Chapter 5 and 6 Review

Show All Work on Separate Paper

Name:_____

Chapter Review

ISG Interactive Study Guide
See pages 119–122 for:
• Vocabulary Check
• Key Concept Check
• Problem Solving
• Reflect

Lesson-by-Lesson Review

Lesson 5-1 Ratios (pp. 184–188)

Express each ratio as a fraction in simplest form.

1. 10 girls out of 24 students

2. 6 red cars to 4 blue cars

3. 10 yards to 8 inches

4. 18 ounces to 3 cups

5. Jean got 12 hits out of 16 times at bat. Express this rate as a fraction in simplest form. Explain its meaning.

Example 1

Express the ratio *2 feet to 18 inches* as a fraction in simplest form.

First, convert feet to inches.

$$\frac{2\text{ ft}}{18\text{ in.}} = \frac{24\text{ in.}}{18\text{ in.}}$$

Next, divide the numerator and denominator by the GCF, 6.

$$\frac{24\text{ in.} \div 6}{18\text{ in.} \div 6} = \frac{4\text{ in.}}{3\text{ in.}} \text{ or } \frac{4}{3}$$

Lesson 5-2 Unit Rates (pp. 189–193)

Express each rate as a unit rate. Round to the nearest tenth or to the nearest cent, if necessary.

6. $25.97 for 8 boxes

7. 400 meters in 5 minutes

8. $175 for 4 concert tickets

9. 125 miles in 200 minutes

10. **Financial Literacy** An eight pack of juice boxes costs $4.79, and a twelve pack of juice boxes costs $6.59. Which is a better buy? Explain.

Example 2

Express *274 miles in 14 gallons of gasoline* as a unit rate. Round to the nearest tenth of a mile if necessary.

Write the rate that compares the miles to the number of gallons. Then divide to find the unit rate.

$$\overset{\div 14}{\frac{274\text{ miles}}{14\text{ gallons}} = \frac{19.6\text{ miles}}{1\text{ gallon}}}$$

$$\div 14$$

So, the car traveled 19.6 miles on 1 gallon of gasoline.

Lesson 5-3 Complex Fractions and Unit Rates (pp. 194–199)

Simplify.

11. $\dfrac{\frac{6}{2}}{5}$

12. $\dfrac{\frac{5}{3}}{10}$

13. Noreen can walk $1\frac{1}{10}$ miles in $\frac{1}{3}$ hour. Find her average speed in miles per hour.

14. Write $66\frac{2}{3}\%$ as a fraction in simplest form.

15. Write $6\frac{1}{2}\%$ as a fraction in simplest form.

16. Write $11\frac{1}{3}\%$ as a fraction in simplest form.

Example 3

Simplify $\dfrac{\frac{5}{3}}{4}$.

$$\frac{\frac{5}{3}}{4} = \frac{5}{1} \div \frac{3}{4} \qquad \text{Write the complex fraction as a division problem.}$$

$$= \frac{5}{1} \times \frac{4}{3} \qquad \text{Multiply by the reciprocal of } \frac{3}{4}, \text{ which is } \frac{4}{3}.$$

$$= \frac{20}{3} \text{ or } 6\frac{2}{3} \qquad \text{Simplify.}$$

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Lesson 5-4 Converting Rates (pp. 200–205)

Complete each conversion. Round to the nearest hundredth, if necessary.

17. 7 in. ≈ ▨ cm
18. 20 m ≈ ▨ yd
19. 25 fl oz ≈ ▨ mL
20. 4 L ≈ ▨ gal
21. 18 pt ≈ ▨ L
22. 12 oz ≈ ▨ g
23. 26 cm ≈ ▨ in.
24. 3 qt ≈ ▨ L
25. 4 m ≈ ▨ ft
26. 68 g ≈ ▨ oz

27. **STEM** A plane is flying at a speed of 425 miles per hour. How far will the plane travel in 0.75 hour?

28. A swimming pool is being drained at a rate of 50 gallons per hour. How many milliliters per second is this? Round to the nearest tenth.

29. A runner runs 2 miles in 9.56 minutes. How many meters per second is this?

30. A family drives their car 135 miles in 3 hours. How many kilometers per hour is this?

Example 4

Complete the conversion. Round to the nearest hundredth.
18 centimeters to inches

Use 1 inch ≈ 2.54 centimeters.

$$18 \text{ cm} \approx 18 \text{ cm} \cdot \frac{1 \text{ in.}}{2.54 \text{ cm}}$$
$$\approx 18 \text{ cm} \cdot \frac{1 \text{ in.}}{2.54 \text{ cm}}$$
$$\approx \frac{18 \text{ in.}}{2.54} \text{ or } 7.09 \text{ in.}$$

Example 5

A peregrine falcon can fly at a top speed of 200 miles per hour. How many feet per second is this?

First, convert miles to feet and hours to seconds.

$$\frac{200 \text{ mi}}{1 \text{ h}} = \frac{200 \text{ mi}}{1 \text{ h}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ h}}{3600 \text{ s}}$$

Next, divide out the common factors.

$$= \frac{\overset{1}{200} \text{ mi}}{1 \text{ h}} \cdot \frac{\overset{176}{5280} \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ h}}{\underset{1}{\overset{30}{3600}} \text{ s}}$$
$$= \frac{293.3 \text{ ft}}{1 \text{ s}}$$

The falcon can fly about 293 feet per second.

Lesson 5-5 Proportional and Nonproportional Relationships (pp. 206–210)

Determine whether the cost is proportional to the number of books purchased. If the relationship is proportional, find the constant of proportionality. Explain your reasoning.

31.

Books	1	2	3	4
Cost ($)	8	16	24	32

32.

Books	2	4	6	8
Cost ($)	2	5	7	10

33. A customer at the ring toss booth gets 8 rings for $2. Find the constant of proportionality. Write an equation relating the cost to the number of rings. At this same rate, how much would a customer pay for 11 rings? for 20 rings?

34. Mrs. Tebon buys 25 party favors for $5. At this same rate, how much would she pay for 40 party favors? for 60 party favors?

Example 6

Determine whether the distance is proportional to the time. If the relationship is proportional, find the constant of proportionality. Explain your reasoning.

Distance (meters)	30	56	69	80
Time (minutes)	1	2	3	4

Write the rate of distance to time for each minute in simplest form.

$$\frac{30}{1} \qquad \frac{56}{2} = \frac{28}{1} \qquad \frac{69}{3} = \frac{23}{1} \qquad \frac{80}{4} = \frac{20}{1}$$

Since the rates are not equal, the distance is not proportional to the time, and there is no constant of proportionality.

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Lesson 5-6 Graphing Proportional Relationships (pp. 212–217)

35. Determine whether the relationship is proportional by graphing on the coordinate plane. Explain your reasoning.

| Time (min)	4	7	8	10
Distance (ft)	8	14	16	20

36. The cost of dance lessons is $12 for 1 lesson, $22 for 2 lessons, and $32 for 3 lessons. Determine whether the cost is proportional to the number of lessons by graphing the ordered pairs on the coordinate plane. Explain your reasoning.

37. The number of squirrels is proportional to the number of trees. A graph of the relationship includes the points (0, 0), (3, 9), and (5, 15).

  a. Find and interpret the constant of proportionality.

  b. Explain what the points (0, 0), (3, 9), and (5, 15) represent.

Example 7

The number of slices of pizza purchased is proportional to the number of students eating. The graph below shows the relationship (students, slices). Determine the constant of proportionality. Explain what it means.
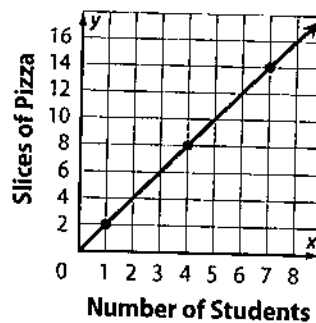
Use the point (4, 8).

$$\frac{\text{slices of pizza}}{\text{number of students}} = \frac{8}{4} = \frac{2}{1} \text{ or } 2$$

The constant of proportionality is the unit rate, 2 slices per student. It describes the number of slices of pizza purchased for every 1 student eating.

Lesson 5-7 Solving Proportions (pp. 218–223)

Solve each proportion.

38. $\frac{15}{a} = \frac{5}{4}$

39. $\frac{m}{6} = \frac{18}{15}$

40. $\frac{28}{24} = \frac{d}{12}$

41. $\frac{16.5}{21} = \frac{5.5}{t}$

42. Financial Literacy A homeowner whose house is assessed for $120,000 pays $1800 in taxes. At the same rate, what is the tax on a house assessed at $135,000?

Example 8

Solve $\frac{4}{9} = \frac{9}{x}$.

$\frac{4}{9} = \frac{9}{x}$	Write the proportion.
$4 \cdot x = 9 \cdot 9$	Cross products
$4x = 81$	Multiply.
$\frac{4x}{4} = \frac{81}{4}$	Divide each side by 4
$x = 20.25$	Simplify

Lesson 5-8 Scale Drawing and Models (pp. 224–229)

On the scale drawing of a museum, the scale is 0.5 inch = 10 feet. Find the actual length of each gallery.

	Gallery	Drawing Length
43.	Modern Art	6 in.
44.	Renaissance	4.25 in.
45.	Egypt	7.5 in.

46. The length of a highway is 900 miles. If 0.5 inch on a map represents 50 miles, what is the length of the highway on the map?

Example 9

A scale model of a car has a bumper that is 3.5 inches long. The scale on the model is 1 inch = 2 feet. What is the length of the actual car bumper?

model length ···▶ $\frac{1 \text{ in.}}{2 \text{ ft}} = \frac{3.5 \text{ in.}}{x \text{ ft}}$ ◀··· model length
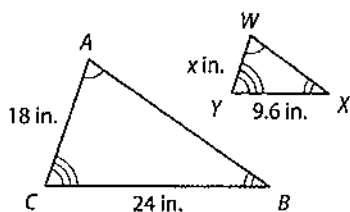
actual length ···▶ ◀··· actual length

$$1 \cdot x = 2 \cdot 3.5$$
$$x = 7$$

The actual length of the car bumper is 7 feet.

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The figures are similar. Determine each missing measure.

47.

48.
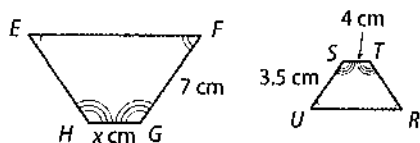
49. A mosaic is created using rectangular blocks. Block *A* has a length of 5 centimeters and a width of 2.5 centimeters. Block *B* is similar to block *A* and has a length of 7 centimeters. What is the width of block *B*?

50. Keshawn enlarges a rectangular photograph to make a poster that is similar to the photograph. The photograph is 4 inches wide and 6 inches long. The poster is 51 inches long. What is the width of the poster?

Example 10

If $\triangle LMN \sim \triangle PQR$, what is the value of x?

$$\frac{LM}{PQ} = \frac{LN}{PR}$$

$$\frac{4.8}{x} = \frac{14.4}{4.8}$$

$$x = 1.6$$

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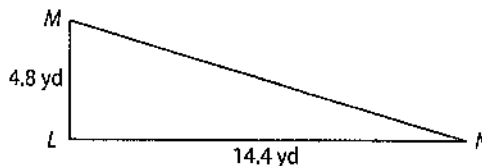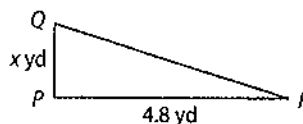
51. At 7 feet 8 inches, the world's tallest woman casts a 46-inch shadow. At the same time, the world's shortest woman casts a 15.5-inch shadow. How tall is the world's shortest woman?

52. The largest known pyramid is the Pyramid of Khufu. At a certain time of day, a vertical yard stick casts a shadow 1.5 feet long, and the pyramid casts a shadow 241 feet long. How tall is the pyramid?

53. Mylie's house is 9 meters tall and casts a shadow 1.5 meters long. At the same time of day, a nearby doghouse casts a shadow that is 0.2 meter long. How tall is the dog house?

54. In the figure below, $\triangle ABE \approx \triangle ACD$. What is the distance across the pond?
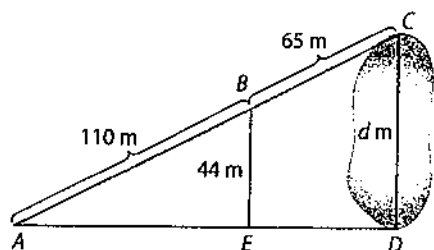
Example 11

The Washington Monument casts a 185-foot shadow at the same time as a nearby flagpole casts a 3-foot shadow. If the flagpole is 9 feet tall, how tall is the Washington Monument?

Write and solve a proportion.

$$\text{monument height} \rightarrow \frac{9 \text{ ft}}{x \text{ ft}} = \frac{3 \text{ ft}}{185 \text{ ft}} \leftarrow \text{monument's shadow}$$

$$9 \cdot 185 = x \cdot 3$$

$$1665 = 3x$$

$$\frac{1665}{3} = \frac{3x}{3}$$

$$555 = x$$

The Washington Monument is 555 feet tall.

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1. 12 is what percent of 60?

2. What is 63% of 130?

3. 28 is 80% of what number?

4. 8 hours is what percent of 24 hours?

5. What distance is 72% of 120 miles?

6. 36 pounds is 15% of what weight?

7. Thirty percent of the CDs that Monique owns are classical. If Monique owns 120 CDs, how many are classical?

8. At Marie's school, 65% of the students are learning a second language. There are 143 students learning a second language. How many students are in Marie's school?

9. In a dance class, 70% of the students wear black ballet shoes. There are 30 students that wear black shoes. How many students are in the class?

Find the percent of each number mentally.

10. 50% of 36

11. 40% of 55

12. $33\frac{1}{3}$% of 27

13. 1% of 167

Estimate. 14–18. See margin.

14. 24% of 40

15. 62% of 90

16. $\frac{1}{6}$% of 298

17. 130% of 250

18. Tito had 244 free throw attempts in his high school career. If he was successful 77% of the time, about how many free throws did he make?

19. There are 38 students in Mr. Raymond's science class. If 76% of them get an A on the final exam, about how many students got A's?

Solve each problem using a percent equation.

20. 17 is what percent of 68?

21. What is $16\frac{2}{3}$% of 24?

22. 55 is 20% of what number?

23. 48 is what percent of 32?

24. 24 is what percent of 48?

25. 49 is what percent of 140?

26. What is 75% of 200?

27. What is 30% of 90?

28. The items in a souvenir shop are on sale for the prices shown. What percent of the original price is the sale price for each item?

Item	Original Price	Sale Price
hat	$14.00	$10.50
beach towel	$17.50	$14.00
tote bag	$9.00	$6.30

29. A jersey is on sale for 50% off the original price. A week later, the manager takes another 50% off. Is the jersey now free? Explain.

Find the percent of change. Round to the nearest tenth, if necessary. Then state whether the percent of change is an *increase* or a *decrease*.

30. From 55 lb to 24 lb

31. From $55.75 to $75.00

Find the percent error.

32. actual distance: 3.2 m, estimated distance: 3.4 m

33. estimated time: 50 min, actual time: 90 min

34. The number of pints of mint chocolate chip sold last week was 88. If this week 110 pints are sold, what is the percent of increase?

35. A project estimated to take 30 days was completed in 75 days. What was the percent error of the estimate?

Find the selling price for each item given the cost and the percent of markup or discount.

36. tennis shoes: $85; 24% discount

37. portable MP3 player: $150; 36% markup

38. pants: $75; 85% discoun

39. amplifier: $100; 135% markup

40. A surfboard has an original price of $259. It is on sale for 55% off the original price. Find the sale price of the surfboard.

41. A jacket with an original price of $49.95 is discounted 33%. Sales tax of 7% is added to the discounted price. How much does it cost to purchase the jacket?

42. A laptop case has an original price of $45. Ellen has a coupon for 35% off the original price. Find how much Ellen paid for the laptop case.

43. Nathan bought a bicycle for $230 at an auction. He fixed it up and sold it at a 30% markup. How much did Nathan sell the bike for?

44. Nan bought an $85 dress on sale at 25% off the original price. She paid 5% sales tax on the sale. What was her total bill?

Find the simple interest to the nearest cent.

45. $575 at 6.25% for 7 years

46. $12,750 at 5% for 10 years

Find the total amount in each account to the nearest cent if the interest is compounded annually.

47. $2750 at 8% for 3 years

48. $1500 at 12.5% for 2 years

49. Lucas borrowed $10,500 to buy a boat. He will pay $276.50 each month for the next 48 months. Find the simple interest rate for his loan.

50. What is the total amount of money in an account where $4000 is invested at an interest rate of 3.5% compounded annually after 3 years?