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 direct measurement involves shadows.
EXAMPLES Sample proportion: $\frac{\text{height}}{\text{shadow}} = \frac{\text{height}}{\text{shadow}}$	**Directions:** Find each missing measure.

1. A flagpole casts a 32-foot shadow at the same time that Evan casts a 9-foot shadow. If Evan is 6 feet tall, how tall is the flagpole?

$\frac{6}{9} = \frac{x}{32}$ $\quad \frac{9x}{9} = \frac{192}{9}$

$x = 21.\overline{3}$ ft (21 1/3)

2. A stop sign casts a shadow that is 4 feet long at the same time that a tree casts a shadow that is 36 feet long. If the stop sign is 7 feet tall, how tall is the tree?

$\frac{7}{4} = \frac{x}{36}$ $\quad \frac{4x}{4} = \frac{252}{4}$

$x = 63$ ft

3. A 28-foot tall building casts a shadow that is 35 feet long. At the same time, a truck outside the building casts a shadow that is $16\frac{7}{8}$ feet tall. How tall is the truck?

$\frac{28}{35} = \frac{x}{16.875}$ $\quad \frac{35x}{35} = \frac{472.5}{35}$

$x = 13.5$ ft (13 1/2)

4. A 45-foot water slide casts a 30-foot shadow. Find the length of the shadow of a 4-foot tall child standing nearby.

$\frac{45}{30} = \frac{4}{x}$ $\quad \frac{45x}{45} = \frac{120}{45}$

$x = 2.\overline{6}$ ft (2 2/3 ft)

5. Amara is 5'6" tall and casts a shadow that is 2 feet long. At the same time, a rollercoaster casts a 120-foot shadow. How tall is the rollercoaster?

$\frac{5.5}{2} = \frac{x}{120}$ $\quad \frac{2x}{2} = \frac{660}{2}$

$x = 330$ ft

6. A lighthouse casts a shadow 32 meters long at the same time a nearby statue casts a shadow that is 9 meters long. If the statue is 11.25 meters tall, find the height of the lighthouse.

$\frac{11.25}{9} = \frac{x}{32}$ $\quad \frac{9x}{9} = \frac{360}{9}$

$\boxed{x = 40m}$

7. The Arc de Triomphe in France is 164 feet tall. If the arc casts a shadow that is $98\frac{2}{5}$ feet tall at the same time a nearby street lamp casts a shadow that is 9 feet long, how tall is the street lamp?

$\frac{164}{98.4} = \frac{x}{9}$ $\quad \frac{98.4x}{98.4} = \frac{1476}{98.4}$

$\boxed{x = 15 ft}$

8. Clint is standing outside the Empire State Building, which is 1,250 feet tall. If Clint is 6'3" tall and casts a 2.5-foot shadow, find the shadow length of Empire State Building.

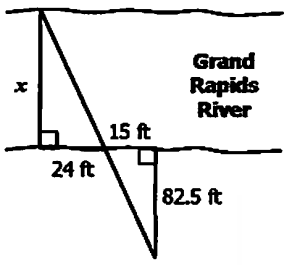
$\frac{6.25}{2.5} = \frac{1250}{x}$ $\quad \frac{6.25x}{6.25} = \frac{8125}{6.25}$

$\boxed{x = 500 ft}$

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.

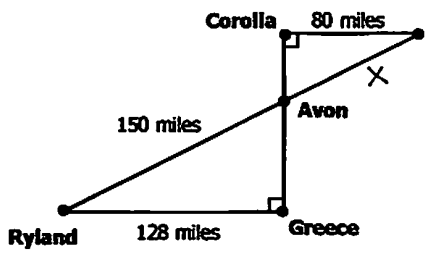


$\frac{82.5}{15} = \frac{x}{24}$

$\frac{15x}{15} = \frac{1980}{15}$

$\boxed{x = 132 ft}$

10. The triangles below are similar. Find the distance from Avon to Franklin.



$\frac{128}{150} = \frac{80}{x}$

$\frac{128x}{128} = \frac{12000}{128}$

$\boxed{x = 93.75 mi}$ (93 3/4)

Name: _____ **Unit 4:** Ratio, Proportion, & Percent

Date: _____ **Per:** _____ **Homework 8:** Indirect Measurement

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

1. A 6-foot tall observer casts a 3.5-foot shadow at the same time a silo casts a 49-foot shadow. How tall is the silo?

$\frac{6}{3.5} = \frac{x}{49}$ $\quad \frac{3.5x}{3.5} = \frac{294}{3.5}$

$x = 84$ ft

2. A statue of Abraham Lincoln casts a 9-foot shadow at the same time the White House casts a 48-foot shadow. If the White House is 70 feet tall, how tall is the statue of Abraham Lincoln?

$\frac{70}{48} = \frac{x}{9}$ $\quad \frac{48x}{48} = \frac{630}{48}$

$x = 13.125$ ft

$(13\frac{1}{8}$ ft$)$

3. A 136-foot tall cell phone tower casts a 79.9-foot shadow. Find the shadow length for a nearby 40-foot telephone pole.

$\frac{136}{79.9} = \frac{40}{x}$ $\quad \frac{136x}{136} = \frac{3196}{136}$

$x = 23.5$ ft

$(23\frac{1}{2})$

4. The Big Ben clocktower in London is approximately 316 feet tall. Shana is standing nearby and notices that she casts a 4-foot shadow. If Shana is 5 feet tall, find the length of Big Ben's shadow.

$\frac{316}{x} = \frac{5}{4}$ $\quad \frac{5x}{5} = \frac{1264}{5}$

$x = 252.8$ ft

$(252\frac{4}{5})$

5. A 36-foot flagpole casts a $10\frac{3}{4}$-foot shadow, while the hospital nearby casts a $37\frac{5}{8}$-foot shadow. Find the height of the hospital.

$\frac{36}{10.75} = \frac{x}{37.625}$

$\frac{10.75x}{10.75} = \frac{1354.5}{10.75}$

$x = 126$ ft

6. The High Roller, a giant ferris wheel in Las Vegas, casts a 242-foot shadow. A 6'3" tall man standing nearby casts a $2\frac{3}{4}$-foot shadow. Find the height of the High Roller.

$\frac{6.25}{2.75} = \frac{x}{242}$

$\frac{2.75x}{2.75} = \frac{1512.5}{2.75}$

$x = 550$ ft

7. A football player casts a $2\frac{3}{5}$-foot shadow at the same time a 30-foot tall goal post casts a 12-foot shadow. Find the height of the football player.

$\frac{30}{12} = \frac{x}{2.6}$

$\frac{12x}{12} = \frac{78}{12}$

$x = 6.5$ ft

(6' 6")

8. King Neptune, a 34-foot tall statue that welcomes visitors to Virginia Beach, casts a $13\frac{3}{5}$-foot shadow. If Jane is 5'9" tall and is standing nearby, find the length of her shadow.

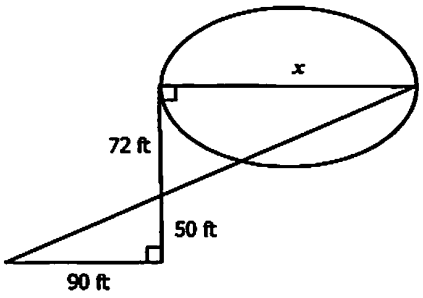
$\frac{34}{13.6} = \frac{5.75}{x}$

$\frac{34x}{34} = \frac{78.2}{34}$

$x = 2.3$ ft

(2 3/10)

9. Find x, the distance across the pond.

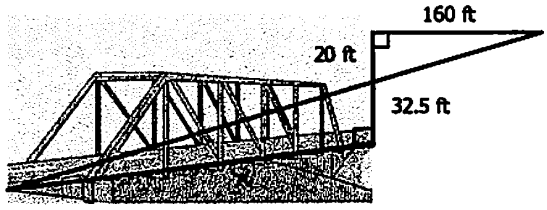


$\frac{50}{72} = \frac{90}{x}$ $\quad \frac{50x}{50} = \frac{6480}{50}$

$x = 129.6$ ft

(129 3/5)

10. Find the distance across the bridge.

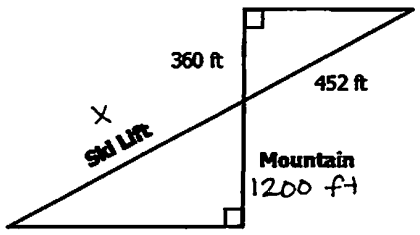


$\frac{32.5}{20} = \frac{x}{160}$

$\frac{20x}{20} = \frac{5200}{20}$

$x = 260$ ft

11. If the mountain is 1,200 feet tall, find the length of the ski lift.

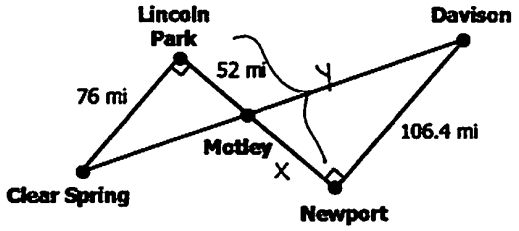


$\frac{1200}{360} = \frac{x}{452}$

$\frac{360x}{360} = \frac{542400}{360}$

$x = 1506.\overline{6}$ ft (1506 2/3)

12. Find the distance from Lincoln Park to Newport.



$\frac{76}{106.4} = \frac{52}{x}$ $\quad \frac{76x}{76} = \frac{5532.8}{76}$

$x = 72.8$ mi

$52 + 72.8 =$ 124.8 mi (124 4/5)

Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 4:** Ratios, Proportions, and Percents

Quiz 4-2: Proportion Applications & Similar Figures

1. Samantha plays on the softball team for her school. She strikes out twice every nine times she is at bat. If she struck out 14 times this season, how many times was she at bat?

$\frac{2}{9} = \frac{14}{x}$ $\quad \frac{2x}{2} = \frac{126}{2}$

$x = 63$

2. Adam entered a 3-hour hot dog eating contest. During the constant, Adam ate 4 hot dogs every 15 minutes. How many did he eat during the entire contest? 3hr = 180 min

$\frac{4}{15} = \frac{x}{180}$ $\quad \frac{15x}{15} = \frac{720}{15}$

$x = 48$

3. Tonya is making a scale model of a monument that is 160 feet tall. If she uses a scale of 4 in. = 15 ft, how tall should she make her model?

$\frac{4}{15} = \frac{x}{160}$ $\quad \frac{15x}{15} = \frac{640}{15}$

$x = 42.\overline{6}$

4. The scale on a map reads $\frac{1}{4}$ inch = 50 miles. If the distance between two cities on the map is $2\frac{3}{4}$ inches, find the actual distance between the cities.

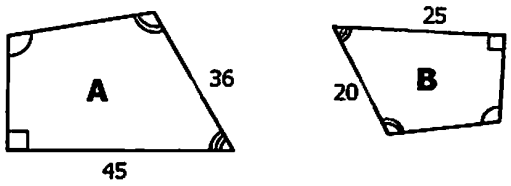
$\frac{.25}{50} = \frac{2.75}{x}$ $\quad \frac{.25x}{.25} = \frac{137.5}{.25}$

$x = 550$

5. An architect drew plans for a new bridge that is 425 meters long. If his plans show the bridge as 50 centimeters, what scale did he use?

$\frac{50}{425} = \frac{1}{8.5}$

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

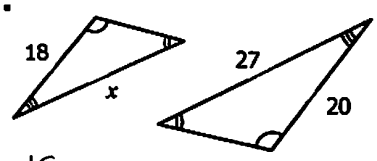


$\frac{45}{25} = \frac{9}{5}$

1.	63 times
2.	48 hot dogs
3.	42.6 in ($42\frac{2}{3}$)
4.	550 mi
5.	1cm = 8.5 m
6.	$\frac{9}{5}$

For questions 7-8, the figures are similar. Find x.

7.

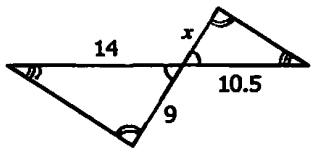


$\frac{18}{20} = \frac{x}{27}$

$\frac{20x}{20} = \frac{486}{20}$

$x = 24.3$

8.

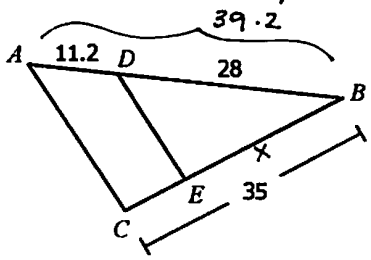


$\frac{9}{x} = \frac{14}{10.5}$

$\frac{14x}{14} = \frac{94.5}{14}$

$x = 6.75$

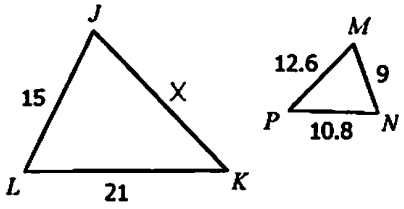
9. Given $\Delta ABC \sim \Delta DBE$, find EB.



$\frac{39.2}{28} = \frac{35}{x}$

$\frac{39.2x}{39.2} = \frac{900}{39.2}$ $x = 25$

10. Given $\Delta JKL \sim \Delta NPM$, find JK.



$\frac{15}{9} = \frac{x}{10.8}$

$\frac{9x}{9} = \frac{162}{9}$ $x = 18$

7. $x = 24.3$ $(24\ 3/10)$

8. $x = 6.75$ $(6\ 3/4)$

9. $EB = 25$

10. $JK = 18$

11. 120 ft

12. 432 ft

13. 231 ft

14. 88 mi

11. An 15-foot tree casts a shadow $20\frac{3}{4}$ feet long at the same time a nearby buidling casts a shadow 166 feet long. How tall is the building?

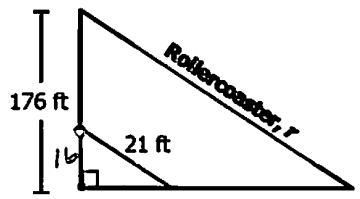
$\frac{15}{20.75} = \frac{x}{166}$ $\frac{20.75x}{20.75} = \frac{2490}{20.75}$ $x = 120$

12. Nora is 5'3" tall and standing near the 252-foot tall Pilgrim Monument in Massachusetts. If she casts 9-foot long shadow, find the length of the shadow casted by the monument.

$\frac{5.25}{9} = \frac{252}{x}$ $\frac{5.25x}{5.25} = \frac{2268}{5.25}$

$x = 432$

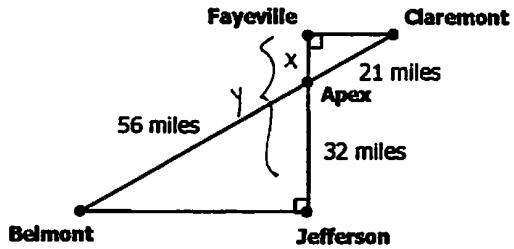
13. If the lamp post is 16 feet tall, find r, the length of the rollercoaster.



$\frac{16}{176} = \frac{21}{r}$ $\frac{16r}{16} = \frac{3696}{16}$

$r = 231$

14. If Pete drives roundtrip from Jefferson to Fayeville, how far will be travel?



$\frac{32}{x} = \frac{56}{21}$ $\frac{56x}{56} = \frac{672}{56}$ $x = 12$

$y = 44$

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Percent Proportion	**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. Depending on the wording of the problem, you may find the following two formulas beneficial in setting up your proportion: $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ ⟷ $\frac{\text{part}}{\text{whole}} = \frac{\%}{100}$

Examples

Directions: Use the percent proportion to solve each problem.

1. 18 is what percent of 40?

$\frac{18}{40} = \frac{x}{100}$

$\frac{40x}{40} = \frac{1800}{40}$ $\quad x = 45$

2. What percent of 75 is 80?

$\frac{80}{75} = \frac{x}{100}$

$\frac{75x}{75} = \frac{8000}{75}$ $\quad x = 106.\overline{6}$ $\quad (106\ 2/3)$

3. What is 30% of 15?

$\frac{x}{15} = \frac{30}{100}$

$\frac{100x}{100} = \frac{450}{100}$ $\quad x = 4.5$ $\quad (4\ 1/2)$

4. Find 8.5% of 160.

$\frac{x}{160} = \frac{8.5}{100}$

$\frac{100x}{100} = \frac{1360}{100}$ $\quad x = 13.6$ $\quad (13\ 3/5)$

5. 28 is 4% of what number?

$\frac{28}{x} = \frac{4}{100}$

$\frac{4x}{4} = \frac{2800}{4}$ $\quad x = 700$

6. 86% of what number is 77.4?

$\frac{77.4}{x} = \frac{86}{100}$

$\frac{86x}{86} = \frac{7740}{86}$ $\quad x = 90$

7. Find 28.5% of 200.

$\frac{x}{200} = \frac{28.5}{100}$

$\frac{100x}{100} = \frac{5700}{100}$ $\quad x = 57$

8. 52 is what percent of 125?

$\frac{52}{125} = \frac{x}{100}$

$\frac{125x}{125} = \frac{5200}{125}$ $\quad x = 41.6$ $\quad (41\ 3/5)$

9. 7.5% of what number is 21?

$\frac{21}{x} = \frac{7.5}{100}$

$\frac{7.5x}{7.5} = \frac{2100}{7.5}$ $\quad x = 280$

10. What is 64% of 80?

$\frac{x}{80} = \frac{64}{100}$

$\frac{100x}{100} = \frac{5120}{100}$ $\quad x = 51.2$ $\quad (51\ 1/5)$

Applications

11. What percent is 0.5 of 3?

$\frac{0.5}{3} = \frac{x}{100}$

$\frac{3x}{3} = \frac{50}{3}$

$x = 16.\overline{6}$ $(16\frac{2}{3})$

12. 103.2 is 48% of what number?

$\frac{103.2}{x} = \frac{48}{100}$

$\frac{48x}{48} = \frac{10320}{48}$

$x = 215$

13. A book collector has 425 books, 56% of which were published prior to 1900. How many books were published prior to 1900?

$\frac{x}{425} = \frac{56}{100}$

$\frac{100x}{100} = \frac{23800}{100}$

$x = 238$ books

14. Twelve of the 28 dogs at the shelter are purebred. What percent of the dogs are purebred?

$\frac{12}{28} = \frac{x}{100}$

$\frac{28x}{28} = \frac{1200}{28}$

$x \approx 42.8\%$

15. Bethany uses 8% of her weekly paycheck to pay for gas. If she spent $34.12 on gas this week, how much was her paycheck?

$\frac{34.12}{x} = \frac{8}{100}$

$\frac{8x}{8} = \frac{3412}{8}$

$x = \$426.50$

16. In Key West, Florida, it is sunny 75% of the days. How many days would you expect it to be sunny in the month of October? Round to the nearest day.

$\frac{x}{31} = \frac{75}{100}$

$\frac{100x}{100} = \frac{2325}{100}$

$x = 23.25$

Approx 23 days

17. On the high school football team, 62.5% of the players are juniors and seniors. If there are 11 juniors and 19 seniors on the team, find the total number of players.

$\frac{30}{x} = \frac{62.5}{100}$

$\frac{62.5x}{62.5} = \frac{3000}{62.5}$

$x = 48$ players

18. Jenna found that 15% of the skittles in a bag of skittles were purple. If there were 60 skittles in the bag, how many were <u>not</u> purple?

$\frac{x}{60} = \frac{15}{100}$

$\frac{100x}{100} = \frac{900}{100}$

$x = 9$ ← purple

$60 - 9 =$ 51 skittles

Name: _____ **Unit 4:** Ratio, Proportion, & Percent

Date: _____ **Per:** _____ **Homework 9:** The Percent Proportion

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

Directions: Use the percent proportion to solve each problem. Round to the nearest tenth or cent when necessary.

1. Find 24% of 165.

$\frac{X}{165} = \frac{24}{100}$

$\frac{100X}{100} = \frac{3960}{100}$

$\boxed{X = 39.6}$ $(39\frac{3}{5})$

2. What percent of 30 is 16.5?

$\frac{16.5}{30} = \frac{X}{100}$

$\frac{30X}{30} = \frac{1650}{30}$

$\boxed{X = 55}$

3. 24.39 is 9% of what number?

$\frac{24.39}{X} = \frac{9}{100}$

$\frac{9X}{9} = \frac{2439}{9}$

$\boxed{X = 271}$

4. $2\frac{3}{5}$ is what percent of 20?

$\frac{2.6}{20} = \frac{X}{100}$

$\frac{20X}{20} = \frac{260}{20}$

$\boxed{X = 13}$

5. What is 48.75% of 204?

$\frac{X}{204} = \frac{4875}{100}$

$\frac{100X}{100} = \frac{9945}{100}$

$\boxed{X = 99.45}$ $(99\frac{9}{20})$

6. 16% of what number is 14?

$\frac{14}{X} = \frac{16}{100}$

$\frac{16X}{16} = \frac{1400}{16}$

$\boxed{X = 87.5}$ $(87\frac{1}{2})$

7. 52 is what percent of 156?

$\frac{52}{156} = \frac{X}{100}$

$\frac{156X}{156} = \frac{5200}{156}$

$\boxed{X = 33.\overline{3}}$ $(33\frac{1}{3})$

8. Find 59.2% of 250.

$\frac{X}{250} = \frac{59.2}{100}$

$\frac{100X}{100} = \frac{14800}{100}$

$\boxed{X = 148}$

9. The Yankees won 90 of their 162 games last season. What percent of the games did they win?

$\frac{90}{162} = \frac{X}{100}$

$\frac{162X}{162} = \frac{9000}{162}$

$\boxed{X = 55.\overline{5}}$ $(55\frac{5}{9})$

10. A school survey says that 75%, or 294 of the 8th graders, have a cell phone. How many 8th graders are there?

$\frac{294}{X} = \frac{75}{100}$

$\frac{75X}{75} = \frac{29400}{75}$

$\boxed{X = 392 \text{ students}}$

11. Kendall tends to spend 32% of her homework time on math. If it took her 26 minutes to complete her math homework, how much time did she spend on homework?

$\frac{26}{x} = \frac{32}{100}$

$\frac{32x}{32} = \frac{2600}{32}$

$x = 81.25$ minutes

(81 1/4)

12. Of the 250 passengers on the plane, 177 checked their bags rather than carry-on. What percent opted for carry-on?

$\frac{73}{250} = \frac{x}{100}$

$\frac{250x}{250} = \frac{7300}{250}$

$x = 29.2\%$

13. At Northshore High School, 87.5% of the teachers have a master's degree. If there are 128 teachers, how many have a master's degree?

$\frac{x}{128} = \frac{87.5}{100}$

$\frac{100x}{100} = \frac{11200}{100}$

$x = 112$ teachers

14. Mara put down 7.5% on the purchase of her new home. If she put down \$14,175, find the purchase price of the home.

$\frac{14175}{x} = \frac{7.5}{100}$

$\frac{7.5x}{7.5} = \frac{1417500}{7.5}$

$x = \$189{,}000$

15. Guests to a wedding had to choose among three entrée options: steak, chicken, or pasta primavera. Of the 128 guests who responded, 63 chose steak and 25 chose pasta primavera. What percent chose chicken?

$\frac{40}{128} = \frac{x}{100}$

$\frac{128x}{128} = \frac{4000}{128}$

$x = 31.25\%$

(31 1/4)

16. There are 14 sixth graders, 29 seventh graders, and 37 eighth graders in the musical at Canon Middle School. If 65% of the students in the musical are girls, how many are girls?

$\frac{x}{80} = \frac{65}{100}$

$\frac{100x}{100} = \frac{5200}{100}$

$x = 52$ girls

17. Thirty 8th graders signed up for running club, however nine dropped out before the first practice. If $46\frac{2}{3}\%$ of the club are 8th graders, how many total students are in the running club?

$\frac{21}{x} = \frac{46.\overline{6}}{100}$

$\frac{46.\overline{6}x}{46.\overline{6}} = \frac{2100}{46.\overline{6}}$

$x = 45$ students

18. Jonah's grandmother gave him \$125 for his birthday. He used 14% of the money to buy music on iTunes and 65% to purchase a new hockey stick. How much more did he spend on the hockey stick than on music?

$\frac{x}{125} = \frac{14}{100}$

$\frac{100x}{100} = \frac{1750}{100}$

$x = \$17.50$

$\frac{y}{125} = \frac{65}{100}$

$\frac{100y}{100} = \frac{81.25}{100}$

$y = \$81.25$

$81.25 - 17.50 = \$63.75$

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Percent Equation	The **percent equation** is a quick way to find a part of a whole quantity by multiplying the whole by the percent written as a decimal. PART = WHOLE • % ↑ Written as a decimal!
	Reminder: To convert a percent to a decimal, divide the percent by 100 OR move the decimal to the left two places.
Examples	**1.** Find 12% of 90. ↓ 0.12 (0.12)(90) = 10.8
	2. Find 96% of 175. ↓ 0.96 (0.96)(175) = 168
	3. What is 27% of 28? (0.27)(28) = 7.56
	4. What is 48.5% of 300? (0.485)(300) = 145.5
	5. Find 2% of 138. (0.02)(138) = 2.76
	6. What is 81.25% of 248? (0.8125)(248) = 201.5
	7. Kate spent 23% of her last paycheck on groceries. If she made $908, how much did she spend on groceries? (0.23)(908) = $208.84
	8. Mark has only used 8.5% of a 34-oz bottle of shampoo. How many ounces has he used? (0.085)(34) = 2.89 oz
	9. There were 80 golfers in the first round of a tournament. Of the 80, 62.5% qualified for the next round. How many did not qualify? (0.625)(80) = 50 80 − 50 = 30 golfers
	10. Tom is a lawyer who makes $132,000 per year. If his legal assistant, Alec, makes 53% of his salary, find Alec's salary. (0.53)(132000) = $69,960

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Discount & Markup	• Stores frequently **discount** or **markup** items. • Discounts are subtracted from the original price. • Markups are added to the original price. • The selling price (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. jeans: \$58, 15% off

$58(0.15) = 8.70$

$58 - 8.70 = 49.30$

Discount: \$8.70

Selling Price: \$49.30

2. tablet: \$492, 20% off

$492(0.20) = 98.40$

$492 - 98.4 = 393.60$

Discount: \$98.40

Selling Price: \$393.60

3. bike: \$295.49, 60% off

$295.49(0.60) = 177.29$

$295.49 - 177.29 = 117.20$

Discount: \$177.29

Selling Price: \$117.20

4. microwave: \$89.99, 5% off

$89.99(0.05) = 4.50$

$89.99 - 4.50 = 85.49$

Discount: \$4.50

Selling Price: \$85.49

5. wedding dress: \$625, 3% markup

$625(0.03) = 18.75$

$625 + 18.75 = 643.75$

Markup: \$18.75

Selling Price: \$643.75

6. sofa: \$1,490.95, 40% markup

$1490.95(0.40) = 596.38$

$1490.95 + 596.38 = 2087.33$

Markup: \$596.38

Selling Price: \$2087.33

7. digital camera: \$250, 12% markup

$250(0.12) = 30$

$250 + 30 = 280$

Markup: \$30

Selling Price: \$280

8. cell phone: \$595.79, 25% markup

$595.79(0.25) = 148.95$

$595.79 + 148.95 = 744.74$

Markup: \$148.95

Selling Price: \$744.74

Sales Tax & Tip	• Sales tax is a percentage added to the selling price. • A tip is a percentage added to the total bill.

Examples

9. Find the final price of a $849.99 laptop with 6% sales tax.

$849.99(.06) = 51.00$

$849.99 + 51 =$

$\boxed{\$900.99}$

10. Find the final price of a $325 lacrosse stick with 7.25% sales tax.

$325(.0725) = 23.56$

$325 + 23.56 =$

$\boxed{\$348.56}$

11. A $105 watch is selling for 30% off. Find the final price of the watch if the sales tax is 8%.

$105(.30) = 31.50$

$105 - 31.50 = 73.50$

$73.50(0.08) = 5.88$

$73.50 + 5.88 = \boxed{\$79.38}$

12. A $125 DVD player is selling for 10% off. Find the final price of the DVD player if the sales tax is 5.5%.

$125(.10) = 12.50$

$125 - 12.50 = 112.50$

$112.50(.055) = 6.19$

$112.50 + 6.19 = \boxed{\$118.69}$

13. Katy bought a $76 dress at 33% off and a $52 pair of shoes at 15% off. If sales tax is 6.75%, how much did she pay in total?

$76(.33) = 25.08$

$76 - 25.08 = 50.92$

$52(.15) = 7.80$

$52 - 7.80 = 44.20$

$50.92 + 44.20 = 95.12$

$95.12(.0675) = 6.42$

$95.12 + 6.42 = \boxed{\$101.54}$

14. For parties of six or more, a restaurant adds a 20% gratuity (or tip). If a dinner bill for a large party comes to $148.25, find the total dinner bill with tip.

$148.25(.20) = 29.65$

$148.25 + 29.65 = \boxed{\$177.90}$

15. Greg and Alana went out to dinner. Their dinner bill came to $68.89. If they had a $10 coupon and left a 15% tip, how much did they pay in total?

$68.89 - 10 = 58.89$

$58.89(.15) = 8.83$

$58.89 + 8.83 = \boxed{\$67.72}$

Name: _____ **Unit 4:** Ratio, Proportion, & Percent

Date: _____ **Per:** _____ **Homework 10:** 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. printer: \$149, 18% off

$149(0.18) = 26.82$

$149 - 26.82 = 122.18$

Discount: \$26.82

Selling Price: \$122.18

2. necklace: \$95.19, 75% off

$95.19(0.75) = 71.39$

$95.19 - 71.39 = 23.80$

Discount: \$71.39

Selling Price: \$23.80

3. kayak: \$329.95, 33% off

$329.95(0.33) = 108.88$

$329.95 - 108.88 = 221.07$

Discount: \$108.88

Selling Price: \$221.07

4. book: \$39, 7.5% markup

$39(0.075) = 2.93$

$39 + 2.93 = 41.93$

Markup: \$2.93

Selling Price: \$41.93

5. television: \$479, 40% markup

$479(0.40) = 191.60$

$479 + 191.60 = 670.60$

Markup: \$191.60

Selling Price: \$670.60

6. car: \$15,558, 28% markup

$15558(0.28) = 4356.24$

$15558 + 4356.24 = 19914.24$

Markup: \$4356.24

Selling Price: \$19914.24

Directions: Read each problem carefully! Round to the nearest cent when necessary

7. Jack's bill at a restaurant came to \$52.31. He wants to leave a 15% tip. How much will the new total be, including tip?

$52.31(0.15) = 7.85$

$52.31 + 7.85 = \boxed{\$60.16}$

8. Kerry bought a bag of dog food for \$37.99. If sales tax is 7.6%, how much did she pay in tax?

$37.99(0.076) = \boxed{\$2.89}$

9. Taylor bought a Keurig for \$141.99. If she had a coupon for 15% off, how much did she save?

$141.99(0.15) = \boxed{\$21.30}$

10. Hotel rates are marked up 30% on a holiday weekend. If it's Memorial Day weekend and the nightly rate at a hotel is normally \$219, find the new rate.

$219(0.30) = 65.70$

$219 + 65.70 = \boxed{\$284.70}$

11. Brett likes to tip his taxi cab drivers 20%. If his cab fare came to \$38.75, how much will he tip the driver?

$38.75(0.20) = \boxed{\$7.75}$

12. Find the final cost for a \$479 laptop with 8% sales tax.

$479(0.08) = 38.32$

$479 + 38.32 = \boxed{\$517.32}$

13. Jamie took her family out for dinner. The bill came to $84.68. If sales tax is 9.5% and she plans to tip 20%, how much will she pay in total? Assume that the tip will include the dinner with tax.

$84.68(0.095) = 8.04$

$84.68 + 8.04 = 92.72$

$92.72(0.20) = 18.54$

$92.72 + 18.54 = \boxed{\$111.26}$

14. Zach needs a new pair of running shoes. The pair that he wants regularly sells for $129. If they are on sale for 24% off, how much will he pay in total if sales tax is 6.4%?

$129(0.24) = 30.96$

$129 - 30.96 = 98.04$

$98.04(0.064) = 6.27$

$98.04 + 6.27 = \boxed{\$104.31}$

15. Robin ordered pizza and opted for delivery. She prepaid $48.95 over the phone using her credit card and plans to give an 18% cash tip upon delivery. If she has $7, will this be enough to cover the tip?

$48.95(0.18) = \$8.81$

No, she needs $8.81 to tip 18%.

16. Because of demand, concert tickets that normally sell for $89.99 each are marked up 20%. If Mark wishes to purchase 8 tickets, how much will he pay in total?

$89.99(0.20) = 18.00$

$89.99 + 18.00 = \$107.99$

$107.99(8) = \boxed{\$863.92}$

17. Cora is buying a $109 dress for the school dance. She has two coupons, one for $10 off and one for 15% off. If she is allowed to use both, is it better to take the $10 off first, then the 15%? Or is better to take the 15% off first, then the 10$ off? Justify your answer by giving the final prices.

$109 - 10 = 99$

$99(0.15) = 14.85$

$99 - 14.85 = \$84.15$

$109(0.15) = 16.35$

$109 - 16.35 = 92.65$

$92.65 - 10 = \$82.65$

It'll be cheaper to use the 15% before the $10 coupon.

18. Brett bought three pairs of jeans and five polo shirts. The jeans that regularly sell for $79 were 35% off and the polo shirts that regularly sell for $39 were 15% off. If sales tax is 5.75% and he gave the cashier $350, how much did he receive back in change?

Jeans:

$79(.35) = 27.65$

$79 - 27.65 = 51.35$

$51.35(3) = 154.05$

Polos:

$39(.15) = 5.85$

$39 - 5.85 = 33.15$

$33.15(5) = 165.75$

$154.05 + 165.75 = 319.80$

$319.80(0.0575) = 18.39$

$319.80 + 18.39 = 338.19$

$350 - 338.19 = \boxed{\$11.81}$

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
PERCENT OF CHANGE	A **percent of change** is the ratio of the amount of change to the original amount: $\text{Percent of Change} = \frac{\text{Amount of Change}}{\text{Original Amount}}$
TYPES *of Percent Change*	» When the original amount goes up, it's called a percent increase. » When the original amount goes down, it's called a percent decrease.
EXAMPLE ➔	Beth bought a \$75 pair of jeans for \$60. Find the percent of change and classify as a percent increase or decrease. $\frac{60-75}{75} = \frac{-15}{75} = -0.20 \rightarrow$ 20% decrease
YOU TRY!	**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. John went from weighing 140 pounds to 155 pounds.

$\frac{155-140}{140} = \frac{15}{140}$

≈ 0.107

10.7% increase

2. The computer that sold for \$815 last month sold for \$925 this month.

$\frac{925-815}{815} = \frac{110}{815}$

≈ 0.135

13.5% increase

3. Last year, the debate team had 25 members. This year, the club has 18 members.

$\frac{18-25}{25} = \frac{-7}{25} = -0.28$

28% decrease

4. Karen's old car got 25 miles per gallon. Her new car gets 31 miles per gallon.

$\frac{31-25}{25} = \frac{6}{25} = 0.24$

24% increase

5. Ian worked 25 hours at the grocery store last week and 36 hours this week.

$\frac{36-25}{25} = \frac{11}{25} = 0.44$

44% increase

6. The football team scored 128 total points last season. This year, they scored 144 total points.

$\frac{144-128}{128} = \frac{16}{128} = 0.\overline{1}$

11.1% increase

7. The store employee changed an $8.00 price sticker to $2.50 and placed it on the sale shelf.

$\frac{2.50-8.00}{8.00} = \frac{-5.5}{8} = -0.6875$

68.75% decrease

8. The police officer gave a woman a ticket for driving 75 mph in a 55 mph speed zone.

$\frac{75-55}{55} = \frac{20}{55} = 0.\overline{36}$

$36.\overline{36}$% increase

9. The total rainfall was 14.5 inches in 2014 and 8.90 inches in 2015.

$\frac{8.9-14.5}{14.5} = \frac{-5.6}{14.5}$

≈ -0.386

38.6% decrease

10. Rob took 75 minutes to finish his 6th grade math final exam and 1 hour and 40 minutes to finish his 7th grade math final exam.

$\frac{100-75}{75} = \frac{25}{75} = 0.\overline{3}$

33.3% increase

11. In Mr. Wahlen's math class, Erin earned an 88 in the 1st quarter and a 94 in the 2nd quarter.

$\frac{94-88}{88} = \frac{6}{88} = 0.0\overline{681}$

$6.\overline{81}$% increase

12. The enrollment at a university increased from 14,000 to 16,000 students.

$\frac{16000-14000}{14000} = \frac{2000}{14000}$

≈ 0.143

14.3% increase

13. The florist sold 800 roses last year on Valentine's Day. This year, the sold 638 roses.

$\frac{638-800}{800} = \frac{-162}{800} = 0.2025$

20.25% decrease

14. The golf club paid $40 for a certain golf club, then sold it for $75.

$\frac{75-40}{40} = \frac{35}{40} = 0.875$

87.5% increase

Name: _____ **Unit 4:** Ratio, Proportion, & Percent

Date: _____ **Per:** _____ **Homework 11:** 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. The laptop was marked down from $895 to $720.

$\frac{720-895}{895} = \frac{-175}{895} \approx -0.196$

19.6% decrease

2. In the 2006 season, Tom Brady threw for 3,529 yards. In the 2007 season, he threw for 2,806 yards.

$\frac{2806-3529}{3529} = \frac{-723}{3529} \approx -0.205$

20.5% decrease

3. The Smith's home was worth $102,500 in 2013 and $111,000 in 2014.

$\frac{111000-102500}{102500} = \frac{8500}{102500} \approx 0.083$

8.3% increase

4. Brandon bought a pair of sneaks for $55 that had a regular price of $90.

$\frac{55-90}{90} = \frac{-35}{90} = -0.3\overline{8}$

38.8% decrease

5. During the winter, the grill was marked at $85. In June, the price was changed to $110.50.

$\frac{110.50-85}{85} = \frac{25.50}{85} = 0.30$

30% increase

6. Sarah started her diet on January 1st at 198 pounds. By the end of the year, she weighed 112 pounds.

$\frac{112-198}{198} = \frac{-86}{198} = -0.\overline{43}$

43.$\overline{43}$% decrease

7. Nate scored an 990 on his first attempt on the SAT and a 1140 on his second attempt.

$\frac{1140-990}{990} = \frac{150}{990} = 0.\overline{15}$

15.15% increase

8. There were 795 runners registered for the marathon in 2015 and 1,208 in 2016.

$\frac{1208-795}{795} = \frac{413}{795} \approx 0.519$

51.9% increase

9. The basic model of a car retails for $24,595. The platinum model of the same car retails for $32,900.

$\frac{32900-24595}{24595} = \frac{8305}{24595} \approx 0.338$

33.8% increase

10. The average high temperature was 86° in August then 74° in September.

$\frac{74-86}{86} = \frac{-12}{86} \approx -0.140$

14% decrease

11. This year's school enrollment at Brookhaven Middle School is 1,524 students. Last year, the enrollment was 1,398 students.

$\frac{1524-1398}{1398} = \frac{126}{1398} \approx 0.09$

9% increase

12. Marshall's dog weighs 82 pounds. The vet said 75 pounds would be more ideal for his size. What percent of his weight does he need to lose?

$\frac{75-82}{82} = \frac{-7}{82} \approx -0.085$

8.5% decrease

Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 4:** Ratios, Proportions, and Percents

Quiz 4-3: Percents

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

1. Find 12% of 145.

$\frac{X}{145} = \frac{12}{100}$

$\frac{100X}{100} = \frac{1740}{100}$

$X = 17.4$

2. What percent of 104 is 91?

$\frac{91}{104} = \frac{X}{100}$

$\frac{104X}{104} = \frac{9100}{104}$

$X = 87.5$

3. 20.8 is 32% of what number?

$\frac{20.8}{X} = \frac{32}{100}$

$\frac{32X}{32} = \frac{2080}{32}$ $X = 65$

4. $21\frac{3}{5}$ is what percent of 40?

$\frac{21.6}{40} = \frac{X}{100}$

$\frac{40X}{40} = \frac{2160}{40}$ $X = 54$

5. The marching band at Parkland High School has 128 students. Of these, 18.75% are ninth graders. How many ninth graders are there in the band?

$\frac{X}{128} = \frac{18.75}{100}$ $\frac{100X}{100} = \frac{2400}{100}$

$X = 24$

6. On Reese's most recent phone bill, 80% of the minutes she used were from calling her mother. If she talked to her mother for 348 minutes, how many total minutes did she use?

$\frac{348}{X} = \frac{80}{100}$ $\frac{80X}{80} = \frac{34800}{80}$

$X = 435$

7. A sweater originally cost $32.75. Last week, Kayleigh bought it at 20% off. How much was deducted from the original price?

$32.75(0.20) = 6.55$

8. A pair of rollerblades is on sale for 35% off the original price. If the original price is $128.40, what is the sale price?

$128.40(0.35) = 44.94$

$128.40 - 44.94 = 83.46$

1.	17.4
2.	87.5%
3.	65
4.	54%
5.	24 9th graders
6.	435 minutes
7.	$6.55
8.	$83.46

9. The price per pound of lobster was $2.94 per pound. Due to a limited supply, this price per pound was marked up 30%. If a Logan buys five pounds of lobster, how much will he pay?

$2.94(0.30) = 0.88$ $\qquad$ $3.82(5) = 19.10$

$2.94 + 0.88 = 3.82$

10. Carson bought a coat for 40% off the original price, then another 15% off the discounted price. If the coat originally cost $149, what was the final sale price that Carson paid?

$149(0.40) = 59.60$ $\qquad$ $89.40(.15) = 13.41$

$149 - 59.6 = 89.40$ $\qquad$ $89.40 - 13.41 = 75.99$

11. Madelyn wants to buy a dress priced at 94.79. If the sales tax is 8%, what is the total amount she must pay?

$94.79(0.08) = 7.58$

$94.79 + 7.58 = 102.37$

12. Shane is buying a pair of sneakers that regularly cost $59. If they are on sale for 10% off and sales tax is 6.25%, what is the sale price of the sneakers including tax?

$59(.10) = 5.90$ $\qquad$ $53.10(0.0625) = 3.32$

$59 - 5.90 = 53.10$ $\qquad$ $53.10 + 3.32 = 56.42$

For questions 13-15, round to the nearest tenth of a percent when necessary. Classify each as a percent increase or percent decrease.

13. The price of gas was $1.80 in September then $2.07 in October. Find the percent of change from September to October.

$$\frac{2.07 - 1.80}{1.80} = \frac{0.27}{1.80} = 0.15$$

14. The number of tourists at the beach per weekend in July was 55,000. In November, the number of tourists per weekend was 18,000. Find the percent of change from July to November.

$$\frac{18000 - 55000}{55000} = \frac{-37000}{55000} = -.67\overline{27}$$

15. It cost $154 for Carla to get her hair done. With a tip, the total cost was $180. What percent of a tip did she leave her hairdresser?

$$\frac{180 - 154}{154} = \frac{26}{154} \approx 0.168$$

9. $19.10

10. $75.99

11. $102.37

12. $56.42

13. 15% increase

14. $67.\overline{27}$% decrease

15. 16.8% increase (tip)

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Simple Interest	➢ **Interest** is the amount of money paid or earned for the use of money by a bank or other financial institution. • For **borrowing money** (loans, credits cards, etc.), interest is **paid.** • For **saving money** (savings accounts, investing, etc.), interest is **earned.**
Simple Interest Formula	To solve problems involving simple interest, use the formula: $I = prt$ I = Amount of interest p = Principle investment r = Rate (as a decimal) t = Time (in years)
Finding Interest	**Directions:** Find the **simple interest** to the nearest cent.

1. \$675 at 4% for 3 years

$I = 675(0.04)(3)$

$I = \$81$

2. \$900 at 8% for 5 years

$I = 900(0.08)(5)$

$I = \$360$

3. \$225 at 5.4% for 2 years

$I = 225(0.054)(2)$

$I = \$24.30$

4. \$1,295 at 9.25% for 4 years

$I = 1295(0.0925)(4)$

$I = \$479.15$

5. \$14,095 at 3.8% for $5\frac{1}{2}$ years

$I = 14095(0.038)(5.5)$

$I = \$2945.86$

6. \$2,200 at 7.5% for $3\frac{1}{4}$ years.

$I = 2200(0.075)(3.25)$

$I = \$536.25$

7. \$460 at 2.99% for 6 months

$I = 460(0.0299)(0.5)$

$I = \$6.88$

8. \$1,849 at 7% for 18 months

$I = 1849(0.07)(1.5)$

$I = \$194.15$

Applications

Directions: Assume each problem refers to simple interest. Read carefully and solve. Round to the nearest tenth or cent when necessary.

9. Marsha borrowed $8,975 at a 4.9% interest rate to purchase a used car. How much total will she have paid after 5 years?

$I = 8975(0.049)(5)$

$I = 2198.88$

$8975 + 2198.88 =$

$\$11,173.88$

10. Carolyn borrowed $38,500 to pay for college. If the interest rate is 3.2%, how much total will she have paid after 10 years?

$I = 38500(0.032)(10)$

$I = 12320$

$38500 + 12320 =$

$\$50,820$

11. Victor used a 36-month line of credit for $15,000 to remodel his kitchen. If the interest rate is 2.5%, how much will he pay in interest?

$I = 15000(0.025)(3)$

$I = \$1125$

12. Lance placed $5,200 in an investment account with a 6.5% interest rate. After how many years will he double his initial investment?

$5200 = 5200(0.065)t$

$\frac{52.00}{338} = \frac{338t}{338}$

$15.4\text{yr} \approx t$

13. Shane took out a 5.5-year loan from the bank in order to purchase a $12,000 motorcycle. At the end of the loan, he had paid $3267 in interest. Find the interest rate.

$3267 = 12000(r)(5.5)$

$\frac{3267}{66000} = \frac{66000r}{66000}$

$0.0495 = r \rightarrow 4.95\%$

14. Gabby used a 2-year loan to purchase a $1,650 television. If she ended up paying $1,914 in total, find the interest rate.

$264 = 1650(r)(2)$

$\frac{264}{3300} = \frac{3300r}{3300}$

$0.08 = r \rightarrow 8\%$

15. Elaina started a savings account with $3,000. The account earned $10 each month in interest over a 5-year period. Find the interest rate.

$3000 + 10(60) = 3600$

$600 = 3000(r)(5)$

$\frac{600}{15000} = \frac{15000r}{15000}$

$0.04 = r \rightarrow 4\%$

16. Alex bought a new boat with a 15-year loan at a 2.4% interest rate. If he ended up paying $8456.40 in interest, what was the purchase price of the boat?

$8456.40 = p(0.024)(15)$

$\frac{8456.40}{0.36} = \frac{0.36p}{0.36}$

$\$23490 = p$

Name: _____ **Unit 4:** Ratio, Proportion, & Percent

Date: _____ Per: _____ **Homework 12:** Simple Interest

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

Directions: Assume each problem refers to simple interest. Read carefully and solve. Round to the nearest tenth or cent when necessary.

1. Find the amount of interest earned in an account with an initial deposit of $800 for 15 years at an interest rate of 3%.

$I = 800(0.03)(15)$

$I = \$360$

2. Find the amount of interest owned for a $1,895 loan for 4 years at a 7.9% interest rate.

$I = 1895(0.079)(4)$

$I = \$598.82$

3. Beth took out a 12-year loan for $35,000 for a new pool. If the interest rate is 10.2%, how much will she pay in interest?

$I = 35000(0.102)(12)$

$I = \$42840$

4. How much interest will be earned on a $6,000 investment at 2.25% for 60 months?

$I = 6000(0.0225)(5)$

$I = \$675$

5. Caleb bought a $795 necklace for his wife's birthday. If he bought it on credit with an interest rate of 16.25%, how much total will he have paid after three years?

$I = 795(0.1625)(3)$

$I = 387.56$

$795 + 387.56 = \$1182.56$

6. If $600 was placed in a savings account with an interest rate of 0.5%, find the total amount in the account after 8 years and 3 months.

$I = 600(0.005)(8.25)$

$I = 24.75$

$600 + 24.75 = \$624.75$

7. Trevon invested $1,500 in an account with an interest rate of 4.25%. If he plans to retire in $18\frac{1}{2}$ years, how much total will be in the account?

$I = 1500(0.0425)(18.5)$

$I = 1179.38$

$1500 + 1179.38 = \$2679.38$

8. Anna bought a new computer for $859 using a 24-month loan with a 18.99% interest rate. How much will she have paid in total at the end of the loan?

$I = 859(0.1899)(2)$

$I = 326.25$

$859 + 326.25 = \$1185.25$

9. After seven years, an initial investment of $600 earned $84. Find the interest rate.

$84 = 600(r)(7)$

$\frac{84}{4200} = \frac{4200r}{4200}$

$0.02 = r \rightarrow \boxed{2\%}$

10. At the end of a 10-year loan, $13,570 had been paid in interest. If the initial loan amount was $23,000, find the interest rate.

$13570 = 23000(r)(10)$

$\frac{13570}{230000} = \frac{230000r}{230000}$

$0.059 = r \rightarrow \boxed{5.9\%}$

11. Ryan took out a 66-month loan to pay for a $28,500 car. If he paid $33,829.50 in total at the end of the loan, find the interest rate.

$5329.5 = 28500(r)(5.5)$

$\frac{5329.5}{156750} = \frac{156750r}{156750}$

$0.034 = r \rightarrow \boxed{3.4\%}$

12. Allyson took out a loan for $8,500 to pay for a trip to Europe. If this was a 4 year loan in with monthly payments of $212.50, what is the interest rate?

$212.5(48) = 10200$

$1700 = 8500(r)(4)$

$\frac{1700}{34000} = \frac{34000r}{34000}$

$0.05 = r \rightarrow \boxed{5\%}$

13. Find the initial deposit into an account that earned $448 at an interest rate of 2.8% after 10 years.

$448 = p(0.028)(10)$

$\frac{448}{0.28} = \frac{0.28p}{0.28}$

$\boxed{\$1600 = p}$

14. Jane took out a loan for college with an interest rate of 5.75%. She does not have to make payments on the loan until she graduates in four years. After four years, the loan has increased $11,960 in interest. Find the original amount of the loan.

$11960 = p(0.0575)(4)$

$\frac{11960}{0.23} = \frac{0.23p}{0.23}$

$\boxed{p = \$52{,}000}$

15. How long will it take a $2,000 investment to earn $544 in interest at a 1.7% interest rate?

$544 = 2000(0.017)t$

$\frac{544}{34} = \frac{34t}{34}$

$16 = t$

$\boxed{16 \text{ years}}$

16. How many months quicker will a $600 investment double at an 8% interest rate compared to a 5% interest rate?

$600 = 600(0.08)t$

$\frac{600}{48} = \frac{48t}{48}$ $\quad t = 12.5$ yrs

$600 = 600(0.05)t$

$\frac{600}{30} = \frac{30t}{30}$ $\quad t = 20$ yrs

$20 - 12.5 = 7.5$ yrs $\rightarrow \boxed{90 \text{ mo}}$

Unit 4 Test Study Guide
(Ratio, Proportion, & Percent)

Name: _____

Date: _____ Per: _____

Topic 1: Ratio & Rates

Use for questions 1-3: A tray of muffins contains 10 chocolate chip muffins, 12 blueberry muffins, 2 pumpkin muffins, and 8 corn muffins. What each ratio in simplest form.

1. pumpkin muffins to chocolate chip muffins

2 : 10 → **1 : 5**

2. blueberry muffins to corn muffins

12 : 8 → **3 : 2**

3. chocolate chip muffins to total muffins

10 : 32 → **5 : 16**

Write each ratio in simplest form. (*Remember to convert the measurement!*)

4. 8 feet to 6 yards

18 ft

8 : 18 → **4 : 9**

5. 76 centimeters to 1 meter

100 cm

76 : 100 → **19 : 25**

6. 6 cups to 4 pints

8 cups

6 : 8 → **3 : 4**

7. 9 gallons to 21 quarts

36 qts

36 : 21 → **12 : 7**

8. 45 seconds to 2 hours

7200 sec

45 : 7200 → **1 : 160**

9. 4 years to 8 months

48 mo

48 : 8 → **6 : 1**

Round the nearest tenth or cent when necessary.

10. In five games of bowling, Gabe's combined score was 380. Find his score per game.

$\frac{380}{5}$ = **76 / game**

11. It took Ciera 24 minutes to drive 18 miles. It took James one hour to drive 46 miles. Who is driving at a faster rate?

Ciera: $\frac{24}{18} = 1.\overline{3}$ min/mile

James: $\frac{60}{46} = 1.30$ min/mile

Determine if Option A or Option B is the better deal. Justify your answer.

12.

- ☐ **Option A:** 2 lbs of pears for $1.98 ($.99/lb)
- ☑ **Option B:** 5 lbs of pears for $4.60 ($.92/lb)

13.

- ☑ **Option A:** a pack of 6 pens for $4.74 ($.79/pen)
- ☐ **Option B:** a pack of 15 pens for $12.19 ($.81/pen)

Topic 2: Proportional Relationships & Solving Proportions

Determine if a proportional relationship exists. If yes, give the constant rate.

14. No!

Minutes	1	8	18	32
Calories Burned	9	72	162	256
cal/min:	9	9	9	8

15. yes; 2.5 in/hr

Hours	2	6	8	14
Snowfall (in)	5	15	20	35
in/hr:	2.5	2.5	2.5	2.5

Determine if the ratios form a proportion.

16. $\frac{5}{27}, \frac{3}{16.2}$

5(16.2) = 27(3)

81 = 81

yes!

17. $\frac{34}{9}, \frac{25}{7}$

34(7) = 9(25)

238 ≠ 225

No!

Solve the proportion.

18. $\frac{x}{12}=\frac{15}{40}$

$\frac{40x}{40}=\frac{180}{40}$

$x = 4.5$

$(4\frac{1}{2})$

19. $\frac{20}{9.5}=\frac{36}{m}$

$\frac{20m}{20}=\frac{342}{20}$

$m = 17.1$

$(17\frac{1}{10})$

20. In a cookie recipe, $1\frac{2}{3}$ cups of milk makes 16 cookies. How many cups of milk are needed to make 24 cookies?

$\frac{1.\overline{6}}{16}=\frac{x}{24}$

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

$x = 2.5$ cups

$(2\frac{1}{2})$

21. Runners in the half marathon entered in three waves. There were 341 runners in the first wave, 295 runners in the second wave, and 316 runners in the third wave. If seven out of eight runners finished the race, how many did not finish?

$\frac{1}{8}=\frac{x}{952}$

$\frac{8x}{8}=\frac{952}{8}$

$x = 119$ runners

Topic 3: Scale Drawings & Models

22. On a map with a scale of 0.5 inch = 75 miles, the distance between two cities is 2.75 inches. Find the actual distance between the cities.

$\frac{0.5}{75}=\frac{2.75}{x}$

$\frac{0.5x}{0.5}=\frac{206.25}{0.5}$

$x = 412.5$ miles

$(412\frac{1}{2})$

23. A model of the Cape Hatteras Lighthouse uses a scale of 8 inches = 30 feet. If the actual lighthouse is 210 feet tall, how tall is the model? Give your answer in feet.

$\frac{8}{30}=\frac{x}{210}$

$\frac{30x}{30}=\frac{1680}{30}$

$x = 56$ in

$4.\overline{6}$ ft

$(4\frac{2}{3})$

24. Nate made a model of the USS Massachusetts Battleship that is 3 feet long. If the actual battleship is 681 feet long, what scale did he use?

$\frac{3}{681}\ \frac{\div 3}{\div 3}=\frac{1}{227}$

1 ft = 227 ft

25. Mr. Willis is building a new dock at his lakehouse that will be 35 feet long. If the blueprints show the dock as 16 inches long, what scale was used to create the blueprint?

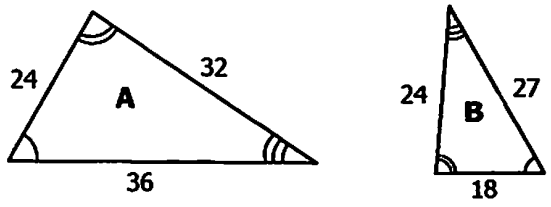
$\frac{16}{35}\ \frac{\div 16}{\div 16}=\frac{1}{2.1875}$

1 in = 2.1875 ft

$(2\frac{3}{16})$

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.

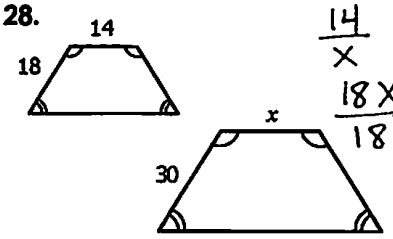
$\frac{36}{27}=\frac{4}{3}$

27. Give the scale factor of Figure B to Figure A.

$\frac{18}{24}=\frac{3}{4}$

If the figures below are similar, find the value of x.

28.



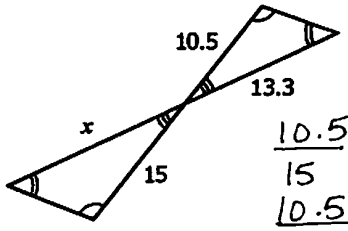
$\frac{14}{x} = \frac{18}{30}$

$\frac{18x}{18} = \frac{420}{18}$

$x = 23.\overline{3}$

$(23\frac{1}{3})$

29.



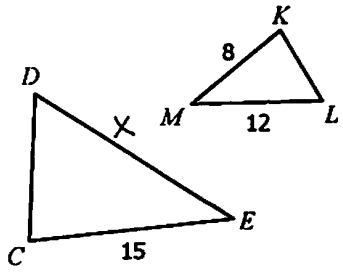
$\frac{10.5}{15} = \frac{13.3}{x}$

$\frac{10.5x}{10.5} = \frac{199.5}{10.5}$

$x = 19$

Use the given information to find each measure.

30. Given $\Delta CDE \sim \Delta KLM$, find DE.



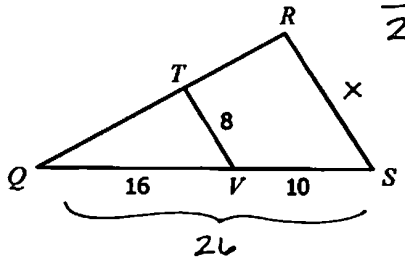
$\frac{x}{12} = \frac{15}{8}$

$\frac{8x}{8} = \frac{180}{8}$

$x = 22.5$

$(22\frac{1}{2})$

31. Given $\Delta QRS \sim \Delta QTV$, find RS.



$\frac{16}{26} = \frac{8}{x}$

$\frac{16x}{16} = \frac{208}{16}$

$x = 13$

32. A flagpole casts a 20-foot shadow at the same time Lexi casts a 5-foot shadow. If Lexi is 5'9", find the height of the flagpole.

$\frac{5.75}{5} = \frac{x}{20}$

$\frac{5x}{5} = \frac{115}{5}$

$x = 23$ ft

33. A 15-foot street lamp casts a 9-foot shadow. If the street lamp is near a 71-foot building, find the length of the shadow casted by the building.

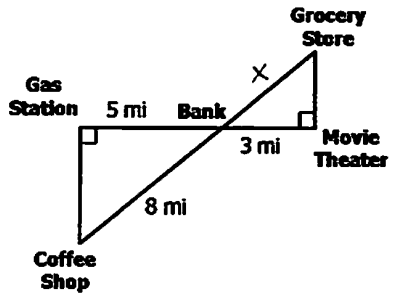
$\frac{15}{9} = \frac{71}{x}$

$\frac{15x}{15} = \frac{639}{15}$

$x = 42.6$ ft

$(42\frac{3}{5})$

Use the diagram below to answer questions 34-35.



34. Find the distance from the bank to the grocery store.

$\frac{8}{x} = \frac{5}{3}$

$\frac{5x}{5} = \frac{24}{5}$

$x = 4.8$ mi

35. Find the distance from the coffee shop to the grocery store, then back to the bank.

$8 + 4.8 + 4.8 =$ 17.6 mi

Topic 5: Percents

36. What percent of 80 is 18?

$\frac{18}{80} = \frac{x}{100}$

$\frac{80x}{80} = \frac{1800}{80}$

$x = 22.5$

37. Find 42% of 135.

$\frac{x}{135} = \frac{42}{100}$

$\frac{100x}{100} = \frac{5670}{100}$

$x = 56.7$

38. 10.2 is 21.25% of what number?

$\frac{10.2}{x} = \frac{21.25}{100}$

$\frac{21.25x}{21.25} = \frac{1020}{21.25}$

$x = 48$

39. At Wally's school, 30% of the students are in 8th grade. If there are 470 students total, find the number of 8th grade students.

$\frac{X}{470} = \frac{30}{100}$

$\frac{100X}{100} = \frac{14100}{100}$

$X = 141$ students

40. Laura spent 78.5% of her paycheck on her mortgage payment. If her mortage was $1,226.17, how much was her paycheck?

$\frac{1226.17}{X} = \frac{78.5}{100}$

$\frac{78.5X}{78.5} = \frac{122617}{78.5}$

$X = \$1562$

41. A stereo that regularly costs $429.99 is on sale for 35% off. How much money will be discounted from the regular price?

$429.99(0.35) = \$150.50$

42. Gas prices are typically marked up for holiday travel. If the prices are marked up 17.5% and the regular price per gallon is $2.40, how much will Mitch pay for 16 gallons of gas?

$2.40(0.175) = 0.42$

$2.40 + 0.42 = 2.82$

$2.82(16) = \$45.12$

43. Claire is buying a new bicycle for $295. If the sales tax is 4.75%, what will she pay in total?

$295(0.0475) = 14.01$

$295 + 14.01 = \$309.01$

44. A $1,349 television is on sale for 20% off. If sales tax is 8%, find the price of the television including tax.

$1349(0.20) = 269.80$

$1349 - 269.80 = 1079.20$

$1079.20(0.08) = 86.34$

$1079.20 + 86.34 = \$1165.54$

45. The Barnes family has a coupon for 10% off their dinner. If their bill comes to $82.50 and they wish to tip 15%, what will they pay in total?

$82.50(0.10) = 8.25$

$82.50 - 8.25 = 74.25$

$74.25(0.15) = 11.14$

$74.25 + 11.14 = \$85.39$

46. A sign above a basket of DVDs reads "3 for $17." Kellen decides to buy 6 DVDs and use a coupon for 25% off. If sales tax is 6%, what will he pay in total?

$\frac{3}{17} = \frac{6}{X}$ $\quad \frac{3X}{3} = \frac{102}{3}$ $\quad X = 34$

$34(0.25) = 8.50$

$34 - 8.5 = 25.50$

$25.50(0.06) = 1.53$

$25.50 + 1.53 = \$27.03$

47. Manny bought a car for $32,985. Five years later, the car was worth $19,500. Find the percent change in the value of the car. Classify as a percent increase or percent decrease.

$$\frac{19500-32985}{32985}$$

$$= \frac{-13485}{32985} \approx -0.409$$

40.9% dec

48. A painting that sold for $4,500 in 2013 is now worth $7,900. Find the percent change in value from then until now. Classify as a percent increase or decrease.

$$\frac{7900-4500}{4500}$$

$$= \frac{3400}{4500} \approx 0.75\overline{}$$

75.5% increase

Topic 6: Simple Interest

Assume each problem below refers to simple interest. Round to the nearest tenth or cent when necessary.

49. Suppose $3,750 is placed in a savings account for 4 years. Find the interest earned if the interest rate is 1.85%.

$I = 3750\ (0.0185)(4)$

$I = \$277.5$

50. Simone borrowed $13,500 from the bank to purchase a used car. If the interest rate on this 72-month loan is 5.9%, howmuch will Simone pay in total back to the bank?

$I = 13500(0.059)(6)$

$I = 4779$

$13500 + 4779 = \$18279$

51. Rylan placed $1,200 in a retirement account. Seven years later, it had earned $546 in interest. Find the interest rate.

$546 = 1200(r)7$

$\frac{546}{8400} = \frac{8400r}{8400}$

$0.065 = r \rightarrow 6.5\%$

52. Alexia took out a 12-year loan for $72,000 to renovate her home. If her monthly payments are $680, what is the interest rate?

$680(144) = 97920$

$25920 = 72000(r)(12)$

$\frac{25920}{864000} = \frac{864000r}{864000}$

$0.03 = r \rightarrow 3\%$

53. How many years will it take a $5,000 investment reach $7,500 at an 8% interest rate?

$2500 = 5000(0.08)t$

$\frac{2500}{400} = \frac{400t}{400}$

$6.25 = t$

6.25 years
(6 1/4 years)

54. Andy took out a 5-year loan at a 12.5% interest rate to pay for a trip to Spain. If he ended up paying $4,937.50 in interest, how much was the trip?

$4937.50 = p(0.125)(5)$

$\frac{4937.50}{0.625} = \frac{p(0.625)}{0.625}$

$\$7900 = p$

Name: _____

Date: _____ Per: _____

Unit 4 Test

Ratio, Proportion, & Percent

Use for questions 1-2: Savannah sold boxes of cookies to raise money for a field trip. The table below shows how many boxes of each type of cookie she sold.

Type of Cookie	Number of Boxes
Chocolate Chip	32
Oatmeal Raisin	18
Peanut Butter	30

1. What is the ratio of boxes of peanut butter cookies to boxes of oatmeal raisin cookies?

30 : 18

A. 4:9 **C.** 3:5

B. 9:4 **D.** 5:3

D

2. What is the ratio of chocolate chip cookies to the total boxes of cookies sold?

32 : 80

A. 2:5 **C.** 5:16

B. 5:2 **D.** 16:5

A

For questions 3-6, write each ratio in simplest form.

3. 14 inches to 4 feet

↓

48 in

14 : 48

A. 2:7

B. 7:2

C. 7:24

D. 7:20

C

4. 8 cups to 12 pints

↓

24 cups

8 : 24

A. 1:3

B. 1:6

C. 2:3

D. 3:2

A

5. 5 gallons to 6 quarts

↓

20 qt

20 : 6

A. 3:5

B. 5:3

C. 3:10

D. 10:3

D

6. 54 seconds to 2 minutes

↓

120 sec

54 : 120

A. 9:10

B. 9:20

C. 2:27

D. 27:2

B

7. Grant drove his car for 417 miles on 15 gallons of gas. How many miles per gallon does Grant's car get?

$\frac{417}{15} = \frac{27.8}{1}$

27.8 mi/gal

8. The various prices of orange juice are given below. Which brand costs the least per ounce?

	Brand	Size	Price	
A	Tropicana	59-ounce	$3.99	$0.07/oz
B	Minute Maid	130-ounce	$6.99	$0.05/oz
C	Simply Orange	64-ounce	$3.84	$0.06/oz
D	Sunny D	96-ounce	$4.19	$0.04/oz

D

For questions 9-10, determine if the data in the table represents a proportional relationship. If yes, give the constant rate.

9.

Tickets Sold	20	36	48	64
Revenue	$175	$315	$420	$560

Proportional? ☑ Yes ☐ No

Constant Rate: $8.75/ticket

10.

Minutes	2	14	26	38
Water Level (in)	3	21	39	57

Proportional? ☑ Yes ☐ No

Constant Rate: 1.5 in/min

11. Which ratios form a proportion? Check all that apply.

☐ $\frac{16}{10}, \frac{12}{8}$ ☑ $\frac{4}{28}, \frac{9}{63}$ ☑ $\frac{10.8}{27}, \frac{7.2}{18}$ ☑ $\frac{3.4}{0.6}, \frac{17}{3}$ ☐ $\frac{52}{21}, \frac{39}{14}$

12. Solve for x: $\frac{0.9}{x} = \frac{2.7}{48}$

$\frac{2.7x}{2.7} = \frac{43.2}{2.7}$

$x = 16$

$x = 16$

13. Solve for p: $\frac{19}{20} = \frac{p}{6}$

$\frac{20p}{20} = \frac{114}{20}$

$p = 5.7$

$p = 5.7$

14. If 24 golf balls weighs 2 ¼ pounds, how much would 60 golf balls weigh?

$\frac{24}{2.25} = \frac{60}{x}$

$\frac{24x}{24} = \frac{135}{24}$

$x = 5.625$

5.625 lb ($5\frac{5}{8}$)

15. Annie can make 18 baskets out of 30 attemps. Her younger brother Cameron can make half as many in the same number of attempts. How many baskets can Cameron make in 50 attempts?

$\frac{9}{30} = \frac{x}{50}$

$\frac{30x}{30} = \frac{450}{30}$

$x = 15$

15 baskets

16. The blueprint of a fishing pier uses a scale of $\frac{1}{8}$ inch = 5 feet. If the pier is $19\frac{3}{4}$ inches long on the blueprint, find its actual length.

$\frac{0.125}{5} = \frac{19.75}{x}$

$\frac{0.125x}{0.125} = \frac{98.75}{0.125}$

$x = 790$

790 ft

17. A model of the F/A-18 Hornet (a jet in the Navy) is 16 inches long. If the actual length of the jet is 56 feet, what scale was used for the model?

$\frac{16}{56}$

A. 1 inch = 2.5 feet

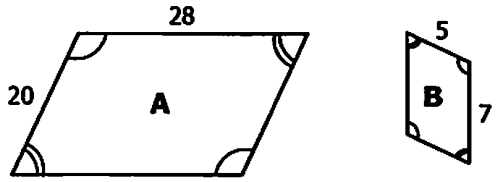
B. 1 inch = 3.5 feet

C. 1 inch = 4 feet

D. 1 inch = 4.5 feet

B

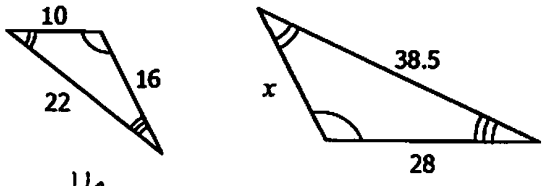
18. What is the scale factor of Figure B to Figure A?



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

1 : 4

19. Given the similar figures below, find the value of x.



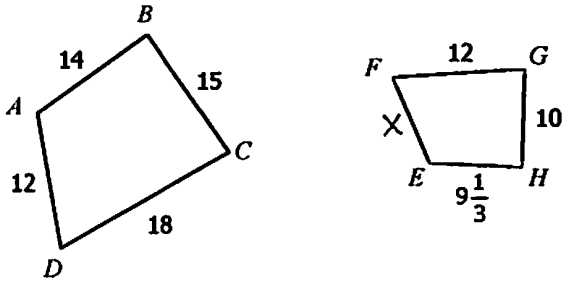
$\frac{10}{x} = \frac{16}{28}$

$\frac{16x}{16} = \frac{280}{16}$

$x = 17.5$

$x = 17.5$ (17 1/2)

20. Given figure $ABCD \sim$ figure $EHGF$, find EF.



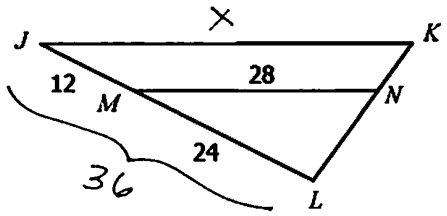
$\frac{12}{x} = \frac{15}{10}$

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

$x = 8$

$EF = 8$

21. Given $\Delta JKL \sim \Delta MNL$, find JK.



$\frac{24}{28} = \frac{36}{x}$

$\frac{24x}{24} = \frac{1008}{24}$

$x = 42$

$JK = 42$

22. A stop sign casts a shadow 8 feet long, while a school bus nearby casts a shadow 12 feet long. If the stop sign is 7 feet tall, how tall is the school bus?

$\frac{7}{8} = \frac{x}{12}$

$\frac{8x}{8} = \frac{84}{8}$

$x = 10.5$

(10 1/2) 10.5 ft

23. An 54-foot tall office building casts a shadow that is 48 feet long. If Mindy is 5'6" tall and standing nearby, find the length of her shadow.

$\frac{54}{48} = \frac{5.5}{x}$

$\frac{54x}{54} = \frac{264}{54}$

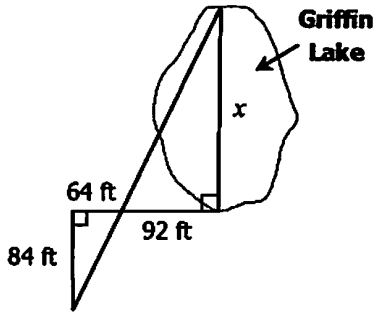
$x = 4.\overline{8}$

A. $3\frac{3}{4}$ feet **C.** $4\frac{1}{3}$ feet

B. $4\frac{1}{2}$ feet **D.** $4\frac{8}{9}$ feet

D

Use the diagram below to answer questions 24-25.



24. Which proportion could find x, the distance across Griffin Lake?

A. $\frac{64}{84} = \frac{x}{92}$ **C.** $\frac{64}{92} = \frac{84}{x}$

B. $\frac{x}{64} = \frac{84}{92}$ **D.** $\frac{84}{x} = \frac{92}{64}$

C

25. Find x.

$\frac{64x}{64} = \frac{7728}{64}$

$x = 120.75$

(120 3/4) 120.75 ft

26. 78 is 65% of what number?

$\frac{78}{x} = \frac{65}{100}$

$\frac{65x}{65} = \frac{7800}{65}$

$x = 120$

120

27. Of the questions on his math test, Shane answered 42 correctly and 18 incorrectly. What percent of the total questions did Shane answer correctly?

$\frac{42}{60} = \frac{x}{100}$

A. 7%

B. 42.9%

(C.) 70%

D. 74%

$\frac{60x}{60} = \frac{4200}{60}$

$x = 70$

C

28. Of the 75 cars that Lindsay saw pass on the highway, 16% had an out-of-state license plate. How many had an out-of-state license plate?

$\frac{x}{75} = \frac{16}{100}$

$\frac{100x}{100} = \frac{1200}{100}$

$x = 12$

12 cars

29. The middle school track team consists of sixth, seventh, and eighth grade students. The 5 sixth grade and 9 seventh grade students make up 43.75% of the entire team. How many eighth grade students are on the team?

A. 16

(B.) 18

C. 20

D. 32

$\frac{14}{x} = \frac{43.75}{100}$

$\frac{43.75x}{43.75} = \frac{1400}{43.75}$

$x = 32$

$32 - 14 = 18$

B

30. Which coat has the lowest sale price?

A. a \$62 coat at 15% off (\$52.70)

B. a \$74 coat at 30% off (\$51.80)

C. a \$58 coat at 10% off (\$52.20)

(D.) a \$68 coat at 25% off (\$51)

D

31. The Clark family went out to dinner. If their dinner bill came to \$81.50 and they wish to leave a 18% tip, how much should they tip?

$81.50(0.18) = 14.67$

\$14.67

32. A televison that regularly sells for \$749 is marked down 15%. After it doesn't sell, it is reduced another 20% from the sale price. What is the total savings from the original price?

$749(0.15) = 112.35$

$749 - 112.35 = 636.65$

$636.65(0.20) = 127.33$

$636.65 - 127.33 = 509.32$

(A.) \$239.68

B. \$262.15

C. \$149.80

D. \$218.32

A

33. Rick is buying a \$115 tennis racquet from a sporting goods store. If the racquet is on sale for 35% off and sales tax is 8%, how much will he pay in total?

$115(0.35) = 40.25$

$115 - 40.25 = 74.75$

$74.75(0.08) = 5.98$

$74.75 + 5.98 = 80.73$

\$80.73

34. Mark bought a concert ticket for $88, then sold it for $121. By what percent did he mark the ticket up?

$\frac{121-88}{88} = \frac{33}{88} = 0.375$

37.5%

35. Lisa's home is currently worth $152,000. When she purchased it five years ago, it was worth $180,000. Find the percent of change and classify as a percent increase or decrease.

$\frac{152000-180000}{180000}$

$= \frac{-28000}{180000}$

$= -.15\overline{5}$

A. $15.\overline{5}\%$ increase

(B.) $15.\overline{5}\%$ decrease

C. 18.4% increase

D. 18.4% decrease

B

36. Nyla borrowed $3,425 from the bank at a simple interest rate of 13.5%. How much interest will the loan accure after two years?

$I = 3425(0.135)(2)$

$I = 924.75$

$924.75

37. If $800 is deposited into a new savings account with a simple interest rate of 1.8%, what will be the total amount in the account after 15 years?

$I = 800(0.018)(15)$

$I = 216$

$800 + 216 = 1016$

$1016

38. Colton is buying a new $1,700 camera to start a photography business. He plans to finance the camera and has two options. Option A offers a 18-month loan at simple interest rate of 4.5%. Option B offers a 3-year loan at a simple interest rate of 2.5%.

A: $1700(0.045)(1.5)$

$= 114.75$

B: $1700(0.025)(3)$

$= 127.50$

A. Option A; saving $323

B. Option B; saving $323

(C.) Option A; saving $12.75

D. Option B; saving $12.75

C

39. Evan and Courtney borrowed $5,600 from their bank in order to help with wedding expenses. If the loan had gained $1,993.60 in interest after 48 months, what is the simple interest rate?

$1993.60 = 5600(r)4$

$\frac{1993.60}{22400} = \frac{22400r}{22400}$

$0.089 = r$

8.9%

40. How many years would it take a $6,000 to triple in value with a simple interest rate of 5%?

$12000 = 6000(0.05)t$

$\frac{12000}{300} = \frac{300t}{300}$

$40 = t$

A. 20 years

B. 30 years

C. 35 years

(D.) 40 years

D