot 20$

$240 = 240$

Yes

2. $\frac{18}{15}, \frac{4}{3}$

$15 \cdot 4 = 18 \cdot 3$

$60 \neq 54$

No

3. $\frac{150}{96}, \frac{25}{16}$

$150 \cdot 16 = 96 \cdot 25$

$2400 = 2400$

Yes

4. $\frac{4}{5}, \frac{10}{12.5}$

$4 \cdot 12.5 = 5 \cdot 10$

$50 = 50$

Yes

Directions: Solve each proportion. Check all solutions.

5. $\frac{1}{3} = \frac{x}{21}$

$3 \cdot x = 1 \cdot 21$

$\frac{3x}{3} = \frac{21}{3}$

$x = 7$

$\frac{1}{3} = \frac{7}{21}$

$21 = 21 \checkmark$

6. $\frac{5}{8} = \frac{20}{p}$

$5 \cdot p = 8 \cdot 20$

$\frac{5p}{5} = \frac{160}{5}$

$p = 32$

$\frac{5}{8} = \frac{20}{32}$

$160 = 160 \checkmark$

7. $\frac{27}{k} = \frac{3}{2}$

$27 \cdot 2 = 3 \cdot k$

$\frac{54}{3} = \frac{3k}{3}$

$18 = k$

$\frac{27}{18} = \frac{3}{2}$

$54 = 54 \checkmark$

8. $\frac{r}{7} = \frac{45}{21}$

$r \cdot 21 = 7 \cdot 45$

$\frac{21r}{21} = \frac{315}{21}$

$r = 15$

9. $\frac{52}{12} = \frac{c}{3}$

$52 \cdot 3 = 12 \cdot c$

$\frac{156}{12} = \frac{12c}{12}$

$13 = c$

10. $\frac{5}{14} = \frac{40}{m}$

$5 \cdot m = 14 \cdot 40$

$\frac{5m}{5} = \frac{560}{5}$

$m = 112$

11. $\frac{25}{y} = \frac{10}{7}$

$25 \cdot 7 = y \cdot 10$

$\frac{175}{10} = \frac{10y}{10}$

$17.5 = y$

$\frac{25}{17.5} = \frac{10}{7}$

$175 = 175 \checkmark$

12. $\frac{20}{v} = \frac{5.2}{6.5}$

$20 \cdot 6.5 = v \cdot 5.2$

$\frac{130}{5.2} = \frac{5.2v}{5.2}$

$25 = v$

$\frac{20}{25} = \frac{5.2}{6.5}$

$130 = 130 \checkmark$

13. $\frac{18.5}{14} = \frac{n}{2.8}$

$18.5 \cdot 2.8 = 14n$

$\frac{51.8}{14} = \frac{14n}{14}$

$3.7 = n$

$\frac{18.5}{14} = \frac{3.7}{2.8}$

$51.8 = 51.8 \checkmark$

Directions: If the values in the table represent a proportional relationship, find the missing value.

14.

	Run 1	Run 2
miles	4	6
minutes	m	54

$\frac{4}{6} = \frac{m}{54}$

$6m = 4 \cdot 54$

$\frac{6m}{6} = \frac{216}{6}$

$m = 36$

15.

	Friday	Saturday
Hours Worked	5	h
Pay	\$43	\$64.50

$\frac{5}{h} = \frac{43}{64.50}$

$43h = 5 \cdot 64.50$

$\frac{43h}{43} = \frac{322.5}{43}$

$h = 7.5$

Name: _____

Math 7

Date: _____ Per: _____

Unit 4: Ratio, Proportion, & Percent

Quiz 4-1: Ratios, Rates, and Proportions**Part I: Ratios & Rates**

1. Given the word **ACCOMPLISHMENT**, what is the ratio of consonants to vowels? Give your answer in simplest form.

$$\frac{10}{4} = \frac{5}{2}$$

2. There are 15 students on the debate team. Of these, 3 are boys. Give the ratio of boys to girls on the debate team in simplest form.

$$\frac{3}{12} = \frac{1}{4}$$

3. In their last game, the New England Patriots scored 9 points in the first half. In the second half, they scored three less than two times the points in the first half. What is the ratio of the points scored in the second half to the total number of points scored?

1st: 9

$$2\text{nd: } 2(9) - 3 = 15$$

$$\frac{15}{24} = \frac{5}{8}$$

Write each rate as a unit rate.

4. 144 pages in 3 minutes

$$\frac{144}{3} = 48$$

5. $1\frac{1}{4}$ cup of milk in 15 brownies

$$\frac{15}{5\frac{1}{4}} = 15 \cdot \frac{4}{5} = 12$$

6. \$12 for 5 boxes of cereal

$$\frac{12}{5} = 2.4$$

7. 12 juice boxes for \$3.36

$$\frac{3.36}{12} = .28$$

8. The table below shows the square miles and population of four towns. Which town has the most people per square mile?

Town	Square Miles	Population	
Town A	38	29,000	≈ 763.2
Town B	42	31,500	$= 750$
Town C	25	19,200	$= 768$
Town D	54	39,000	≈ 722.2

Determine whether Option A or Option B is the better deal. Justify your answer by giving the unit rates for each option.

9. ☐ Option A: \$15.40 for 3.5 lbs of gummy bears

Unit Price: \$4.40/lb

- ☒ Option B: \$7.65 for 1.8 lbs of gummy bears

Unit Price: \$4.25/lb

1. 5:2

2. 1:4

3. 5:8

4. 48 pg/min

5. 12 brownies/cup

6. \$2.40/box

7. \$0.28/juice box

8. Town C

10. ☐ Option A: 20 ounces of ketchup for \$3.29
☒ Option B: 32 ounces of ketchup for \$4.49

Unit Price: \$0.16 / ounce
Unit Price: \$0.14 / ounce

Part II: Proportional Relationships & Solving Proportions

Determine whether the quantities in the table represent a proportional relationship.
If yes, give the constant rate.

11.

Times at Bat	Hits
6	4
10	8
15	12
20	15

Proportional? NO

Rate: —

12.

Gallons of Gas	Miles Driven
4	110
10	275
18	495
30	825

Proportional? Yes

Rate: 27.5 mi/gal

Determine whether the ratios form a proportion.

13. $\frac{18}{32}, \frac{27}{48}$ $18 \cdot 48 = 32 \cdot 27$
 $864 = 864$

14. $\frac{84}{54}, \frac{16}{9}$ $84 \cdot 9 = 54 \cdot 16$
 $756 = 864$

Solve each proportion.

15. $\frac{x}{15} = \frac{14}{30}$ $\frac{30x}{30} = \frac{210}{30}$
 $x = 7$

16. $\frac{6}{27} = \frac{4}{k}$ $\frac{6k}{6} = \frac{108}{6}$
 $k = 18$

17. $\frac{21}{r} = \frac{15}{14}$ $\frac{15r}{15} = \frac{294}{15}$
 $r = 19.6$

18. $\frac{1.6}{10} = \frac{w}{2.5}$ $\frac{10w}{10} = \frac{4}{10}$
 $w = 0.4$

13. Yes

14. No

15. x = 7

16. k = 18

17. r = 19.6

18. w = 0.4

19. m = 5 min

20. c = \$1.70

If the variables in the table form a proportional relationship, use a proportion to find the missing value.

19.

Minutes	Words
2	96
m	240

$\frac{96}{2} = \frac{240}{m}$

$\frac{96m}{96} = \frac{480}{96}$

$m = 5$

20.

Pounds	Cost
2.5	c
7	\$4.76

$\frac{c}{2.5} = \frac{4.76}{7}$

$\frac{7c}{7} = \frac{11.9}{7}$

$c = 1.7$

Name:

Date:

Topic:

Class:

Main Ideas/Questions

Notes/Examples

PROPORTION

Word Problems

Proportions can be used to solve word problems in which there is a constant rate. It's very important to **STAY CONSISTENT** when setting up your proportion. The units must match on each side of the equal sign. Which of the following equations is a valid proportion?

$$\frac{\text{miles}}{\text{hours}} = \frac{\text{hours}}{\text{miles}}$$

$$\frac{\text{miles}}{\text{hours}} = \frac{\text{miles}}{\text{hours}}$$

Helpful Hint: Set up a key when writing proportions to make sure the units stay consistent.

EXAMPLES

Directions: Solve each word problem using a proportion. Round to the nearest tenth or cent when necessary.

1. The ratio of hot dogs to hamburgers sold at a baseball stadium is 8:3. If there were 272 hot dogs were sold, how many hamburgers were sold?

$$\begin{array}{l} \frac{\text{HD}}{\text{HB}} \quad \frac{8}{3} = \frac{272}{x} \\ 8x = 816 \\ \frac{8x}{8} = \frac{816}{8} \\ \boxed{x = 102 \text{ hamburgers}} \end{array}$$

2. The ratio of children to teachers at a preschool is 14:5. How many children are at the preschool if there are 30 teachers?

$$\begin{array}{l} \frac{C}{T} \quad \frac{14}{5} = \frac{x}{30} \\ 5x = 420 \\ \frac{5x}{5} = \frac{420}{5} \\ \boxed{x = 84 \text{ children}} \end{array}$$

3. Malaya bought 32 pieces of candy for \$16. The next day she returns to buy more candy with \$4. How many pieces can she buy?

$$\begin{array}{l} \frac{C}{\$} \quad \frac{32}{16} = \frac{x}{4} \\ 16x = 128 \\ \frac{16x}{16} = \frac{128}{16} \\ \boxed{x = 8 \text{ pieces}} \end{array}$$

4. Three out of four students in school have at least one sibling. If there are 300 students in your school, how many would have at least one sibling?

$$\begin{array}{l} \frac{3}{4} = \frac{x}{300} \\ 4x = 900 \\ \frac{4x}{4} = \frac{900}{4} \\ \boxed{x = 225 \text{ students}} \end{array}$$

5. Dave is moving to a new house 5 km away from his old house. If one mile is approximately 1.6 km, how many miles are between the two houses?

$$\begin{array}{l} \frac{\text{mi}}{\text{km}} \quad \frac{x}{5} = \frac{1}{1.6} \\ 1.6x = 5 \\ \frac{1.6x}{1.6} = \frac{5}{1.6} \\ \boxed{x \approx 3.1 \text{ mi}} \end{array}$$

6. The fee to check luggage with a new airline is based on the weight of each bag. Brett paid \$7.14 to check a 42-pound bag. How much will Eileen pay if her bag weighs 63 pounds?

$$\begin{array}{l} \frac{\$}{\text{lb}} \quad \frac{7.14}{42} = \frac{x}{63} \\ 42x = 449.82 \\ \frac{42x}{42} = \frac{449.82}{42} \\ \boxed{x = \$10.71} \end{array}$$

7. If fourteen children in made 84 bracelets, how many children would it take to make 192 bracelets?

$$\frac{14}{84} = \frac{x}{192}$$

$$\frac{84x}{84} = \frac{2688}{84}$$

$$x = 32 \text{ children}$$

8. If one gallon is approximately 3.8 liters, how many liters are in 4.5 gallons?

$$\frac{1}{3.8} = \frac{4.5}{x}$$

$$x = 17.1 \text{ liters}$$

9. Jason spends 18 hours over three weeks practicing karate. How many hours does he practice in seven weeks?

$$\frac{18}{3} = \frac{x}{7}$$

$$\frac{3x}{3} = \frac{126}{3}$$

$$x = 42 \text{ hours}$$

10. One ounce is approximately 28.35 grams. If a chocolate bar weighs 360 grams, find its weight in ounces to the nearest tenth.

$$\frac{1}{28.35} = \frac{x}{360}$$

$$\frac{28.35x}{28.35} = \frac{360}{28.35}$$

$$x = 12.7 \text{ ounces}$$

11. Nick walked $\frac{3}{4}$ of a mile in 12 minutes. How long would it take him to walk three miles at this pace?

$$\frac{.75}{12} = \frac{3}{x}$$

$$\frac{.75x}{.75} = \frac{36}{.75}$$

$$x = 48 \text{ min}$$

12. A brownie recipe calls for 3 eggs for 18 brownies. How many eggs would be needed to make four dozen brownies?

$$\frac{3}{18} = \frac{x}{48}$$

$$\frac{18x}{18} = \frac{144}{18}$$

$$x = 8 \text{ eggs}$$

13. The Phillips family is slowly filling their pool. It takes 2 hours for 60 gallons of water to be pumped into the pool. How many gallons would be pumped in after 3 days?

$$\frac{2}{60} = \frac{72}{x}$$

$$\frac{2x}{2} = \frac{4320}{2}$$

$$x = 2160 \text{ gallons}$$

14. Margo read forty-two pages in 2.5 hours. Pete read six fewer pages in the same amount of time. How long would it take Pete to read 80 pages?

$$\frac{36}{2.5} = \frac{80}{x}$$

$$\frac{36x}{36} = \frac{200}{36}$$

$$x \approx 5.6 \text{ hours}$$

15. The ratio of green to yellow candies is 2:5. If there are 32 green candies, how many green and yellow candies are there altogether?

$$\frac{2}{5} = \frac{32}{x}$$

$$\frac{2x}{2} = \frac{160}{2}$$

$$x = 80$$

$$32 + 80$$

$$= 112$$

$$\text{Candies}$$

16. Allison can sew three scarves in 75 minutes. How many scarves can she sew in four hours?

$$\frac{3}{75} = \frac{x}{240}$$

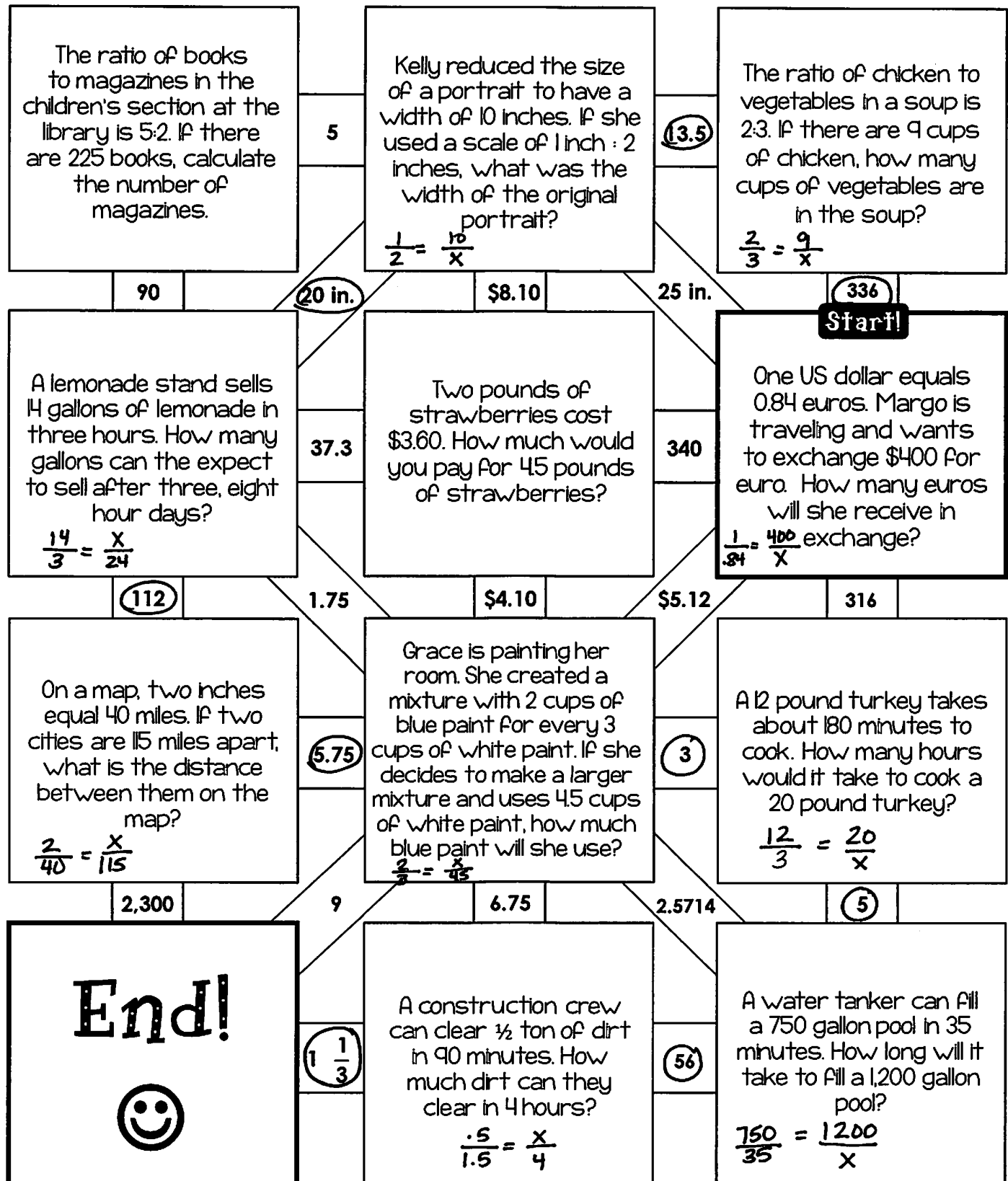
$$\frac{75x}{75} = \frac{720}{75}$$

$$x = 9.6$$

$$9 \text{ scarves}$$

Proportions Word Problems Maze!

Directions: Set up a proportion for each word problem then solve.
Use your solutions to navigate through the maze. **Staple all work to this paper!**



Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 5: Proportion Word Problems

**** This is a 2-page document! ******Directions:** Use a proportion to solve each word problem. Round to the nearest tenth or cent when necessary.

1. The ratio of adults to children in a movie theater is 7:2. If there are 26 children in the theater, how many adults are there?

$$\frac{7}{2} = \frac{x}{26}$$

$$2x = 182$$

$$x = 91 \text{ adults}$$

2. The ratio of students to laptops in a school is 3:2. If there are 1,200 students, how many laptops are there?

$$\frac{3}{2} = \frac{1200}{x}$$

$$3x = 2400$$

$$x = 800 \text{ laptops}$$

3. The toll on a highway is based on the number of miles driven. If the toll on a 15-mile stretch of highway is \$0.60, find the cost to drive a 80-mile stretch.

$$\frac{15}{0.60} = \frac{80}{x}$$

$$15x = 48$$

$$x = \$3.20$$

4. The late fee at the library is based on the number of days a book is late. Carter paid \$1.08 for a book that was 9 days late. If his sister Sydney's had a fee of \$1.92 for a late book, how many days late was the book?

$$\frac{1.08}{9} = \frac{1.92}{x}$$

$$1.08x = 17.28$$

$$x = 16 \text{ days}$$

5. If one meter is approximately 3.28 feet, how many meters are in 20 feet?

$$\frac{1}{3.28} = \frac{x}{20}$$

$$3.28x = 20$$

$$x = 6.1 \text{ m}$$

6. If 24 water bottles weigh 30 pounds, how much would a shipment of 150 water bottles weigh?

$$\frac{24}{30} = \frac{150}{x}$$

$$24x = 4500$$

$$x = 187.5 \text{ pounds}$$

7. There are 18 streetlights evenly spaced on a 1.5-mile road. How many streetlights would you expect on a 4-mile road in which they are spaced out the same?

$$\frac{18}{1.5} = \frac{x}{4}$$

$$1.5x = 72$$

$$x = 48 \text{ streetlights}$$

8. The shortfin mako shark is the fastest shark in the ocean, reaching speeds of 45 miles per hour. At this speed, how long would it take a shortfin mako shark to swim 75 miles?

$$\frac{45}{1} = \frac{75}{x}$$

$$45x = 75$$

$$x = 1.6 \text{ hours (1 hr 40 min)}$$

9. Jocelyn exchanged \$50 in United States currency for \$62 in Canadian currency. If she now has \$16 in Canadian currency left, how much can she expect to receive in exchange for United States currency?

$$\frac{50}{62} = \frac{x}{16}$$

$$62x = 800$$

$$x = \$12.90$$

10. A salad dressing recipe calls for $\frac{3}{4}$ cup of olive oil for every $\frac{1}{2}$ cup of vinegar. How many cups of vinegar are needed for 2 cups of olive oil?

$$\frac{.75}{.5} = \frac{2}{x}$$

$$.75x = 1$$

$$x = 1.\bar{3} \text{ cups}$$

(1 $\frac{1}{3}$ cups)

11. There are 158 beats per minute in a certain Taylor Swift song. If the song is 3 minutes and 30 seconds long, how many total beats are there?

$$\frac{158}{1} = \frac{x}{3.5}$$

$$x = 553 \text{ beats}$$

12. Two pumps can remove 1,300 gallons per minute from a flooded lake. If the goal is to pump 4,000 gallons per minute, how many pumps are needed?

$$\frac{2}{1300} = \frac{x}{4000}$$

$$1300x = 8000$$

$$x = 6.2$$

$$7 \text{ pumps}$$

13. Jane worked 38 hours at the grocery store last week and made \$296.40. If she works three less hours this week than she did last week, how much will she make?

$$\frac{38}{296.40} = \frac{35}{x}$$

$$38x = 10374$$

$$x = \$273$$

14. Alana's hair grew 2 inches in 5 months. How many inches would her hair grow in 1 year?

$$\frac{2}{5} = \frac{x}{12}$$

$$5x = 24$$

$$x = 4.8 \text{ in}$$

15. The ratio of strawberries to blueberries in a basket is 3:5. If there are 72 strawberries in the basket, find the total number of strawberries and blueberries in the basket.

$$\frac{3}{5} = \frac{72}{x}$$

$$3x = 360 \quad x = 120$$

$$120 + 72 = 192 \text{ berries}$$

16. Garrett can complete four laps around the track in 7 minutes and 45 seconds. How many full laps can be complete in 1 hour?

$$\frac{4}{7.75} = \frac{x}{60}$$

$$7.75x = 240$$

$$x = 30.9677$$

$$30 \text{ laps}$$

Name:	Date:
-------	-------

Topic:	Class:
--------	--------

Main Ideas/Questions	Notes/Examples
Scale Drawings & Models	A scale drawing or model is used to represent an object that is too big or too small to be shown in its actual size. The dimensions of the object on the scale drawing or model are proportional to the dimensions of the actual object.
Scale	<ul style="list-style-type: none"> The scale is the <u>ratio</u> of the size of the model to its actual size. Scale = <u>model / actual</u> A scale can have the same units or different units. You can use a scale to find a missing measure on the model or the actual object. Simply set up and solve a proportion.

Directions: Solve each word problem using a proportion.

1. Eric is planning to build a raised garden. He sketches a plan with a scale of 1.5 inches = 4 feet. If the garden has a width of 4 inches on the drawing, what will be the actual width of the garden?

$$\frac{1.5}{4} = \frac{4}{x}$$

$$\frac{1.5x}{1.5} = \frac{16}{1.5}$$

$$x = 10.6 \text{ ft}$$

(10 ft 8 in)

2. Alisha wants to enlarge a photograph to make into a poster for her room. The photograph is 6 inches tall. The poster will be created using a scale of 4.5 inches = 2 inches. How tall will the poster be?

$$\frac{2}{4.5} = \frac{6}{x}$$

$$\frac{2x}{2} = \frac{27}{2}$$

$$x = 13.5 \text{ in}$$

3. James is building a doll house that is proportional to his own house. He is using a scale of 0.5 inch = 1 foot. If the doll house is 12.3 inches tall, how tall is his house?

$$\frac{.5}{1} = \frac{12.3}{x}$$

$$\frac{.5x}{.5} = \frac{12.3}{.5}$$

$$x = 24.6 \text{ ft}$$

4. A drawing has been enlarged using a scale of 1 inch = 1.5 inches. If the original drawing was 4.6 inches long, how long is the enlargement?

$$\frac{1}{1.5} = \frac{4.6}{x}$$

$$x = 6.9 \text{ in}$$

5. The Mount Rushmore Monument is 60 feet tall. A model of the monument is sold in the gift shop. If the model was made using a scale of 1 inch = 40 inches, how tall is the model?

$$\frac{1}{40} = \frac{x}{720}$$

$$\frac{40x}{40} = \frac{720}{40}$$

$$x = 18 \text{ in}$$

6. An architect is reviewing plans for a house. A living room measures 4 inches by 6.5 inches on the plans. If the scale is 1 inch = 3 feet, what is the area of the actual living room?

$$\frac{1}{3} = \frac{4}{x}$$

$$x = 12$$

$$\frac{1}{3} = \frac{6.5}{x}$$

$$x = 19.5$$

$$234 \text{ sq. ft}$$

7. A large map has a scale of $1\frac{1}{2}$ inches = 40 miles. If two cities are $1\frac{1}{2}$ feet apart on the map, what is the actual distance between them?

$$\frac{1.5}{40} = \frac{18}{x}$$

$$\frac{1.5x}{1.5} = \frac{720}{1.5}$$

$$x = 480 \text{ mi}$$

8. Students in Mr. Morgan's math class were asked to produce drawing of themselves using the scale 0.75 inches = 2 feet. Travis is 5'8" tall. How tall will his drawing be?

$$\frac{.75}{24} = \frac{x}{68}$$

$$\frac{24x}{24} = \frac{51}{24}$$

$$x = 2.125 \text{ in}$$

Finding the Scale

To find the scale of a drawing or model:

- Step 1: Write the ratio of the model length to the actual length.
- Step 2: Simplify the ratio so the numerator is 1. (Divide the numerator and denominator by the numerator.)

Directions: Find the scale for each drawing/model:

9. Model Height: 6 in
Actual Height: 72 ft

$$\frac{6 \text{ in}}{72 \text{ ft}} \div 6 = \frac{1}{12}$$

$$1 \text{ in} = 12 \text{ ft}$$

10. Map Distance: 36 cm

Actual Distance: $4\frac{1}{2}$ km

$$\frac{36 \text{ cm}}{4.5 \text{ km}} = \frac{1}{.125}$$

$$1 \text{ cm} = \frac{1}{8} \text{ km}$$

11. A poster was made of a 6-foot tall musician. If the musician on the poster is 20 inches tall, was the scale used to make the poster?

$$\frac{20 \text{ in}}{6 \text{ ft}} = \frac{1}{.3}$$

$$1 \text{ in} = \frac{3}{10} \text{ ft}$$

12. A model airplane is 18 centimeters long. If the actual airplane is 60 meters long, what scale was used to create the model?

$$\frac{18 \text{ cm}}{60 \text{ m}} = \frac{1}{3.3}$$

$$1 \text{ cm} = 3\frac{1}{3} \text{ m}$$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 6: Scale Drawings & Models

**** This is a 2-page document! ****

Directions: A map uses a scale of 1 inch = 30 miles. The distance between various cities on the map are given below. Find the actual distance between the cities.

1. 4 inches

$$\frac{1}{30} = \frac{4}{x}$$

$$x = 120 \text{ mi}$$

2. 7 inches

$$\frac{1}{30} = \frac{7}{x}$$

$$x = 210 \text{ mi}$$

3. 1 foot

$$\frac{1}{30} = \frac{12}{x}$$

$$x = 360 \text{ mi}$$

Directions: A map uses a scale of $\frac{1}{2}$ centimeter = 75 kilometers. The actual distances between various cities are given below. Find the distance between the cities on the map.

4. 50 kilometers

$$\frac{.5}{75} = \frac{x}{50}$$

$$75x = 25$$

$$x = .\bar{3} \text{ cm}$$

5. 280 kilometers

$$\frac{.5}{75} = \frac{x}{280}$$

$$75x = 140$$

$$x = 1.\bar{8}\bar{6} \text{ cm}$$

6. $142\frac{1}{2}$ kilometers

$$\frac{.5}{75} = \frac{x}{142.5}$$

$$75x = 71.25$$

$$x = .95 \text{ cm}$$

Directions: Solve each word problem.

7. A scale drawing of the statue of Abraham Lincoln in the Lincoln Memorial uses a scale of 1 inches = 3 feet. If the statue is 19 feet tall, how tall is the statue on the drawing?

$$\frac{1}{3} = \frac{x}{19}$$

$$\frac{3x}{3} = \frac{19}{3}$$

$$x = 6.\bar{3} \text{ in}$$

8. A map of a city uses a scale of 1 centimeter = 3.5 meters. If a road shown on the map runs for 25 centimeters, how long is the road?

$$\frac{1}{3.5} = \frac{25}{x}$$

$$x = 87.5 \text{ m}$$

9. Jada made a model of the Space Needle in Seattle for a science project. She used a scale of 2 inches = 55 feet. If her project is 22 inches tall, find the actual height of the Space Needle.

$$\frac{2}{55} = \frac{22}{x}$$

$$\frac{2x}{2} = \frac{1210}{2}$$

$$x = 605 \text{ ft}$$

10. A scale drawing of an ant uses a scale of 1 centimeter = 1.5 millimeters. If the actual ant is 5 millimeters long, find the length of the ant on the drawing.

$$\frac{1}{1.5} = \frac{x}{5}$$

$$\frac{1.5x}{1.5} = \frac{5}{1.5}$$

$$x = 3.\bar{3} \text{ cm}$$

11. A poster of the Detroit Lions football players uses a scale of 4 inches = 3 feet. If quarterback Matthew Stafford is $8\frac{1}{3}$ inches tall on the poster, find his actual height.

$$\frac{4}{3} = \frac{8.\bar{3}}{x}$$

$$\frac{4x}{4} = \frac{25}{4}$$

$$x = 6.25 \text{ ft}$$

12. A scale drawing of an NFL goal post uses a scale of 2 inches = 5 feet. If the actual width of the goal post is $18\frac{1}{2}$ feet, what is the width of the goal post on the drawing?

$$\frac{2}{5} = \frac{x}{18.5}$$

$$\frac{5x}{5} = \frac{37}{5}$$

$$x = 7.4 \text{ in}$$

13. A scale drawing of the Tybee Island Lighthouse in Georgia is $9\frac{5}{8}$ inches tall. If the drawing use a scale of 5 inches = 80 feet, find the actual height of the lighthouse.

$$\frac{5}{80} = \frac{9.625}{x}$$

$$\frac{5x}{5} = \frac{770}{5}$$

$$x = 154 \text{ ft}$$

14. Jack's living room is 16 feet by 20 feet long. If a scale drawing of his living room uses a scale of $\frac{3}{4}$ inches = 6 feet, find the dimensions of his living room on the drawing.

$$\frac{.75}{6} = \frac{x}{16}$$

$$x = 2 \text{ in}$$

$$\frac{.75}{6} = \frac{x}{20}$$

$$x = 2.5 \text{ in}$$

$$2 \text{ in} \times 2.5 \text{ in}$$

Directions: Given the drawing/model length and the actual length, find each scale.

15. Drawing Length: 18 centimeters
Actual Length: 450 meters

$$\frac{18}{450} = \frac{1}{25}$$

$$1 \text{ cm} = 25 \text{ m}$$

16. Model Length: 4 feet
Actual Length: 250 miles

$$\frac{4}{250} = \frac{1}{62.5}$$

$$1 \text{ ft} = 62.5 \text{ mi}$$

17. Model Length: 40 centimeters
Actual Length: 15 millimeters

$$\frac{40}{15} = \frac{1}{.375}$$

$$1 \text{ cm} = .375 \text{ mm}$$

18. Drawing Length: 25 feet
Actual Length: 180 yards

$$\frac{25}{180} = \frac{1}{7.2}$$

$$1 \text{ ft} = 7.2 \text{ yd}$$

19. Miami and Orlando are 205 miles apart. If a map shows them as 5 inches apart, give the scale.

$$\frac{5}{205} = \frac{1}{41}$$

$$1 \text{ in} = 41 \text{ mi}$$

20. Sam made a model of the Liberty Bell with a base circumference of 8 inches. If the base circumference of the actual Liberty Bell is 12 feet, what scale did he use?

$$\frac{8}{12} = \frac{1}{1.5}$$

$$1 \text{ in} = 1.5 \text{ ft}$$

Name:

Class:

Topic:

Date:

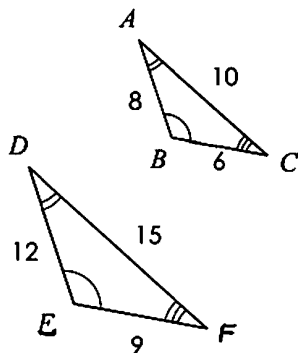
Main Ideas/Questions

Notes

SIMILAR FIGURES

- Similar figures have the same Shape but a different Size.
- Figures are similar if:
 - » Corresponding angles are congruent.
 - » Corresponding sides are proportionate.
- The ratio of corresponding sides is called the scale factor.

EXAMPLE

**Directions:** Use the triangles to the left to answer each question.1. Are the triangles similar? Yes

2. Give the corresponding angles and their relationship:

$\angle A \cong \angle D$

$\angle B \cong \angle E$

$\angle C \cong \angle F$

3. Give the corresponding sides and their relationship:

$$\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$$

4. What is the scale factor of $\triangle ABC$ to $\triangle DEF$?

$$\frac{8}{12} = \boxed{\frac{2}{3}}$$

5. What is the scale factor of $\triangle DEF$ to $\triangle ABC$?

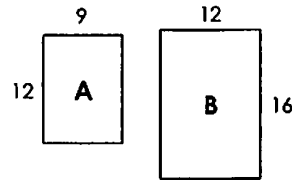
$$\frac{15}{10} = \boxed{\frac{3}{2}}$$

ARE WE SIMILAR?

Yes or No?!

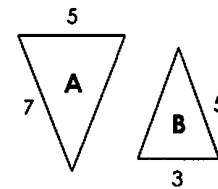
Directions: Determine whether the figures are similar. If they are, give the scale factor of Figure A to Figure B. Prove your answer.

6.



$$\frac{12}{16} = \frac{9}{12} \checkmark \quad \frac{9}{12} = \boxed{\frac{3}{4}}$$

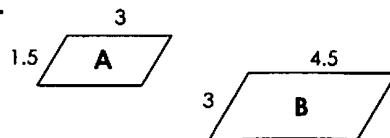
7.



$$\frac{5}{3} \neq \frac{7}{5}$$

Not Similar

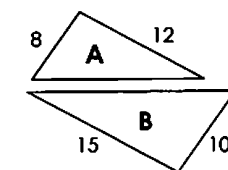
8.



$$\frac{1.5}{3} \neq \frac{3}{4.5}$$

Not Similar

9.



$$\frac{8}{10} = \frac{12}{15} \checkmark$$

$$\frac{8}{10} = \boxed{\frac{4}{5}}$$

FINDING MISSING MEASURES

Because the sides of similar figures are proportional, you can use a **proportion** to find a missing side length. Simply match up two pairs of corresponding sides.

EXAMPLES

Directions: Given each pair of figures are similar, set up and solve a proportion to find the missing side.

Similar Figures	Work and Solution
<p>10.</p>	$\frac{4}{2} = \frac{x}{4}$ $\frac{2x}{2} = \frac{16}{2}$ $x = 8$
<p>11.</p>	$\frac{16}{10} = \frac{8}{x}$ $\frac{16x}{16} = \frac{80}{16}$ $x = 5$
<p>12.</p>	$\frac{3}{4.5} = \frac{x}{6}$ $\frac{4.5x}{4.5} = \frac{18}{4.5}$ $x = 4$
<p>13.</p>	$\frac{11}{5} = \frac{x}{3}$ $\frac{5x}{5} = \frac{33}{5}$ $x = 6.6$
<p>14.</p>	$\frac{30}{24} = \frac{x}{20}$ $\frac{24x}{24} = \frac{600}{24}$ $x = 25$
<p>15.</p>	$\frac{3}{7.5} = \frac{x}{9}$ $\frac{7.5x}{7.5} = \frac{27}{7.5}$ $x = 3.6$

Name: _____

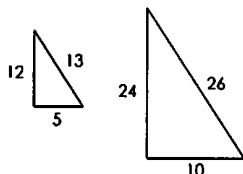
Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 7: Similar Figures

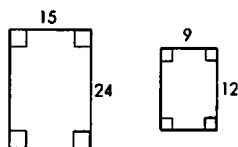
**** This is a 2-page document! ******Directions:** Determine whether the figures below are similar. Prove your answer

1.



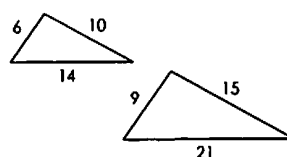
$$\frac{12}{24} = \frac{13}{26} = \frac{5}{10} \quad \text{yes}$$

2.



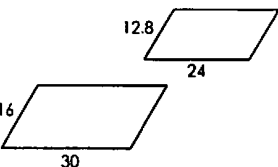
$$\frac{15}{9} \neq \frac{24}{12} \quad \text{No}$$

3.



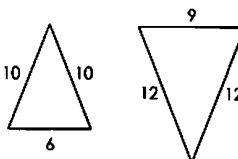
$$\frac{6}{9} = \frac{10}{15} = \frac{14}{21} \quad \text{yes}$$

4.



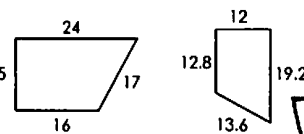
$$\frac{12.8}{16} = \frac{24}{30} \quad \text{yes}$$

5.



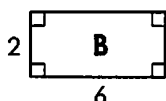
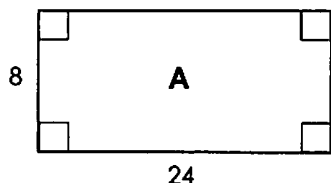
$$\frac{10}{12} \neq \frac{6}{9} \quad \text{No}$$

6.



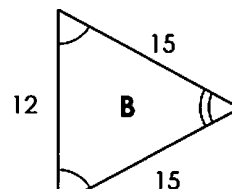
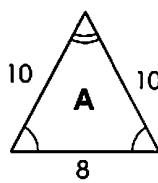
$$\frac{15}{12.8} = \frac{24}{19.2} = \frac{17}{13.6} = \frac{16}{12.8} \quad \text{yes}$$

7. If the figures below are similar, give the scale factor of Figure A to Figure B.



$$\frac{8}{2} = \frac{24}{6} \quad \checkmark \quad \frac{8}{2} = \boxed{\frac{4}{1}}$$

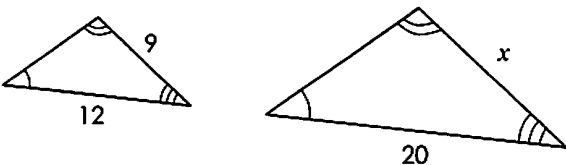
8. If the figures below are similar, give the scale factor of Figure B to Figure A.



$$\frac{10}{15} = \frac{8}{12} \quad \checkmark \quad \frac{12}{8} = \boxed{\frac{3}{2}}$$

Directions: Each pair of figures are similar. Use a proportion to find the missing side.**Similar Figures****Work and Solution**

9.

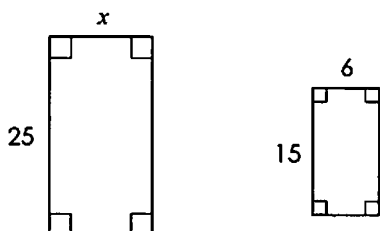


$$\frac{9}{x} = \frac{12}{20}$$

$$\frac{12x}{12} = \frac{180}{12}$$

$$\boxed{x = 15}$$

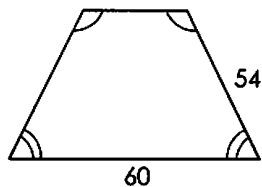
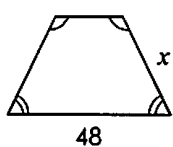
10.



$$\frac{x}{6} = \frac{25}{15}$$

$$\frac{15x}{15} = \frac{150}{15} \quad \boxed{x = 10}$$

11.

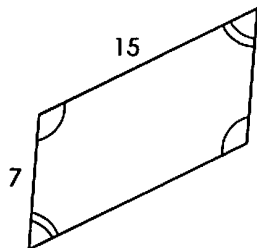
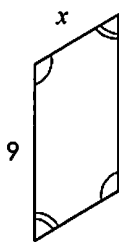


$$\frac{x}{54} = \frac{48}{60}$$

$$\frac{60x}{60} = \frac{2592}{60}$$

$$x = 43.2$$

12.

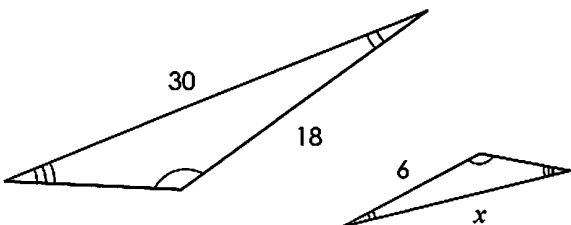


$$\frac{x}{7} = \frac{9}{15}$$

$$\frac{15x}{15} = \frac{63}{15}$$

$$x = 4.2$$

13.

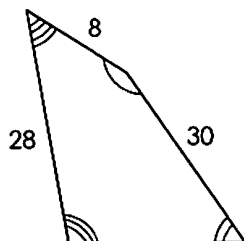
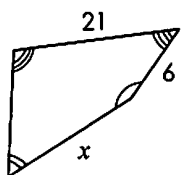


$$\frac{30}{x} = \frac{18}{6}$$

$$\frac{18x}{18} = \frac{180}{18}$$

$$x = 10$$

14.

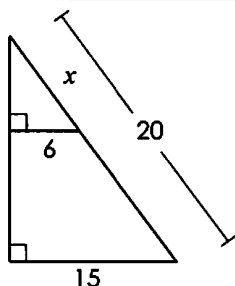


$$\frac{21}{28} = \frac{x}{30}$$

$$\frac{28x}{28} = \frac{630}{28}$$

$$x = 22.5$$

15.

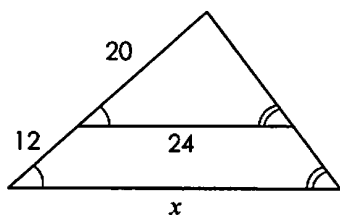


$$\frac{x}{20} = \frac{6}{15}$$

$$\frac{15x}{15} = \frac{120}{15}$$

$$x = 8$$

16.



$$\frac{20}{32} = \frac{24}{x}$$

$$\frac{20x}{20} = \frac{768}{20}$$

$$x = 38.4$$

Name:

Class:

Topic:

Date:

Main Ideas/Questions

Notes

Indirect Measurement

- Indirect measurement uses the properties of similar triangles to find measurements that are difficult to measure directly.
- One type of indirect measurement involves shadows.

Examples

Sample proportion:

$$\frac{\text{height}}{\text{shadow}} = \frac{\text{height}}{\text{shadow}}$$

Directions: Find each missing measure.

1. A home casts an 85-foot shadow. At the same time, a bush casts a 10-foot shadow. If the bush is 6 feet tall, how tall is the house?

$$\frac{x}{85} = \frac{6}{10}$$

$$\frac{10x}{10} = \frac{510}{10}$$

$$x = 51 \text{ ft}$$

2. A mailbox is 2.5 feet tall and casts a 5-foot shadow. Byron is 5 feet tall and is standing next to the mailbox. How long is Byron's shadow?

$$\frac{2.5}{5} = \frac{5}{x}$$

$$\frac{2.5x}{2.5} = \frac{25}{2.5}$$

$$x = 10 \text{ ft}$$

3. Morgan is 54 inches tall and helps raise the school flag each morning. She casts a 36-inch shadow, while the flagpole she is standing next to casts a shadow that is 90 inches long. How tall is the flagpole?

$$\frac{54}{36} = \frac{x}{90}$$

$$\frac{36x}{36} = \frac{4860}{36}$$

$$x = 135 \text{ in}$$

4. Two apple trees are growing next to each other. The older tree casts a 36-foot shadow. The smaller tree casts a 12-foot shadow and is 8 feet tall. How tall is the older tree?

$$\frac{x}{36} = \frac{8}{12}$$

$$\frac{12x}{12} = \frac{288}{12}$$

$$x = 24 \text{ ft}$$

5. The statue of liberty is 305 feet tall. Nicole is $5\frac{1}{2}$ tall and is casting an 8-foot shadow while standing next to the statue of liberty. How long is the statue of liberty's shadow?

$$\frac{305}{x} = \frac{5.5}{8}$$

$$\frac{5.5x}{5.5} = \frac{2440}{5.5}$$

$$x = 443.63 \text{ ft}$$

$$(443\frac{7}{11} \text{ ft})$$

6. Cora is on vacation. She is standing next to a palm tree that casts a 27-foot shadow. If Cora is casting a 6-foot shadow and is 60 inches tall, how many feet tall is the palm tree?

$$\frac{5}{6} = \frac{x}{27}$$

$$\frac{6x}{6} = \frac{135}{6}$$

$$x = 22.5 \text{ ft}$$

7. Kat is taking a picture next to a statue that casts a 7-foot shadow. Kat casts a 4-foot shadow. If Kat is 4'9" tall, how tall is the statue?

$$\frac{4.75}{4} = \frac{x}{7}$$

$$\frac{4x}{4} = \frac{33.25}{4}$$

$$x = 8.3125 \text{ ft} \quad \left(8\frac{5}{16} \text{ ft}\right)$$

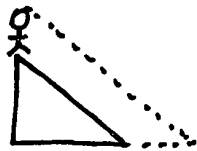
8. A set of sports bleachers is 30 feet tall. James is standing on the top of the bleachers. The bleachers cast a 40-foot shadow. The shadow of James standing on top of the bleachers is 48 feet long. How tall is James?

$$\frac{30}{40} = \frac{x}{48}$$

$$\frac{40x}{40} = \frac{1400}{40}$$

$$x = 36 \rightarrow$$

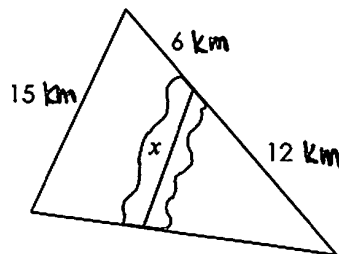
James is 6 ft tall



More Examples

Surveyors also use similar triangles to find distances that do not involve shadows. Given the diagrams, find each missing measure. Round to the nearest tenth when necessary.

9. The triangles below are similar. Find x , the distance across the river.

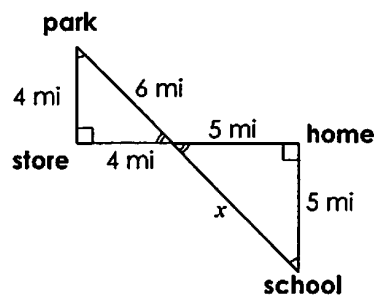


$$\frac{12}{x} = \frac{18}{15}$$

$$\frac{18x}{18} = \frac{180}{18}$$

$$x = 10 \text{ km}$$

10. The triangles below are similar. Find the distance from the school to the park.



$$\frac{4}{5} = \frac{6}{x}$$

$$\frac{4x}{4} = \frac{30}{4}$$

$$x = 7.5$$

$$13.5 \text{ mi}$$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 8: Indirect Measurement

1. Mark casts a shadow that is 4 feet long. At the same time, a nearby tree casts a shadow that is 20 feet long. If Mark is 6 feet tall, how tall is the tree?

$$\frac{6}{4} = \frac{x}{20}$$

$$\frac{4x}{4} = \frac{120}{4}$$

$$x = 30 \text{ ft}$$

2. A stop sign that is 7 feet tall casts a shadow that is 8 feet long. Find the length of the shadow casted by a nearby 63-foot tall building.

$$\frac{7}{8} = \frac{63}{x}$$

$$\frac{7x}{7} = \frac{504}{7}$$

$$x = 72 \text{ ft}$$

3. Evie is $5\frac{1}{2}$ feet tall and casts a 9-foot shadow. At the same time, a utility pole casts a 30-foot shadow. How tall is the utility pole?

$$\frac{5.5}{9} = \frac{x}{30}$$

$$\frac{9x}{9} = \frac{165}{9}$$

$$x = 18\frac{1}{3} \text{ ft}$$

$$(x = 18\frac{1}{3} \text{ ft})$$

4. A fire hydrant that is $2\frac{3}{4}$ feet tall casts a shadow that is 2 feet long. Find the length of the shadow casted by a nearby 154-foot tall lighthouse.

$$\frac{2.75}{2} = \frac{154}{x}$$

$$\frac{2.75x}{2.75} = \frac{308}{2.75}$$

$$x = 112 \text{ ft}$$

5. A 64-foot tall monument casts a shadow 16 feet long. If Kyle is standing nearby and is 6'3" tall, find the length of his shadow.

$$\frac{64}{16} = \frac{6.25}{x}$$

$$\frac{64x}{64} = \frac{100}{64}$$

$$x = 1.5625 \text{ ft}$$

$$(1\frac{9}{16} \text{ ft})$$

6. A 25-foot tall streetlight casts a shadow 20 feet long. If Melanie is standing at the end of the shadow casted by a 60-foot tall building, how far is she from the building?

$$\frac{25}{20} = \frac{60}{x}$$

$$\frac{25x}{25} = \frac{1200}{25}$$

$$x = 48 \text{ ft}$$

7. Abby is 5 feet tall and casts a 4-foot long shadow. If her older brother Ethan is standing next to her and casts a 4.6-foot shadow, how much taller than Abby is Ethan?

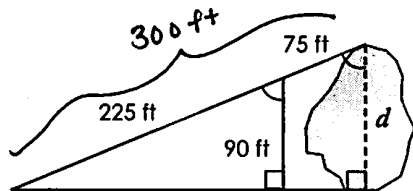
$$\frac{5}{4} = \frac{x}{4.6}$$

$$\frac{4x}{4} = \frac{23}{4}$$

$$x = 5.75 \text{ ft}$$

Ethan is 0.75 ft (9 in) taller.

9. Find d , the distance across the lake.



$$\frac{225}{90} = \frac{300}{x}$$

$$\frac{225x}{225} = \frac{27000}{225}$$

$$x = 120 \text{ ft}$$

8. The distance between a 16-foot tall flagpole and a 40-foot tall tree is equal to the sum of the lengths of their shadows. If the flagpole casts a 18-foot shadow, find the distance from the flagpole to the tree.

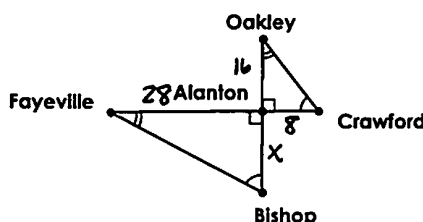
$$\frac{16}{18} = \frac{40}{x}$$

$$\frac{16x}{16} = \frac{720}{16}$$

$$x = 45$$

$$45 + 18 = 63 \text{ ft}$$

10. Alanton is 16 miles from Oakley, 8 miles from Crawford, and 28 miles from Fayeve. How far is Alanton from Bishop?



$$\frac{28}{16} = \frac{x}{8}$$

$$\frac{16x}{16} = \frac{224}{16}$$

$$x = 14 \text{ mi}$$

Name: _____

Math 7

Date: _____ Per: _____

Unit 4: Ratio, Proportion, & Percent

Quiz 4-2: Proportion Applications & Similar Figures

1. The ratio of pennies to quarters in a piggy bank is 14:3. If there are 51 quarters in the bank, how many pennies are there?

$$\frac{P}{Q} = \frac{14}{3} = \frac{X}{51}$$

$$\frac{3X}{3} = \frac{714}{3}$$

$$X = 238$$

2. Raynor earns \$4 in rewards for every \$75 he spends at the grocery store. If he earned \$44 in rewards last much, how much did he spend at the store?

$$\frac{4}{75} = \frac{44}{X}$$

$$\frac{4X}{4} = \frac{3300}{4}$$

$$X = 825$$

3. Kasha drove 135 miles and used 5.4 gallons of gas. If the fuel efficiency of her car remains consistent and gas costs \$2.59 per gallon, how much money can she expect to fill up her tank for an upcoming 300-mile road trip?

$$\frac{135}{5.4} = \frac{300}{X}$$

$$\frac{135X}{135} = \frac{1620}{135}$$

$$X = 12$$

$$12(2.59) = 31.08$$

4. Dale made a model of a lighthouse using a scale of 4 inches = 50 feet. If the lighthouse is 120 feet tall, how tall is his model?

$$\frac{4}{50} = \frac{X}{120}$$

$$\frac{50X}{50} = \frac{480}{50}$$

$$X = 9.6$$

5. The scale on a map reads $\frac{1}{2}$ inch = 75 miles. If the distance between two cities on the map is $3\frac{1}{4}$ inches, find the actual distance between the cities.

$$\frac{.5}{75} = \frac{3.25}{X}$$

$$\frac{.5X}{.5} = \frac{243.75}{.5}$$

$$X = 487.5$$

6. The Boeing 747 airplane is 250 feet in length. If a model of this plane is 8 inches long, what scale was used to create the model?

$$\frac{8}{250} = \frac{1}{31.25}$$

1. 238 pennies

2. \$825

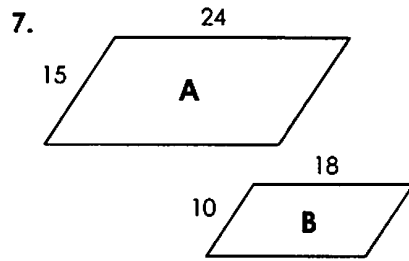
3. \$31.08

4. 9.6 in

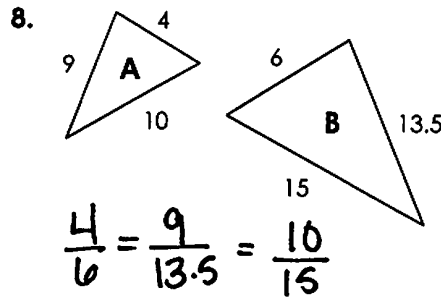
5. 487.5 mi

6. 1 in = 31.25 ft

For questions 7 and 8, determine if the figures are similar. If yes, give the scale factor of Figure A to Figure B.



$$\frac{15}{10} \neq \frac{24}{18}$$



$$\frac{4}{6} = \frac{9}{13.5} = \frac{10}{15}$$

$$\frac{4}{6} = \frac{2}{3}$$

7. Not Similar

8. yes; $\frac{2}{3}$

9. $x = 15$

10. $x = 23.2$

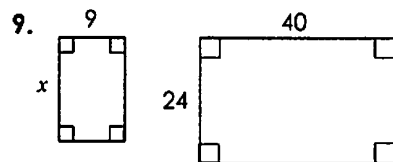
11. 120 ft

12. 2 ft

13. 27 ft

14. 32 ft

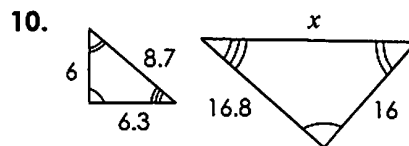
For questions 9 and 10, the figures are similar. Find x .



$$\frac{9}{24} = \frac{x}{40}$$

$$\frac{24x}{24} = \frac{360}{24}$$

$$x = 15$$



$$\frac{6}{16} = \frac{8.7}{x}$$

$$\frac{6x}{6} = \frac{139.2}{6}$$

$$x = 23.2$$

11. A 24-foot tree casts a shadow that is 9 feet long. At the same time, a nearby building casts a shadow 45 feet long. How tall is the building?

$$\frac{24}{9} = \frac{x}{45}$$

$$\frac{9x}{9} = \frac{1080}{9}$$

$$x = 120$$

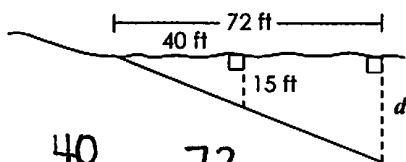
12. A water tower that is 132 feet tall casts a 48-foot long shadow. If Shannon is 5'6" inches tall and standing near the tower, find the length of her shadow.

$$\frac{132}{48} = \frac{5.5}{x}$$

$$\frac{132x}{132} = \frac{264}{132}$$

$$x = 2$$

13. Find d , the depth of the water.

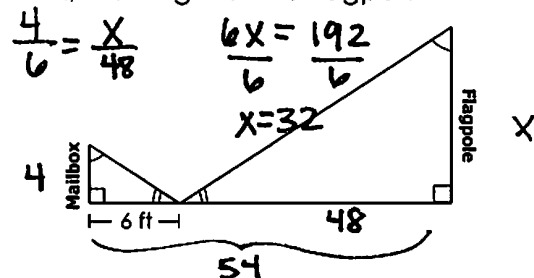


$$\frac{40}{15} = \frac{72}{d}$$

$$\frac{40d}{40} = \frac{1080}{40}$$

$$d = 27$$

14. If the mailbox is 4 feet tall and located 54 feet from the base of the flagpole, find the height of the flagpole.



$$\frac{4}{6} = \frac{x}{48}$$

$$\frac{6x}{6} = \frac{192}{6}$$

$$x = 32$$

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Percent Proportion	<p>In a Percent Proportion: One ratio compares a part of a quantity to the whole quantity. The other ratio shows the equivalent percent written as a fraction over 100.</p> <p>Depending on the wording of the problem, you may find the following two formulas beneficial in setting up your proportion:</p> <div style="display: flex; align-items: center; justify-content: center; gap: 20px;"> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ </div> ↔ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $\frac{\text{part}}{\text{whole}} = \frac{\%}{100}$ </div> </div>
Examples	<p>Directions: Use the percent proportion to solve each problem.</p> <div style="display: grid; grid-template-columns: 1fr 1fr; gap: 10px;"> <!-- Problem 1 --> <div> <p>1. 12 is what percent of 80?</p> $\frac{12}{80} = \frac{x}{100}$ $\frac{80x}{80} = \frac{1200}{80}$ $x = 15$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">15%</p> </div> <!-- Problem 2 --> <div> <p>2. What percent of 90 is 72?</p> $\frac{72}{90} = \frac{x}{100}$ $\frac{90x}{90} = \frac{7200}{90}$ $x = 80$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">80%</p> </div> <!-- Problem 3 --> <div> <p>3. What is 70% of 150?</p> $\frac{x}{150} = \frac{70}{100}$ $\frac{100x}{100} = \frac{10500}{100}$ $x = 105$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 105</p> </div> <!-- Problem 4 --> <div> <p>4. Find 95% of 140.</p> $\frac{x}{140} = \frac{95}{100}$ $\frac{100x}{100} = \frac{13300}{100}$ $x = 133$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 133</p> </div> <!-- Problem 5 --> <div> <p>5. 6 is 5% of what number?</p> $\frac{6}{x} = \frac{5}{100}$ $\frac{5x}{5} = \frac{600}{5}$ $x = 120$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 120</p> </div> <!-- Problem 6 --> <div> <p>6. 77% of what number is 100.1?</p> $\frac{100.1}{x} = \frac{77}{100}$ $\frac{77x}{77} = \frac{10010}{77}$ $x = 130$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 130</p> </div> <!-- Problem 7 --> <div> <p>7. Find 12.5% of 60.</p> $\frac{x}{60} = \frac{12.5}{100}$ $\frac{100x}{100} = \frac{750}{100}$ $x = 7.5$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 7.5</p> </div> <!-- Problem 8 --> <div> <p>8. 61.2 is what percent of 90?</p> $\frac{61.2}{90} = \frac{x}{100}$ $\frac{90x}{90} = \frac{6120}{90}$ $x = 68$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">68%</p> </div> <!-- Problem 9 --> <div> <p>9. 52.5% of what number is 105?</p> $\frac{105}{x} = \frac{52.5}{100}$ $\frac{52.5x}{52.5} = \frac{10500}{52.5}$ $x = 200$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 200</p> </div> <!-- Problem 10 --> <div> <p>10. What is 32% of 50?</p> $\frac{x}{50} = \frac{32}{100}$ $\frac{100x}{100} = \frac{1600}{100}$ $x = 16$ <p style="border: 1px solid black; padding: 2px; display: inline-block;">x = 16</p> </div> </div>

	<p>11. What percent is 2.5 of 40?</p> $\frac{2.5}{40} = \frac{x}{100} \quad \frac{40x=250}{\frac{40}{40} \frac{250}{40}}$ $x=6.25$	<p>12. 67.1 is 55% of what number?</p> $\frac{67.1}{x} = \frac{55}{100} \quad \frac{55x=6710}{\frac{55}{55} \frac{6710}{55}}$ $x=122$
Applications	<p>13. Hannah has a goal of running 42 miles this week. By Tuesday she had completed 20% of her goal. How many miles had she run by Tuesday?</p> $\frac{x}{42} = \frac{20}{100}$ $\frac{100x}{100} = \frac{840}{100}$ $x=8.4 \text{ mi}$	<p>14. There are 84 jars of jelly on a shelf at the store. 21 are grape. What percent of the jars of jelly are grape?</p> $\frac{20}{84} = \frac{x}{100}$ $\frac{84x}{84} = \frac{2100}{84}$ $x=25$ 25%
	<p>15. 45% of the rooms in a hotel are booked. If 36 rooms are booked, how many rooms are in hotel altogether?</p> $\frac{36}{x} = \frac{45}{100}$ $\frac{45x}{45} = \frac{3600}{45}$ $x=80$ 80 rooms	<p>16. In Orlando, Florida, there are an average of 24 days of rain each June. What percent of the month of June experiences rain?</p> $\frac{24}{30} = \frac{x}{100}$ $30x=2400$ $x=80$ 80%
	<p>17. In a daycare program, 14% of the children are in the infants and toddler classes. If there are 9 infants and 12 toddlers, how many total children are in the daycare program?</p> $\frac{21}{x} = \frac{14}{100}$ $\frac{14x}{14} = \frac{2100}{14}$ $x=150$ 150 kids	<p>18. Jameson used 42% of the money on a gift card to purchase groceries. If he spent \$67.20 on groceries, how much was on the gift card to begin with?</p> $\frac{67.20}{x} = \frac{42}{100}$ $\frac{42x}{42} = \frac{6720}{42}$ $x=160$ $\$160$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 9: The Percent Proportion

Directions: Use the percent proportion to solve each problem.

1. 14 is what percent of 25?

$$\frac{14}{25} = \frac{X}{100}$$

$$25X = 1400$$

$$X = 56$$

2. What percent of 120 is 7.8?

$$\frac{7.8}{120} = \frac{X}{100}$$

$$120X = 780$$

$$X = 6.5$$

3. What is 37.5% of 360?

$$\frac{X}{360} = \frac{37.5}{100}$$

$$100X = 13500$$

$$X = 135$$

4. What is 15% of 92?

$$\frac{X}{92} = \frac{15}{100}$$

$$100X = 1380$$

$$X = 13.8$$

5. Find 4% of 1,275.

$$\frac{X}{1275} = \frac{4}{100}$$

$$100X = 5100$$

$$X = 51$$

6. Find 18.5% of 500.

$$\frac{X}{500} = \frac{18.5}{100}$$

$$100X = 9250$$

$$X = 92.5$$

7. 16.8 is 10% of what number?

$$\frac{16.8}{X} = \frac{10}{100}$$

$$10X = 1680$$

$$X = 168$$

8. 2.5% of what number is 14?

$$\frac{14}{X} = \frac{2.5}{100}$$

$$1400 = 2.5X$$

$$X = 560$$

9. 150 is 96% of what number?

$$\frac{150}{X} = \frac{96}{100}$$

$$96X = 15000$$

$$X = 156.25$$

10. Jaylon spent \$21.60 of the \$80 he got for his birthday. What percent of his money did he spend?

$$\frac{21.60}{80} = \frac{X}{100}$$

$$\frac{80X}{80} = \frac{2160}{80}$$

$$X = 27$$

$$27\%$$

11. Of the 180 days of school last year, Grace was absent 15 days. What percent of the days was she absent?

$$\frac{15}{180} = \frac{X}{100}$$

$$\frac{180X}{180} = \frac{1500}{180}$$

$$X = 8.\bar{3}$$

$$8.\bar{3}\%$$

12. Race drivers must complete 200 laps in the Daytona 500. If Ricky Bobby only completed 57% of the race, how many laps did he complete?

$$\frac{X}{200} = \frac{57}{100}$$

$$\frac{100X}{100} = \frac{11400}{100}$$

$$X = 114 \text{ laps}$$

13. There are 1,560 students enrolled at Greenwood Middle School. If 85% of these students ride the bus, how many do not ride the bus?

$$\frac{X}{1560} = \frac{85}{100}$$

$$\frac{100X}{100} = \frac{132600}{100}$$

$$X = 1326$$

$$234 \text{ do not ride bus}$$

14. Ed is a car salesman. He makes 1.5% commission on each car he sells. If he made \$397.50 on the last car he sold, find the sales price of the car.

$$\frac{397.50}{X} = \frac{1.5}{100}$$

$$\frac{1.5X}{1.5} = \frac{39750}{1.5}$$

$$X = 26500$$

$$\$26500$$

15. Heather bought a large bag of bird seed and used 24% of the bag. How many pounds were originally in the bag if there are 15.2 pounds left?

$$\frac{15.2}{X} = \frac{76}{100}$$

$$\frac{76X}{76} = \frac{1520}{76}$$


$$X = 20 \text{ pounds}$$

Name:

Class:

Topic:

Date:

Main Ideas/Questions	Notes	
PERCENT EQUATION	<p>The percent equation is another way to find a part of a whole quantity by <u>multiplying</u> the <u>whole</u> by the percent written as a <u>decimal</u>.</p> $\boxed{\text{Whole}} \cdot \boxed{\%} = \boxed{\text{Part}}$ <p>Written as a decimal! </p>	
	<p>Reminder: To convert a percent to a decimal, divide the percent by 100 OR move the decimal to the left two places.</p>	
EXAMPLES	1. Find 15% of 60.	2. Find 36% of 80.
	$60(.15) = \boxed{9}$	$80(.36) = \boxed{28.8}$
	3. What is 22% of 45?	4. What is 32.5% of 250?
	$45(.22) = \boxed{9.9}$	$250(.325) = \boxed{81.25}$
	5. 44.8 is what percent of 140?	6. 80 is what percent of 120?
	$\frac{140x}{140} = \frac{44.8}{140}$ $x = .32 \quad \boxed{32\%}$	$\frac{120x}{120} = \frac{80}{120}$ $x = .6\bar{6} \quad \boxed{66.\bar{6}\%}$
	7. What percent of 95 is 60.8?	8. What percent of 12 is 3.3?
	$\frac{95x}{95} = \frac{60.8}{95}$ $x = .64 \quad \boxed{64\%}$	$\frac{12x}{12} = \frac{3.3}{12}$ $x = .275 \quad \boxed{27.5\%}$
	9. 221 is 65% of what number?	10. 11.25 is 75% of what number?
	$\frac{.65x}{.65} = \frac{221}{.65}$ $x = 340 \quad \boxed{340}$	$\frac{.75x}{.75} = \frac{11.25}{.75}$ $x = 15 \quad \boxed{15}$

	<p>11. 4 is 80% of what number?</p> $\begin{array}{r} .80x = 4 \\ .8 \quad .8 \\ \hline x = 5 \end{array}$	<p>12. 132 is 60% of what number?</p> $\begin{array}{r} .60x = 132 \\ .60 \quad .60 \\ \hline x = 220 \end{array}$
APPLICATIONS	<p>13. Nathan completed 60% of the passes he attempted during the last football season. If he attempted 90 passes, how many did he complete?</p> $90(.60) = 54$ <p>54 passes</p>	<p>14. Emma scored a 75% on her math test. If there were 60 questions on the test, how many did she get correct?</p> $60(.75) = 45$ <p>45 questions</p>
	<p>15. Rafael has \$230 in his savings account. He used 20% of his money to buy a video game. What was the cost of the video game?</p> $230(.20) = 46$ <p>\$46</p>	<p>16. Tyler ate 42 grapes from a bowl. There were 90 grapes in the bowl to begin with. What percent of the grapes did Tyler eat?</p> $\begin{array}{r} 90x = 42 \\ 90 \quad 90 \\ \hline x = .46\bar{6} \end{array}$ <p>46.67%</p>
	<p>17. Bruce spent \$30 on lunch. If he had \$55 in his wallet, what percent of his money did he spend on lunch?</p> $\begin{array}{r} 55x = 30 \\ 55 \quad 55 \\ \hline x = .54 \end{array}$ <p>54.547%</p>	<p>18. 45% of the students at River Middle School walk to school. If 234 students walk to school, how many students are at River Middle School altogether?</p> $\begin{array}{r} .45x = 234 \\ .45 \quad .45 \\ \hline x = 520 \end{array}$ <p>520 students</p>
	<p>19. Bakersfield California sees 191 sunny days on average each year. What percent of the total days in a year are sunny in Bakersfield?</p> $\begin{array}{r} 365x = 191 \\ 365 \quad 365 \\ \hline x \approx .5232 \end{array}$ <p>52.329%</p>	<p>20. Rachel paid \$58 for a Blu-ray player that was on sale. She only paid 80% of the original cost. What was the original cost of the Blu-ray player?</p> $\begin{array}{r} .8x = 58 \\ .8 \quad .8 \\ \hline x = 72.5 \end{array}$ <p>\$72.50</p>

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 10: The Percent Equation

Directions: Use the percent equation to solve each problem.

1. Find 15% of 120.

$$120(.15) =$$

$$\boxed{18}$$

2. What is 60% of 52?

$$52(.60) =$$

$$\boxed{31.2}$$

3. What is 3% of 84?

$$84(.03) =$$

$$\boxed{2.52}$$

4. 378 is what percent of 450?

$$\frac{450x}{450} = \frac{378}{450}$$

$$x = .84$$

$$\boxed{84\%}$$

5. What percent of 72 is 68.4?

$$\frac{72x}{72} = \frac{68.4}{72}$$

$$x = .95$$

$$\boxed{95\%}$$

6. 8 is what percent of 128?

$$\frac{128x}{128} = \frac{8}{128}$$

$$x = .0625$$

$$\boxed{6.25\%}$$

7. 48 is 40% of what number?

$$\frac{.40x}{.40} = \frac{48}{.40}$$

$$\boxed{x = 120}$$

8. 12.5 is 8% of what number?

$$\frac{.08x}{.08} = \frac{12.5}{.08}$$

$$\boxed{x = 156.25}$$

9. What number is 62.5% of 195?

$$195(.625) =$$

$$\boxed{121.875}$$

10. Lynn took a test and got 60% of the questions correctly. If the test had 95 questions, how many did she get correct?

$$95(.60) = 57$$

$$\boxed{57 \text{ questions}}$$

11. On Halloween, 87.5% of the homes in a certain neighborhood handed out candy. If there are 104 homes in the neighborhood, how many handed out candy?

$$104(.875) = 91$$

$$\boxed{91 \text{ homes}}$$

12. Adam is a field goal kicker. If he made 30 field goals out of his last 32 attempts, what percent of the attempts did he make?

$$\frac{32x}{32} = \frac{30}{32}$$

$$x = .9375$$

$$\boxed{93.75\%}$$

13. Karrie was late to work 14 times last year. If she worked 250 days last year, what percent of the days was she late?

$$\frac{250x}{250} = \frac{14}{250}$$

$$x = .056$$

$$\boxed{5.6\%}$$

14. Last softball season, Jenny hit 32% of the times she was at bat. If she had 80 hits, how many times was she at bat?

$$\frac{.32x}{.32} = \frac{80}{.32}$$

$$x = 250$$

$$\boxed{250 \text{ at bats}}$$

15. At a lightbulb manufacturing plant, 2% of the lightbulbs are found to be defective. If the plant had 56 defective lightbulbs on certain day, how many did it manufacture that day?

$$\frac{.02x}{.02} = \frac{56}{.02}$$

$$x = 2800$$

$$\boxed{2800 \text{ lightbulbs}}$$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples				
WARM-UP	Directions: Use your calculator to find 5%, 10%, and 20% of each value.				
		Value	5%	10%	20%
	1.	5	.25	.5	1
	2.	29	1.45	2.9	5.8
	3.	84	4.2	8.4	16.8
	4.	125	6.25	12.5	25
	5.	463	23.15	46.3	92.6
	6.	700	35	70	140
IDENTIFYING PATTERNS	Directions: Describe the patterns you see for each percentage.				
	10%	Move the decimal one spot to the left			
	5%	Half of 10%; Find 10%, then half that #			
	20%	Double 10%; Find 10%, then double that #			
FINDING 10% Mentally	To find 10% mentally: Move the decimal one spot to the left.				
	Directions: Find 10% of each number mentally:				
	7. 6 0.6	8. 158 15.8		9. 19 1.9	
	10. 840 84	11. 361 36.1		12. 73 7.3	
FINDING 20% Mentally	To find 20% mentally: Find 10%, then double your answer				
	Example: <div>Given: 32</div> \Rightarrow <div>10% of 32: 3.2</div> \Rightarrow <div>20% of 32: 6.4</div>				
	Directions: Find 20% of each number mentally.				
	13. 220 10% = 2.2 20% = 44	14. 108 10% = 10.8 20% = 21.6		15. 43 10% = 4.3 20% = 8.6	
	16. 572 114.4	17. 9 1.8		18. 495 99	

FINDING 5% Mentally

To find 5% mentally: Find 10%, then half your answer

Example:

Given:
86



10% of 86:
8.6



5% of 86:
4.3

Directions: Find 5% of each number mentally.

19. 14

$$10\% = 1.4$$

$$5\% = \boxed{0.7}$$

20. 162

$$10\% = 16.2$$

$$5\% = \boxed{8.1}$$

21. 97

$$10\% = 9.7$$

$$5\% = \boxed{4.85}$$

22. 300

$$\boxed{15}$$

23. 249

$$\boxed{12.45}$$

24. 560

$$\boxed{28}$$

FINDING 15% Mentally

To find 15% mentally: Find 5% and 10%, then add them together

Example:

Given:
28



10% of 28:
2.8



5% of 28:
1.4



15% of 28:
4.2

Directions: Find 15% of each number mentally.

25. 180

$$10\% = 18$$

$$5\% = 9$$

$$15\% = \boxed{27}$$

26. 5

$$10\% = .5$$

$$5\% = .25$$

$$15\% = \boxed{.75}$$

27. 248

$$10\% = 24.8$$

$$5\% = 12.4$$

$$15\% = \boxed{37.2}$$

28. 39

$$\boxed{5.85}$$

29. 88

$$\boxed{13.2}$$

30. 52

$$\boxed{7.8}$$

APPLICATIONS

Directions: Find each number mentally.

31. Jonah used 20% of his paycheck to pay bills. If he made \$572, how much were his bills?

$$10\% : 57.2$$

$$20\% : 114.4$$

$$\boxed{\$114.40}$$

32. Blair bought a bag of 2.7 pounds of gummy bears. If she gives 10% of the bag to her friend, how many pounds does she have left?

$$10\% : .27$$

$$2.7 - .27 = \boxed{2.43 \text{ lb}}$$

33. Last month, 15% of 140 phone calls that Nick received were from his mother. How many times did his mother call him?

$$10\% : 14$$

$$5\% : 7$$

$$15\% : 21$$

$$\boxed{21 \text{ times}}$$

34. This past weekend, the grocery store donated 5% of each sale to the local schools. If Sam's grocery bill was \$82.60, how much went to help the schools?

$$10\% : 8.26$$

$$5\% : 4.13$$

$$\boxed{\$4.13}$$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 11: Finding Percents Mentally

Directions: Find each percent mentally.

1. What is 15% of 80.

$10\% : 8$

$5\% : 4$

$15\% : \boxed{12}$

2. Find 10% of 42.

$\boxed{4.2}$

3. Find 5% of 196.

$10\% : 19.6$

$5\% : \boxed{9.8}$

4. What is 20% of 12?

$10\% : 1.2$

$20\% : \boxed{2.4}$

5. Find 15% of 430.

$10\% : 43$

$5\% : 21.5$

$15\% : \boxed{64.5}$

6. What is 20% of 650.

$10\% : 65$

$20\% : \boxed{130}$

7. Find 10% of 8.

$\boxed{0.8}$

8. What is 20% of 75?

$10\% : 7.5$

$20\% : \boxed{15}$

9. Find 5% of 88.

$10\% : 8.8$

$5\% : \boxed{4.4}$

10. Tatum exercised for 55 minutes. 10% of that time was spent warming up. How many minutes did Tatum spend warming up?

$\boxed{5.5 \text{ minutes}}$

11. Marco bought a 64 ounce bag of popcorn. He ate 5% of the bag with his lunch. How much popcorn did he eat at lunch?

$10\% : 6.4$

$5\% : 3.2$

$\boxed{3.2 \text{ ounces}}$

12. Allison sent and received 240 text messages last month. 20% of those messages were sent to her best friend. How many text messages did Allison send to her best friend last month?

$10\% : 24$

$20\% : 48$

$\boxed{48 \text{ texts}}$

13. Wesley spent \$34.60 at the grocery store. 15% of that was spent on fruit. How much did Wesley spend on fruit?

$10\% : 3.46$

$5\% : 1.73$

$15\% : 5.19$

$\boxed{\$5.19}$

14. Charlotte bought a 14 pound bag of ice. By the time she got home, 10% of the bag had melted and dripped out of the bag. How much did the ice weigh when she got home?

$10\% : 1.4$

$14 - 1.4 = \boxed{12.6 \text{ lb}}$

15. Xavier filled a 36 ounce cup with water. He quickly drank 20% of it. How much water did he drink?

$10\% : 3.6$

$20\% : 7.2$

$\boxed{7.2 \text{ ounces}}$

Name: _____

Math 7

Date: _____ Per: _____

Unit 4: Ratio, Proportion, & Percent

Quiz 4-3: Percent Proportion/Percent Equation

Use the percent proportion or percent equation to solve. Round to the nearest tenth or cent when necessary.

1. Find 55% of 134.

$$134(.55) = x$$

2. 19.5 is what percent of 150?

$$150x = 19.5$$

3. 4.5 is 7.5% of what number?

$$.075x = 4.5$$

4. What is 96% of 112.5?

$$112.5(.96) = x$$

5. 15.7 is what percent of 785?

$$785x = 15.7$$

6. 24 is 31.25% of what number?

$$.3125x = 24$$

7. Ben ran for president of his class. If there are 410 students and he received 72% of the vote, how many students voted for Ben?

$$410(.72) = x$$

$$x = 295.2$$

8. Hannah is driving 680 miles from Nashville to Orlando. If she has 306 miles left to drive, what percent of the trip has she driven?

$$680x = 374$$

$$x = 0.55$$

9. Marcus went on a diet and lost weight. He now weighs 197.4 pounds, which is 84% of his original weight. How much did he weigh at the beginning of his diet?

$$.84x = 197.4$$

$$x = 235$$

10. Caroline needs to find 15% of \$128, but she doesn't have a calculator. Thoroughly explain how she can do this mentally, detailing each step. Give the final answer.

Caroline can find 10% by moving the decimal left one time, resulting in 12.8. She can then find 5% by halving the 10% value, giving her 6.4. Lastly, she can total the 10% and 5% values to get 15%. Caroline will then find 15% of \$128 to be \$19.20.

1. 73.7

2. 13%

3. 60

4. 108

5. 2%

6. 76.8

7. 295 students

8. 55%

9. 235 lb

Name: _____

Class: _____

Topic: _____

Date: _____

Main Ideas/Questions	Notes	
Discount & Markup	<ul style="list-style-type: none"> Stores frequently discount or markup items. Discounts are <u>subtracted</u> from the original price. Markups are <u>added</u> to the original price. The <u>Selling price</u> (or sale price) is the amount the customer ends up paying. 	
Examples	Directions: Find the discount and markup for each, then find the final selling price. Round to the nearest cent when necessary.	
	1. dresser: \$280, 15% off $280(.15) = 42$ $280 - 42 = 238$ Discount: <u>\$ 42</u> Selling Price: <u>\$ 238</u>	2. apple juice: \$4.90, 20% off $4.90(.20) = 0.98$ $4.90 - 0.98 = 3.92$ Discount: <u>\$ 0.98</u> Selling Price: <u>\$ 3.92</u>
	3. 24-pack of bottled water: \$9.99, 30% off $9.99(.30) = 3.00$ $9.99 - 3.00 = 6.99$ Discount: <u>\$ 3</u> Selling Price: <u>\$ 6.99</u>	4. box of diapers: \$28.75, 10% off $28.75(.10) = 2.88$ $28.75 - 2.88 = 25.87$ Discount: <u>\$ 2.88</u> Selling Price: <u>\$ 25.87</u>
	5. box of copy paper: \$25, 4% markup $25(.04) = 1$ $25 + 1 = 26$ Markup: <u>\$ 1</u> Selling Price: <u>\$ 26</u>	6. video game: \$64.50, 8% markup $64.50(.08) = 5.16$ $64.50 + 5.16 = 69.66$ Markup: <u>\$ 5.16</u> Selling Price: <u>\$ 69.66</u>
	7. box of pencils: \$5.25, 25% markup $5.25(.25) = 1.31$ $5.25 + 1.31 = 6.56$ Markup: <u>\$ 1.31</u> Selling Price: <u>\$ 6.56</u>	8. laptop: \$199.99, 13% markup $199.99(.13) = 26.00$ $199.99 + 26.00 = 225.99$ Markup: <u>\$ 26</u> Selling Price: <u>\$ 225.99</u>

Sales Tax & Tip	<ul style="list-style-type: none"> Sales tax is a percentage <u>added</u> to the selling price. A tip is a percentage <u>added</u> to the total bill.
Examples	<div> <div> <p>9. Find the final price of an \$719.99 laptop with 5% sales tax.</p> $719.99(.05) = 36$ $719.99 + 36 = \boxed{\\$755.99}$ </div> <div> <p>10. Find the final price of a \$149.99 smart watch with 8.5% sales tax.</p> $149.99(.085) = 12.75$ $149.99 + 12.75 = \boxed{\\$162.74}$ </div> </div>
	<p>11. A \$799.99 television is selling for 13% off. Find the final price of the television if the sales tax is 6%.</p> <div> $799.99(.13) = 104$ $799.99 - 104 = 695.99$ </div> <div> $695.99(.06) = 41.76$ $695.99 + 41.76 = \boxed{\\$737.75}$ </div>
	<p>14. The Martin family went out to dinner. Their total was \$125.80. The used a coupon to save 15% on their meal. They left an 18% tip on the original total. Find the total dinner bill, including the discount and tip.</p> <div> $125.80(.15) = 18.87$ $125.80 - 18.87 = 106.93$ </div> <div> $125.80(.18) = 22.64$ $106.93 + 22.64 = \boxed{\\$129.57}$ </div>
	<p>15. Cheryl bought an \$80 coffee maker that was discounted 20% and a \$55 storage shelf that was discounted 30%. She was charged 8% tax on her purchase. How much did she pay altogether?</p> <div> $80(.20) = 16$ $80 - 16 = 64$ </div> <div> $55(.3) = 16.5$ $55 - 16.5 = 38.5$ </div> <div> $102.5(.08) = 8.2$ $102.5 + 8.2 = \boxed{\\$110.70}$ </div>
Commission	<ul style="list-style-type: none"> Commission is a percentage <u>paid</u> or <u>earned</u> for services.
Examples	<p>16. The Moore family is selling their house and they will pay their Realtor 5% commission off the sales price. If they sell their home for \$145,000, how much will they owe their Realtor?</p> $145000(.05) = \boxed{\$7,250}$
	<p>17. Reggie is a car salesman and makes 2.5% commission off every car he sells. If he sold 6 cars last month for a total of 204,000, how much did he earn?</p> $204000(.025) = \boxed{\$5,100}$
	<p>18. Carole sells magazine subscriptions. She makes 15% commission, plus \$10 an hour. If she worked 30 hours last week and sold \$480 in magazine subscriptions, how much did she make in total?</p> $30(10) + 480(.15) = 300 + 72 = \boxed{\$372}$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 12: Discount & Markup

**** This is a 2-page document! ******Directions:** Find the discount and markup for each, then find the final selling price. Round to the nearest cent when necessary.

1. tablet: \$439, 40% off
 $439(.4) = 175.60$
 $439 - 175.60 = 263.40$

Discount: \$175.60Selling Price: \$263.40

2. bracelet: \$84, 18% off
 $84(.18) = 15.12$
 $84 - 15.12 = 68.88$

Discount: \$15.12Selling Price: \$68.88

3. boat: \$23,500, 12.5% off
 $23500(.125) = 2937.50$
 $23500 - 2937.50 = 20562.50$

Discount: \$2937.50Selling Price: \$20,562.50

4. gallon of gas: \$2.15,
 15% markup
 $2.15(.15) = .32$
 $2.15 + .32 = 2.47$

Markup: \$0.32Selling Price: \$2.47

5. video game: \$18,
 6.5% markup
 $18(.065) = 1.17$
 $18 + 1.17 = 19.17$

Markup: \$1.17Selling Price: \$19.17

6. flight: \$229, 60% markup
 $229(.6) = 137.40$
 $229 + 137.40 = 366.40$

Markup: \$137.40Selling Price: \$366.40**Directions:** Read each problem carefully! Round to the nearest cent when necessary

7. Kelly's bill at a restaurant came to \$21.52. If she decides to leave a 18% tip, how much of a tip should she leave?

$$21.52(.18) = \boxed{\$3.87}$$

8. Thomas got a haircut from the barber. If the haircut costs \$32 and he wants to leave a 18% tip, how much will he pay in total?

$$32(.18) = 5.76$$

$$32 + 5.76 = \boxed{\$37.76}$$

9. Manny took a cab to a concert. If the cab fare was \$14 and he wants to leave a 15% tip, how much will he pay in total?

$$14(.15) = 2.10$$

$$14 + 2.10 = \boxed{\$16.10}$$

10. The dinner bill for four people came to \$108.60. If they plan to leave a 20% tip and split the bill equally, how much will each person pay?

$$108.60(.2) = 21.72$$

$$108.60 + 21.72 = 130.32$$

\$32.58 each

11. Scarlet is buying a watch that costs \$49. If sales tax is 6%, how much will be added to the cost of the watch?

$$49(.06) = \boxed{\$2.94}$$

12. Jeremiah bought a jacket for \$110.25. If sales tax is 8.5%, how much will he pay in total?

$$110.25(.085) = 9.37$$

$$110.25 + 9.37 = \boxed{\$119.62}$$

13. Find the total cost for a \$579 smartphone with 5% sales tax.

$$579(.05) = 28.95$$

$$579 + 28.95 =$$

$$\boxed{\$607.95}$$

14. Violet is buying a \$24 scarf. If sales tax is 7.25% and she hands the cashier \$30, how much change will she get?

$$24(.0725) = 1.74$$

$$24 + 1.74 = 25.74$$

$$30 - 25.74 = \boxed{\$4.26}$$

15. Brandt is buying a new set of golf clubs for \$584. If the clubs are on sale now for 30% off and sales tax is 7%, how much will he pay in total?

$$584(.30) = 175.20$$

$$584 - 175.20 = 408.80$$

$$408.80(.07) = 28.62$$

$$408.80 + 28.62 = \boxed{\$437.42}$$

16. Find the final price on a \$1,049 television that is on sale for 12% off if the sales tax is 4.5%.

$$1049(.12) = 125.88$$

$$1049 - 125.88 = 923.12$$

$$923.12(.045) = 41.54$$

$$923.12 + 41.54 = \boxed{\$964.66}$$

17. A one-night stay at the Great Wolf Lodge is \$249. If you have a coupon for 10% off the room rate and sales tax is 12.75%, find the total cost for one night.

$$249(.10) = 24.90$$

$$249 - 24.9 = 224.10$$

$$224.10(.1275) = 28.57$$

$$224.10 + 28.57 = \boxed{\$252.67}$$

18. Misty is buying a pair of jeans for \$54 and a pair of boots for \$95. She has a coupon for 15% off if she spends at least \$75. If sales tax is 8%, how much will she pay in total?

$$149(.15) = 22.35$$

$$149 - 22.35 = 126.65$$

$$126.65(.08) = 10.13$$

$$126.65 + 10.13 = \boxed{\$136.78}$$

19. Ellie makes 12.5% commission through selling makeup. If her total sales last month were \$1,840, what will be her take-home pay?

$$1840(.125)$$

$$= \boxed{\$230}$$

20. Greg earns 2% commission on each car he sells, plus a base salary of \$500 per week. If his total car sales in one week was \$68,775, find his take-home pay for the week.

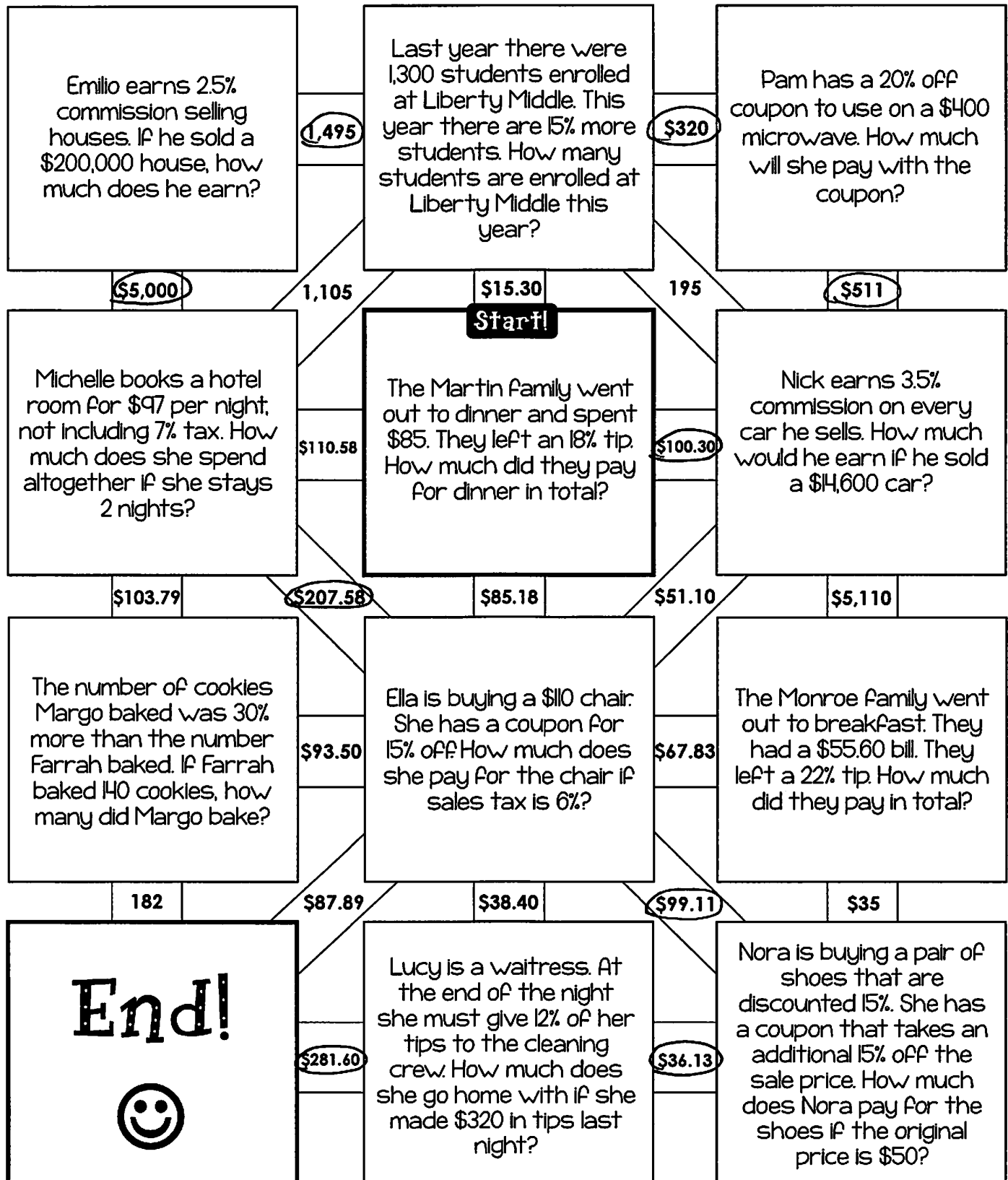
$$.02(68775) + 500$$

$$= 1375.50 + 500$$

$$= \boxed{\$1875.50}$$

Percent Increase and Decrease Maze!

Directions: Read each word problem then solve.
Use your solutions to navigate through the maze. **Staple all work to this paper!**



Name:

Class:

Topic:

Date:

Main Ideas/Questions	Notes
PERCENT OF CHANGE	<p>A percent of change is the ratio of the amount of change to the original amount:</p> $\text{Percent of change} = \frac{\text{Amount of Change}}{\text{Original amount}}$
TYPES OF PERCENT change	<p>» When the original amount goes <u>up</u>, it's called a <u>percent increase</u>.</p> <p>» When the original amount goes <u>down</u>, it's called a <u>percent decrease</u>.</p>
EXAMPLE ►	<p>Marianne bought a \$30 slow cooker for \$20. Find the percent of change and classify as a percent increase or decrease.</p> $\frac{20 - 30}{30} = \frac{-10}{30} = -0.\bar{3}$ <p>33.3% decrease</p>
YOU TRY!	<p>Directions: Find the percent of change and classify as a percent increase or decrease. Round to the nearest tenth of a percent when necessary.</p> <div> <p>1. Last week Joe ran 45 miles. This week he ran 34 miles.</p> $\frac{34 - 45}{45} = \frac{-11}{45} = -.2\bar{4}$ <p>24.4% decrease</p> </div> <div> <p>2. A computer store changed the price of a laptop from \$250 to \$290.</p> $\frac{290 - 250}{250} = \frac{40}{250} \approx .16$ <p>16% increase</p> </div> <div> <p>3. A soccer club has 120 members this year, compared to 85 members last year.</p> $\frac{120 - 85}{85} = \frac{35}{85} \approx .412$ <p>41.2% increase</p> </div> <div> <p>4. Lilly's old car seat had a maximum weight of 40 pounds. Her new car seat has a max weight of 70 pounds.</p> $\frac{70 - 40}{40} = \frac{30}{40} = .75$ <p>75% increase</p> </div>

5. Carlos made \$435 last week and \$600 this week.

$$\frac{600-435}{435} = \frac{165}{435} \approx 0.379$$

37.9% increase

6. Penelope spent \$120 on groceries last week. This week she spent \$105.

$$\frac{105-120}{120} = \frac{-15}{120} = -.125$$

12.5% decrease

7. The cost of a gallon of gas changed from \$2.15 to \$2.68.

$$\frac{2.68-2.15}{2.15} = \frac{.53}{2.15} \approx .247$$

24.7% increase

8. Tami made 24 cupcakes yesterday and 14 cupcakes today.

$$\frac{14-24}{24} = \frac{-10}{24} = -.41\bar{6}$$

41.6% decrease

9. In 2015 the total snowfall in Groveland, MA was 108 inches. The total was 49.9 inches in 2016.

$$\frac{49.9-108}{108} = \frac{-58.1}{108} \approx -.538$$

53.8% decrease

10. It took the Phillips family 6 hours to drive to their vacation destination. Due to traffic, it took them 8 hours and 42 minutes to drive home.

$$\frac{8.7-6}{6} = \frac{2.7}{6} = .45$$

45% increase

11. 120 seventh grade students completed their math homework last week, compared to 104 students the week before.

$$\frac{120-104}{104} = \frac{16}{104} \approx .154$$

15.4% increase

12. The price of a computer changed from \$1,150 to \$1,300.

$$\frac{1300-1150}{1150} = \frac{150}{1150} \approx .13$$

13% increase

13. Britney spent 115 minutes reading last week and 140 minutes reading this week.

$$\frac{140-115}{115} = \frac{25}{115} \approx .217$$

21.7% increase

14. Quincy delivered 240 newspapers yesterday and 180 newspapers today.

$$\frac{180-240}{240} = \frac{-60}{240} = -.25$$

25% decrease

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 13: Percent of Change

Directions: Find the percent of change and classify as a percent increase or decrease. Round to the nearest tenth of a percent when necessary.

1. Last year, there were 120 students in the marching band. This year, there are 138.

$$\frac{138-120}{120} = \frac{18}{120} = .15$$

15% increase

2. A savings account with \$500 now has \$120.

$$\frac{120-500}{500} = \frac{-380}{500} = -.76$$

76% decrease

3. Annie bought a brand new car for \$32,000. The car is now worth \$21,000.

$$\frac{21000-32000}{32000} = \frac{-11000}{32000} \approx -.344$$

34.4% decrease

4. The cost per credit hour at a community college was \$190 in 2010. In 2016, the cost per credit hour was \$315.

$$\frac{315-190}{190} = \frac{125}{190} \approx .658$$

65.8% increase

5. The price of a gallon of gas went from \$2.09 to \$2.24 for the Thanksgiving holiday.

$$\frac{2.24-2.09}{2.09} = \frac{.15}{2.09} \approx .072$$

7.2% increase

6. Bryson sent 3,809 text messages in June. In July, he sent 3,115.

$$\frac{3115-3809}{3809} = \frac{-694}{3809} \approx -.182$$

18.2% decrease

7. Clarissa's credit score went from 670 to 715 in one year.

$$\frac{715-670}{670} = \frac{45}{670} \approx .067$$

6.7% increase

8. A \$39 watch is now on clearance for \$17.50.

$$\frac{17.5-39}{39} = \frac{-21.5}{39} \approx -.551$$

55.1% decrease

9. The Florida Panthers won 47 games in the 2015-16 hockey season. In the 2016-17 season, they won 35 games.

$$\frac{35-47}{47} = \frac{-12}{47} \approx -.255$$

25.5% decrease

10. A 13.5-oz bottle of shampoo now has 18 ounces.

$$\frac{18-13.5}{13.5} = \frac{4.5}{13.5} = 0.\bar{3}$$

33.\bar{3}% increase

11. Clara put 860 miles on her car in May. In June, she put 28 less than twice the number of miles on her car that she did in May.

$$\frac{1692-860}{860} = \frac{832}{860} \approx .967$$

96.7% increase

12. Stan had a personal best one mile run time of 6 minutes and 35 seconds. After his last run, his new personal best is 6 minutes and 20 seconds.

$$\frac{6\frac{1}{2} - 6\frac{7}{12}}{6\frac{7}{12}} = \frac{-.25}{6\frac{7}{12}} \approx -.038$$

3.8% decrease

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes	
SIMPLE INTEREST	<p>➤ Interest is the amount of money paid or earned for the use of money by a bank or other financial institution.</p> <ul style="list-style-type: none">For borrowing money (loans, credits cards, etc.), interest is paid.For saving money (savings accounts, investing, etc.), interest is earned.	
SIMPLE INTEREST FORMULA	<p>To solve problems involving simple interest, use the formula:</p> <div>$I = prt$</div>	<p>$I =$ <u>Amount of interest</u></p> <p>$p =$ <u>Principle investment</u></p> <p>$r =$ <u>Rate (decimal)</u></p> <p>$t =$ <u>Time (years)</u></p>
FINDING INTEREST	Directions: Find the simple interest to the nearest cent.	
	1. \$100 at 5% for 10 years $I = 100(.05)(10)$ $= \boxed{\$50}$	2. \$750 at 3% for 15 years $I = 750(.03)(15)$ $= \boxed{\$337.50}$
	3. \$1,400 at 8% for 6 years $I = 1400(.08)(6)$ $= \boxed{\$672}$	4. \$545 at 4% for $2\frac{1}{2}$ years. $I = 545(.04)(2.5)$ $= \boxed{\$54.5}$
	5. \$10,000 at 4.2% for 5 years $I = 10000(.042)(5)$ $= \boxed{\$2100}$	6. \$2,400 at 3.5% for $5\frac{1}{4}$ years. $I = 2400(.035)(5.25)$ $= \boxed{\$441}$
	7. \$840 at 3.5% for 9 months $I = 840(.035)(.75)$ $= \boxed{\$22.05}$	8. \$12,400 at 10% for 18 months $I = 12400(.10)(1.5)$ $= \boxed{\$1860}$

APPLICATIONS

Directions: Solve each problem. Round to the nearest tenth or cent when necessary.

9. Layla borrowed \$42,000 to remodel with a 4% simple interest rate to remodel her home. How much total interest will she have paid after 3 years?

$$42000 (.04)(3)$$

$$= \$5040$$

10. Michelle borrowed \$120,000 to buy a home. If the simple interest rate is 4.25%, how much interest will she have paid after 15 years?

$$120000 (.0425)(15)$$

$$= \$7650$$

11. Cora put \$4,000 in a college savings account with a 5% simple interest rate. How much will she have in the account altogether after 5 years?

$$4000 (.05)(5)$$

$$= 1000$$

$$\$5000 \text{ total}$$

12. Leslie took out a small business loan for \$25,000. If the simple interest rate was 3.25%, how much interest will she have paid after ten years?

$$25000 (.0325)(10)$$

$$= \$8125$$

13. Malorie took out a loan to build a deck. The loan was for \$15,000 and had a 7.5% simple interest rate. If she paid a total of \$1,687.50 in interest, how long did she have the loan?

$$1687.50 = 15000 (.075) X$$

$$1687.50 = 1125 X$$

$$1.5 = X$$

$$1.5 \text{ years}$$

14. Beth took out a 6 month loan to buy furniture. If she had a 4% simple interest rate and paid a total of \$28 in interest, calculate the original loan amount.

$$28 = X (.04)(.5)$$

$$28 = .02 X$$

$$1400 = X$$

$$\$1400$$

15. Deanna started a savings account for her granddaughter when she was born. She put \$1,500 in an account with a simple 3.25% interest rate. What will be the total amount in the account after 18 years?

$$1500 (.0325)(18)$$

$$= 877.50$$

$$\$2377.50$$

16. Jessica took out a \$84,000 loan to buy her grandmother a house. After 10 years, she had paid \$31,500 in interest. What was her interest rate?

$$31500 = 84000 (10) X$$

$$31500 = 840000 X$$

$$.0375 = X$$

$$3.75\%$$

Name: _____

Unit 4: Ratio, Proportion, & Percent

Date: _____ Per: _____

Homework 14: Simple Interest

Directions: Solve each problem. Round to the nearest cent when necessary.

1. If Casey places \$890 in a savings account, how much interest will he earn in 12 years at a 5% simple interest rate?

$$890 (.05)(12)$$

$$= \$534$$

2. To purchase a car, Leah borrowed \$12,000 for 5 years at a simple interest rate of 8%. How much interest will she have paid by the end of the loan?

$$12000 (.08)(5)$$

$$= \$4800$$

3. Mark's grandparents deposited \$1,200 into an account when he was born. How much interest will the account have earned after 18 years at a 1.5% simple interest rate?

$$1200 (.015)(18)$$

$$= \$324$$

4. To purchase an engagement ring for his girlfriend, Elliott borrowed \$3,800 from the bank for three years at a 4.25% simple interest rate. How much interest will he have paid at the end of the loan?

$$3800 (.0425)(3)$$

$$= \$484.50$$

5. Nora invested \$1,500 in a bond at a simple interest rate of 3%. How much will the bond be worth in total after 10 years?

$$1500 (.03)(10) = 450$$

$$\$1950$$

6. When Adam started his career, he placed \$500 in a savings account with a 2.7% simple interest rate. How much will be in the account in total after he retires in 30 years?

$$500 (.027)(30) = 405$$

$$\$905$$

7. Pete took out a 48-month loan for \$5,200 to buy a used motorcycle. If the simple interest rate is 8.5%, how much will he have paid in total at the end of the loan?

$$5200 (.085)(4) = 1768$$

$$\$6968$$

8. Caroline won \$250,000 in a lottery. After paying \$96,000 in taxes, she placed the remaining amount in a savings account at a 2% interest rate. How much interest will the account earn after just 6 months?

$$154000 (.02)(.5)$$

$$= \$1540$$

9. An investment of \$1,800 in the stock market earned \$378 in two years. Find the simple interest rate.

$$1800(2) \times = 378$$

$$3600 \times = 378$$

$$\times = .105$$

$$10.5\%$$

10. Liam opened a savings account with a \$400 deposit and a simple interest rate of 7.5%. If the balance of the account is now \$670 and there were no deposits or withdrawals, how long ago did he open the account?

$$270 = 400(.075) \times$$

$$270 = 30 \times$$

$$9 = \times$$

$$9 \text{ years}$$

Name: _____

Math 7

Date: _____ Per: _____

Unit 4: Ratio, Proportion, & Percent

Quiz 4-4: Percent Increase & Decrease, Simple Interest**Read and solve each problem. Round to the nearest cent if necessary.**

1. A hockey stick originally costs \$79. How much will Stevens save if he has a coupon for 20% off?

$$79(.20) = 15.8$$

2. A computer that originally costs \$929 was returned to the electronics store. Because the box was opened, the store put it on the clearance rack for 35% off. What is the price of the computer?

$$929(.35) = 325.15$$

$$929 - 325.15 = 603.85$$

3. The ticket price for a one-way flight from Orlando to Philadelphia is regularly \$149. If Callie is purchasing a ticket for the day before Thanksgiving and the airline marked the ticket price up 72%, find the cost of her ticket.

$$149(.72) = 107.28$$

$$149 + 107.28 = 256.28$$

4. Dale is buying a new stereo for \$1,580. If sales tax is 7.2%, how much will he pay in total?

$$1580(.072) = 113.76$$

$$1580 + 113.76 = 1693.76$$

5. The Neiman family went out to dinner. How much will they pay altogether if their dinner bill came to \$78.52 and they tip 18%?

$$78.52(.18) = 14.13$$

$$78.52 + 14.13 = 92.65$$

6. Mya is buying a purse online that regularly costs \$72. How much will she pay in total if she has a promo code for 25% off plus free shipping and sales tax is 5.5%?

$$72(.25) = 18$$

$$72 - 18 = 54$$

$$54(.055) = 2.97$$

$$54 + 2.97 = 56.97$$

7. A real estate agent receives 2.5% commission on the sale of each house. How much commission will the agent earn on the sale of a \$219,000 home?

$$219000(.025) = 5475$$

8. Felicia works for a furniture company. She earns a base salary of \$300 per week, then 4% commission on sales. How much will she make in one week if her sales totaled \$7,268?

$$300 + 7268(.04)$$

$$= 590.72$$

- | | |
|----|------------|
| 1. | \$ 15.80 |
| 2. | \$ 603.85 |
| 3. | \$ 256.28 |
| 4. | \$ 1693.76 |
| 5. | \$ 92.65 |
| 6. | \$ 56.97 |
| 7. | \$ 5475 |
| 8. | \$ 590.72 |

For questions 9-11, round to the nearest tenth of a percent when necessary.
Classify each as a percent increase or percent decrease.

9. In 2000, the population of a town was 19,500 people. In 2010, the population of the same town was 28,000. Find the percent of change in population from 2000 to 2010.

$$\frac{28000 - 19500}{19500} = \frac{8500}{19500} = .436$$

10. Vera's final average in seventh grade was 96. In eighth grade, her final average was 91. Find the percent of change in her final average from seventh grade to eighth grade.

$$\frac{91 - 96}{96} = \frac{-5}{96} = -.052$$

11. Casey bought a football jersey that cost \$129.50. With tax, he paid \$137.50. What is the sales tax rate?

$$\frac{137.50 - 129.50}{129.50} = \frac{8}{129.5} = .062$$

- | | |
|-----|--------------|
| 9. | 43.6% inc. |
| 10. | 5.2% dec |
| 11. | 6.2% |
| 12. | \$480 |
| 13. | \$1136.11 |
| 14. | 17 years ago |
| 15. | 4.5% |

Read and solve each problem. Round to the nearest cent if necessary.

12. Ruby deposited \$1,200 in an account that pays 5% in simple interest. How much will the account earn after 8 years?

$$1200(.05)(8)$$

13. Tyler opened a credit card with a 19.5% simple interest rate to purchase a \$879 laptop. If he pays off the laptop in 18 months, how much will he have paid in total?

$$879(.195)(1.5) = \$257.11$$

$$879 + 257.11 = 1136.11$$

14. Jerome deposited \$8,000 into a new retirement account with a simple interest rate of 2.8%. If account has earned \$3,808 in interest, and there have been no other deposits or withdrawals, how many years ago did he open the account?

$$3808 = 8000(.028)x$$

$$3808 = 224x$$

$$17 = x$$

15. Lily took out a 5-year loan from the bank for \$31,000 to purchase a new car. At the end of the loan, she had paid a total of \$37,975. Find the interest rate on the loan.

$$6975 = 31000(5)x$$

$$6975 = 155000x$$

$$.045 = x$$

Unit 4 Test Study Guide (Ratio, Proportion, & Percent)

Name: _____

Date: _____ Per: _____

Topic 1: Ratio & Rates

Use for questions 1-3: An aquarium has 14 angelfish, 12 clownfish and 18 seahorses in one exhibit. What each ratio in simplest form.

1. angelfish to seahorses

$$\frac{14}{18} = \frac{7}{9}$$

2. clownfish to angelfish and seahorses.

$$\frac{12}{32} = \frac{3}{8}$$

3. seahorses to the total number of fish in the exhibit.

$$\frac{18}{44} = \frac{9}{22}$$

Write each ratio in simplest form.

4. 3 cups of sugar to 27 cups of milk

$$\frac{3}{27} = \frac{1}{9}$$

5. 6 bowls of cereal to 20 pancakes

$$\frac{6}{20} = \frac{3}{10}$$

6. 85 pieces of candy to 10 bags

$$\frac{85}{10} = \frac{17}{2}$$

7. 22 forks to 30 spoons

$$\frac{22}{30} = \frac{11}{15}$$

8. 152 cherries to 16 jars

$$\frac{152}{16} = \frac{19}{2}$$

9. 3.5 yards of fabric for 5 scarves

$$\frac{3.5}{5} = \frac{7}{10}$$

Calculate each unit rate. Round the nearest tenth or cent when necessary.

10. After running 5 miles, Kevin's total time was 42 minutes. Find his time per mile.

$$\frac{42}{5} = \frac{8.4}{1} \quad 8.4 \text{ min/mi}$$

11. Nellie purchased 6.5 pounds of strawberries for \$12.87. Calculate the cost of a single pound.

$$\frac{12.87}{6.5} = \frac{1.98}{1} \quad \$1.98/lb$$

Determine if Option A or Option B is the better deal. Justify your answer.

12. ☒ Option A: 6 granola bars for \$6.48 (1.08)

☐ Option B: 5 granola bars for \$5.50 (1.10)

13. ☐ Option A: 16 oz. of jelly for \$3.30 (.21)

☒ Option B: 48 oz. of jelly for \$8.64 (.18)

Topic 2: Proportional Relationships & Solving Proportions

Determine if a proportional relationship exists. If yes, give the constant rate.

14.

Gallons of Milk	
Gallons	Cost (\$)
1	\$3.15
2	\$6.30
3	\$9.45
4	\$12.60

yes
\$3.15/gal

15.

Pieces of Tile	Total Length (ft.)
2	$3\frac{1}{2}$
4	$6\frac{1}{2}$
6	$9\frac{1}{2}$

No

Determine if the ratios form a proportion.

16. $\frac{4}{10}, \frac{32}{72}$

$$4 \cdot 72 = 10 \cdot 32$$

$$288 \neq 320$$

No

17. $\frac{40}{25}, \frac{32}{20}$

$$40 \cdot 20 = 25 \cdot 32$$

$$800 = 800$$

Yes

Solve the proportion.

18. $\frac{15}{45} = \frac{9}{c}$
 $15 \cdot c = 45 \cdot 9$
 $15c = 405$
 $c = 27$

19. $\frac{16}{120} = \frac{v}{15}$
 $120 \cdot v = 16 \cdot 15$
 $120v = 240$
 $v = 2$

20. Erin is making lemonade. She needs $1\frac{3}{4}$ cups of white sugar to make 8 cups of lemonade. She has a 32 cup pitcher to fill. How many cups of sugar will she need?

$$\frac{1.75}{8} = \frac{x}{32}$$

$$8x = 56$$

$$x = 7$$

7 cups

21. Morgan pays \$1.25 per soda for each of her friends. Complete the table given this proportional relationship.

Sodas	Total Cost
1	1.25
2	2.50
3	3.75
4	5.00

Topic 3: Scale Drawings & Models

22. On a map with a scale of 0.25 inch = 30 miles, the distance between two cities is 8.3 inches. Find the actual distance between the cities.

$$\frac{.25}{30} = \frac{8.3}{x}$$

$$.25x = 249$$

$$x = 996$$

996 mi

23. A model of a skyscraper uses the scale of 2 inches = 45 feet. If the actual skyscraper is 992 feet tall, how tall is the model?

$$\frac{2}{45} = \frac{x}{992}$$

$$45x = 1984$$

$$x = 44.08\overline{8} \text{ ft}$$

$$(44\frac{8}{90} \text{ ft})$$

24. Morgan and Natalie's heights can be compared using a scale of 1.5 inch : 2.5 inches. If Morgan is 36 inches tall, find Natalie's height. Give your answer in feet.

$$\frac{1.5}{2.5} = \frac{36}{x}$$

$$1.5x = 90$$

$$x = 60 \text{ in}$$

5 feet

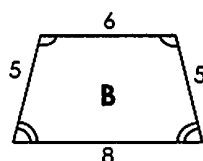
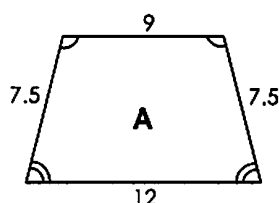
25. Carl is remodeling his kitchen. On his plans, the kitchen island is 4 inches long. If the actual kitchen island will be 9.2 feet long, what was the scale used to create the drawing?

$$\frac{4}{9.2} \div 4 = \frac{1}{2.3}$$

1 in : 2.3 ft

Topic 4: Similar Figures & Indirect Measure

Use the similar figures below for questions 26-27.



26. Give the scale factor of Figure A to Figure B.

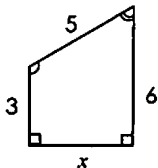
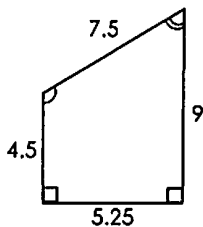
$$\frac{7.5}{5} = \frac{3}{2}$$

27. Give the scale factor of Figure B to Figure A.

$$\frac{8}{12} = \frac{2}{3}$$

If the figures below are similar, find the value of x .

28.

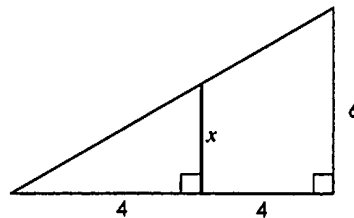


$$\frac{9}{6} = \frac{5.25}{x}$$

$$9x = 31.5$$

$$x = 3.5$$

29.



$$\frac{4}{x} = \frac{8}{6}$$

$$8x = 24$$

$$x = 3$$

Use the given information to find each measure. Round to the nearest hundredth if necessary.

30. A palm tree casts a 19 foot shadow. A beach umbrella in the sand next to the palm tree casts a 6.5 foot shadow. If the umbrella is 4 feet tall, calculate the height of the palm tree.

$$\frac{x}{19} = \frac{4}{6.5}$$

$$6.5x = 76$$

$$x \approx 11.7$$

$$11.7 \text{ ft}$$

31. A telephone pole is 45 feet tall and casts a 20 foot shadow. A street lamp next to the telephone pole casts a 12 foot shadow. Calculate the height of the street lamp.

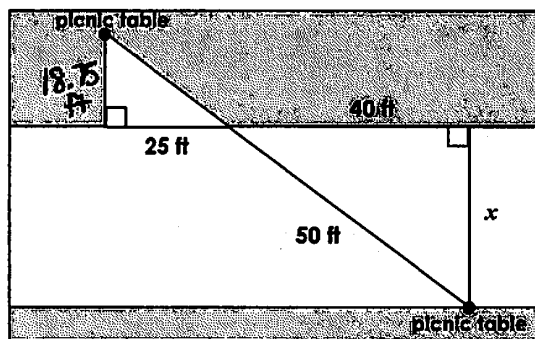
$$\frac{45}{20} = \frac{x}{12}$$

$$20x = 540$$

$$x = 27$$

$$27 \text{ ft}$$

Use the diagram of the park below to answer questions 32-33.



32. Find the length of the bridge (x) across the water.

$$\frac{25}{40} = \frac{18.75}{x}$$

$$\frac{25x}{25} = \frac{750}{25}$$

$$x = 30 \text{ ft}$$

33. There are two picnic tables in the park, one on each side of the river. Find the distance between the two picnic tables.

$$\frac{25}{40} = \frac{y}{50}$$

$$40y = 1250$$

$$y = 31.25$$

$$81.25 \text{ ft}$$

Topic 5: Percents

Round to the nearest hundredth if necessary.

34. Find 15% of 30.

$$\frac{15}{100} = \frac{x}{30}$$

$$100x = 450$$

$$x = 4.5$$

35. What is 65% of 175?

$$\frac{65}{100} = \frac{x}{175}$$

$$100x = 11375$$

$$x = 113.75$$

36. 150 is what percent of 250?

$$\frac{150}{250} = \frac{x}{100}$$

$$15000 = 250x$$

$$60 = x$$

$$60\%$$

37. 115.6 is what percent of 340?

$$\frac{115.6}{340} = \frac{x}{100}$$

$$340x = 11560$$

$$x = 34$$

38. 28 is 40% of what number?

$$\frac{28}{x} = \frac{40}{100}$$

$$2800 = 40x$$

$$70 = x$$

39. 31.85 is 24.5% of what number?

$$\frac{31.85}{x} = \frac{24.5}{100}$$

$$24.5x = 3185$$

$$x = 130$$

40. Andrew took a math test with 40 questions. If he scored an 85%, how many questions did he get correct?

$$\frac{x}{40} = \frac{85}{100}$$

$$100x = 3400$$

$$x = 34 \text{ questions}$$

41. Fifty-six students in a gymnastics club participated in the last fundraiser. Find the total number of students in the gymnastics club if 80% of the students in the club participated in the fundraiser.

$$\frac{56}{x} = \frac{80}{100}$$

$$80x = 5600$$

$$x = 70 \text{ students}$$

42. A box of diapers is marked down 10%. How much are the diapers if they originally cost \$28.75?

$$28.75 (.10) = 2.88$$

$$28.75 - 2.88$$

$$= \$25.87$$

43. A certain laptop is really popular and sells for \$209. Since sales are so good, the store raises the price by 12%. What is the cost of the laptop after the markup?

$$209 (.12) = 25.08$$

$$209 + 25.08$$

$$= \$234.08$$

44. An \$80 printer is selling for 37.5% off. Find the final price of the printer if sales tax is 5.5%.

$$80 (.375) = 30$$

$$80 - 30 = 50$$

$$50 (.055) = 2.75$$

$$50 + 2.75 = \$52.75$$

45. Beth is buying a new washing machine that costs \$450. She has a 15% off coupon and must pay 6% sales tax. How much will Beth pay for the washing machine?

$$450 (.15) = 67.50$$

$$450 - 67.50 = 382.50$$

$$382.50 (.06) = 22.95$$

$$382.50 + 22.95 = \$405.45$$

46. Nina buys a \$59.99 video game on sale for 15% off. She then uses a coupon that takes 20% off the sale price. If sales tax is 7%, how much did she pay in total?

$$59.99 (.15) = 9$$

$$59.99 - 9 = 50.99$$

$$50.99 (.20) = 10.20$$

$$50.99 - 10.20 = 40.79$$

$$40.79 (.07) = 2.86$$

$$40.79 + 2.86 = \$43.65$$

47. David works for the postal service. Last week he drove a total of 350 miles delivering mail and this week he drove a total of 415 miles. What is the percent change in the number of miles driven? Classify as a percent increase or decrease.

$$\frac{415 - 350}{350} = \frac{65}{350} = 0.186$$

$$18.6\% \text{ increase}$$

48. The James family purchased their home in 2000 for \$175,000. They sold their home in 2017 for \$250,000. Find the percent change in the value of their home. Classify as a percent increase or decrease.

$$\frac{250000 - 175000}{175000} = \frac{75000}{175000} = .429$$

42.9% inc

49. Rachel owns a cupcake shop. Last week she used 42.5 pounds of sugar making cupcakes. This week she used 26 pounds of sugar. Find the percent change in the amount of sugar used. Classify as a percent increase or decrease.

$$\frac{26 - 42.5}{42.5} = \frac{-16.5}{42.5} = -.388$$

38.8% dec

Topic 6: Simple Interest

Solve each problem. Round to the nearest tenth or cent when necessary.

50. Simon put \$15,000 in an account with a simple interest rate of 4.5%. Calculate the amount of interest earned at the end of 8 years.

$$15000 (8) (.045)$$

$$= \$5400$$

51. Tyler borrowed \$42,000 from the bank to open up a skateboard shop. If he had a simple interest rate of 5%, how much will he have paid to the bank in total once he paid the loan back in full after 15 years?

$$42000 (15) (.05)$$

$$= 31500$$

\$73500

52. Chelsey put \$450 into an account with a simple interest rate of 2.5%. When she withdrew the money she had earned a total of \$67.50 in interest. How long did she leave the money in the account?

$$67.50 = 450 (.025) \times$$

$$67.50 = 11.25x$$

$$6 = x$$

6 years

53. Marcus borrowed \$9,000 from his bank to buy a car. The bank charged him a simple interest rate of 1.25%. By the time he paid back the money, he had paid a total of \$9,281.25. How long did it take Marcus to pay back the money?

$$281.25 = 9000 (.0125) \times$$

$$281.25 = 112.5x$$

$$2.5 = x$$

2.5 years

54. What was the simple interest rate on a \$8,000 investment that was left in an account for 18 months and earned \$360 in interest?

$$360 = 8000 (1.5) \times$$

$$3600 = 12000x$$

$$.03 = x$$

3%

55. Vince took out a \$500 loan to buy a new couch. He paid back the loan in 2 years and paid a total of \$570. What was the simple interest rate for his loan?

$$70 = 500 (2) \times$$

$$70 = 1000x$$

$$.07 = x$$

7%

Name: _____

Unit 4 Test

Date: _____ Per: _____

Ratio, Proportion, & Percent

Use for questions 1-2: Robyn exercises 5 days each week. The table below shows the number of calories she burned during each workout last week.

Monday	Tuesday	Wednesday	Thursday	Friday
488	551	610	360	391

1. What is the ratio of the calories Robyn burned on Wednesday to the calories she burned on Monday?

$$\frac{610}{488}$$

- A. 4:3
B. 3:2
C. 5:3
D. 5:4

D

2. What is the ratio of the calories Robyn burned on Thursday to the total number of calories she burned for the week?

$$\frac{360}{2199}$$

- A. 3:20
B. 4:25
C. 2:15
D. 5:18

A

3. If a 60-page magazine cost \$1.20 to print, find the cost per page to print.

$$\frac{1.20}{60} = .02$$

- A. \$0.02 per page
B. \$0.03 per page
C. \$0.05 per page
D. \$0.08 per page

A

4. Lucas's computer took 8 minutes to download 30 songs. How many seconds per song did it take his computer to download?

$$\frac{480}{30} = 16$$

- A. 12 seconds
B. 16 seconds
C. 18 seconds
D. 20 seconds

B

5. Gwen bought a 2 $\frac{1}{4}$ -pound bag of Finch bird seed and a 3 $\frac{1}{2}$ -pound bag of Parrot bird seed. The total cost for the two bags was \$16.79. Find the cost per pound if it is the same for both types of bird seed.

$$\frac{16.79}{5.75} = 2.92$$

- A. \$2.74 per pound
B. \$2.80 per pound
C. \$2.88 per pound
D. \$2.92 per pound

D

6. The prices of various bottles of shampoo are given below. Which bottle of shampoo costs the last per ounce?

	Brand	Size	Price
A	Garnier	18-oz	\$6.19
B	Pantene	21-oz	\$6.59
C	Herbal Essences	15-oz	\$4.29
D	Dove	12-oz	\$3.69

.34

.31

.29

.31

C

For questions 7-8, determine if the data in the table represents a proportional relationship. If yes, give the constant rate.

7.

Minutes	6	14	25	48
Points Scored	8	20	32	60

Proportional?

☐ Yes

☒ No

Constant Rate:

8.

Eggs	2	5	8	12
Milk (cups)	$\frac{1}{2}$	$1\frac{1}{4}$	2	3

Proportional?

☒ Yes

☐ No

Constant Rate:

4 eggs / 1 cup milk

9. Which ratios form a proportion? Check all that apply.

<input checked="" type="checkbox"/> $\frac{9}{6}, \frac{12}{8}$	<input checked="" type="checkbox"/> $\frac{16}{28}, \frac{6}{10.5}$	<input type="checkbox"/> $\frac{12}{32}, \frac{8}{20}$	<input type="checkbox"/> $\frac{1.5}{8}, \frac{4}{18}$	<input checked="" type="checkbox"/> $\frac{2}{37.5}, \frac{0.8}{15}$
---	---	--	--	--

10. Solve for x: $\frac{18}{10} = \frac{x}{12}$

$$\frac{10x}{10} = \frac{216}{10}$$

$x = 21.6$

11. Solve for k: $\frac{8}{k} = \frac{36}{1.8}$

$$\frac{36k}{36} = \frac{14.4}{36}$$

$k = 0.4$

12. Connie can type 675 words in 18 minutes. At the same speed, how many words can she type in 40 minutes?

$$\frac{675}{18} = \frac{x}{40}$$

$$18x = 27000$$

$$x = 1500$$

1500 words

13. The ratio of empty seats to full seats in an auditorium is 3:7. If there are 203 full seats, find the total number of seats.

$$\frac{3}{7} = \frac{x}{203}$$

$$7x = 609$$

$$x = 87$$

- A. 87 seats
- B. 275 seats
- C. 290 seats
- D. 298 seats

C

14. The scale on a map reads $\frac{1}{2}$ inch = 30 miles. If two cities on the map are $5\frac{3}{4}$ inches apart, find the actual distance between the cities.

$$\frac{.5}{30} = \frac{5.75}{x}$$

$$.5x = 172.5$$

$$x = 345$$

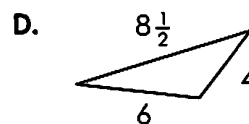
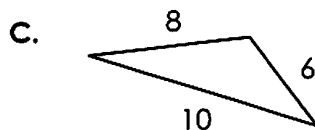
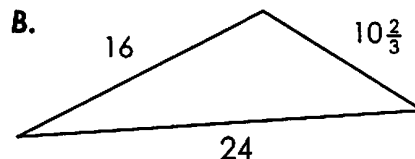
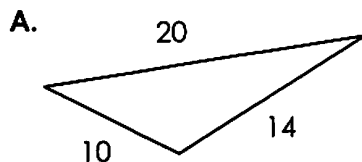
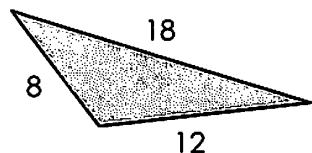
- A. 300 miles
- B. 315 miles
- C. 327 miles
- D. 345 miles

D

15. An architect is making a scale model of a building that he is designing. If the building is to be 120 feet tall and his model is 15 inches tall, what scale did he use to make the model?

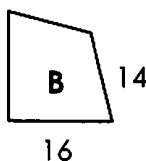
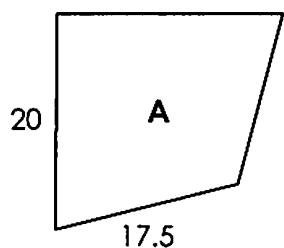
1 inch = 8 feet

16. Which figure is similar to the shaded figure below?



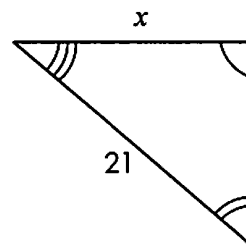
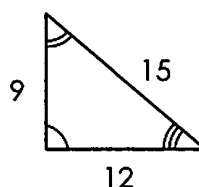
B

17. If the figures below are similar, give the scale factor of **Figure A** to **Figure B**.



5 : 4

18. Given the similar figures, find the value of x .



$$\frac{15}{21} = \frac{12}{x}$$

$$15x = 252$$

$$x = 16.8$$

19. A mailbox that is $4\frac{1}{2}$ feet tall casts a shadow that is 6 feet long. At the same time, a nearby Ferris wheel casts a shadow 84 feet long. Find the height of the Ferris wheel.

$$\frac{4.5}{6} = \frac{x}{84}$$

$$6x = 378$$

- A. 60 feet
- B. 63 feet
- C. 72 feet
- D. 75 feet

B

20. Marissa is standing next an 18-foot tall flagpole that is casting a 12-foot long shadow. If Marissa's shadow is $3\frac{1}{2}$ feet long, how tall is Marissa?

$$\frac{18}{12} = \frac{x}{3.5}$$

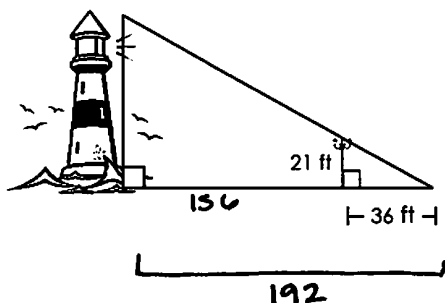
$$12x = 63$$

$$x = 5.25$$

- A. 5'0"
- B. 5'2"
- C. 5'3"
- D. 5'4"

C

Use the diagram below to answer question 21.



21. If the streetlamp is located 156 feet from the base of the lighthouse, find the height of the lighthouse.

$$\frac{36}{21} = \frac{192}{x}$$

$$36x = 4032$$

- A. 112 feet
- B. 118 feet
- C. 124 feet
- D. 132 feet

A

22. What is 95% of 60?

$$\frac{95}{100} = \frac{x}{60}$$

$$100x = 5700$$

57

23. Forty-two of the students in the band own their instrument. If this is 37.5% of the students in the band, how many total students are in the band?

$$\frac{37.5}{100} = \frac{42}{x}$$

$$37.5x = 4200$$

- A. 92 students
- B. 104 students
- C. 108 students
- D. 112 students

D

24. Last quarter, 84 seventh grade students made honor roll. If there are 400 students in the seventh grade, what percent made honor roll?

$$\frac{84}{400} = \frac{x}{100}$$

$$400x = 8400$$

21%

25. Angela took 56 minutes to take her history test. Bryan took 70% of the time that it took Angela to complete the test. How long did it take Bryan to take his history test?

$$\frac{70}{100} = \frac{x}{56}$$

$$100x = 3920$$

- A. 36.4 minutes
- B. 38.5 minutes
- C. 39.2 minutes
- D. 41.8 minutes

C

26. Eli found the same jacket he wants to buy at four different stores. Each of the stores is offering discounts for the holiday weekend. Place the store letters in the boxes to show the sales price sales price of the jacket from least to greatest.

Store	Regular Price	Discount
A	\$64.25	12% off
B	\$72.00	20% off
C	\$68.75	18% off
D	\$67.50	15% off

56.54

57.6

56.38

57.98

Sales Price of Jacket (Least to Greatest)

C, A, D, B

27. Skylar got a manicure for \$28 and pedicure for \$35 at the salon. If she plans to tip 15%, how much will she pay in total?

$$63(.15) = 9.45$$

\$72.45

28. Toby found a \$52 wallet on the clearance rack for 60% off. If sales tax is 6.25%, how much will he pay in total?

$$52(.6) = 31.20$$

$$52 - 31.20 = 20.80$$

$$20.80(.0625) = 1.30$$

- A. \$22.10
- B. \$23.75
- C. \$28.50
- D. \$33.15

A

29. A car salesperson earns 5.8% commission on every car sold. How much commission will the salesperson earn on the sale of a \$28,400 car?

$$28400 (.058)$$

$$\boxed{\$1647.20}$$

30. Harper sells appliances. She makes a weekly salary of \$450 plus 3% commission on her total sales for the week. If her sales this past week were \$3,200, find her total earnings for the week.

$$450 + 3200(.03)$$

- A. \$524
B. \$546
C. \$578
D. \$595

B

31. The average cost of a bag of popcorn at the movie theater was \$3.50 in 1995 and \$4.75 in 2015. Find the percent of change in the price of a bag of popcorn from 1995 to 2015 and classify as a percent increase or percent decrease.

$$\frac{4.75 - 3.50}{3.50} = .357$$

- A. 26.3% decrease
B. 26.3% increase
C. 35.7% decrease
D. 35.7% increase

D

32. A tablet that regularly sells for \$330 was on sale for 15% off. If Jeremiah paid \$302.94 total including tax, what is the sales tax rate?

$$\frac{302.94 - 280.5}{280.5}$$

$$= .08$$

- A. 6.75%
B. 7.5%
C. 8%
D. 8.25%

C

33. Lora borrowed \$4,500 for some home repairs. She will be paying 6% in simple interest over the next three years. What is the total amount she will be paying on the loan?

$$4500 (.06) (3) = 810$$

- A. \$5,310
B. \$5,475
C. \$5,690
D. \$5,805

A

34. After 18 months, how much more will a \$2,500 investment make at a 5.5% simple interest rate than a 4% simple interest rate?

$$2500 (.055) (1.5) = 206.25$$

$$2500 (.04) (1.5) = 150$$

- A. \$48.95
B. \$56.25
C. \$64.50
D. \$72.10

B

35. Marvin used the money he received from high school graduation gifts to start a new savings account with a simple interest rate of 7.5%. After 12 years, the account had earned \$288. If there were no other deposits or withdrawals, what was the original amount placed in the account?

$$288 = X (.075) (12)$$

$$288 = .9X$$

- A. \$240
B. \$275
C. \$320
D. \$360

C

36. Alice borrowed \$16,700 from the bank at a simple interest rate of 9% to purchase a used car. At the end of the loan, she had paid a total of \$24,215. How many months was the car loan?

$$7515 = 16700(.09)X$$

$$7515 = 1503X$$

$$5 = X$$

- A. 48 months
B. 60 months
C. 66 months
D. 72 months

B

CREDITS

I use clipart and
fonts in my products by:



Art with Jenny K



Many thanks to these
talented artists!