Lesson 1.1   Skills Practice

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Show Someone You Care- Send Flowers!
Introduction to Ratios and Rates

Vocabulary

Write the term or phrase from the box that best completes each statement.

| ratio   rate   unit rate   proportion   scaling up   scaling down   equivalent ratios |

1. _____ means to multiply the numerator and the denominator of a ratio by the same factor.

2. A _____ is a ratio that compares two quantities that are measured in different units.

3. _____ means to divide the numerator and the denominator of a ratio by the same factor.

4. A _____ is a comparison using division.

5. A _____ is an equation that states that two ratios are equal.

6. A _____ is a comparison of two measurements in which the denominator has a value of one unit.

7. _____ are ratios that represent the same part-to-part relationship or the same part-to-whole relationship.

Problem Set

Write each statement as a ratio using colons and in fractional form.

1. There are 5 boys for every 3 girls.

    5 boys : 3 girls, $\dfrac{5 \text{ boys}}{3 \text{ girls}}$

2. There are 2 basketballs for every soccer ball.

3. There are 4 bananas in each fruit basket.

1

4. There are 50 gallons of water used after 4 showers.

5. There are 3 blueberry muffins in each variety pack of 6 muffins.
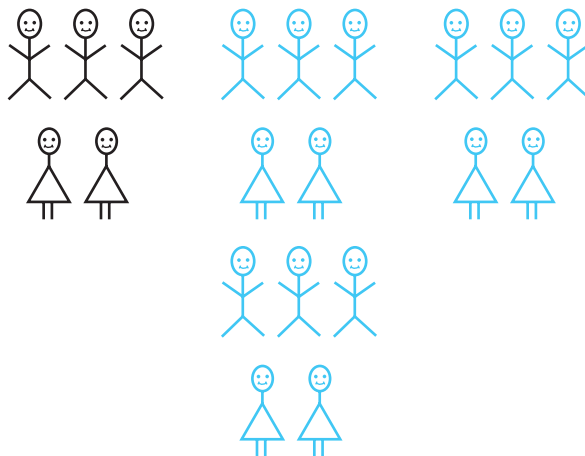
6. You purchase a dozen roses for $42.

7. There are 4 grape juice boxes in each variety pack of 10 juice boxes.

8. Each bagel costs $0.45.
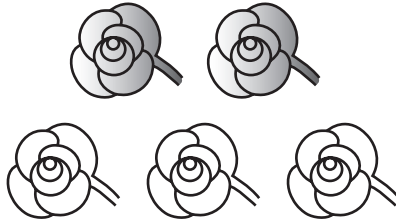
Complete the model to answer each question.

9. For every 3 boys at soccer camp, there are 2 girls. If there are 20 children at soccer camp, how many are girls?
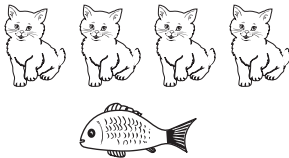
There are 8 girls at soccer camp.

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10. In a Friendship Bouquet, 2 out of every 5 roses are pink. If there are 6 pink roses, how many total roses are in the bouquet?
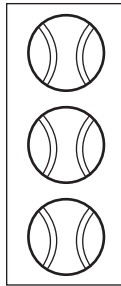
11. In an apartment building, there are 4 tenants who own cats for every 1 tenant who owns fish. If there are 5 tenants who own fish, how many tenants own cats?
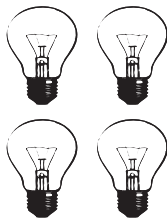
1

12. Each three pack of tennis balls costs $5.75. How many tennis balls can you buy for $23?

$ 5.75

13. Four light bulbs cost $3.20. How much does it cost to buy 14 light bulbs?

$ 3.20

14. Three pens cost $1.80. How many pens can you buy for $6?

$ 1.80

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Scale up the ratio to complete each proportion.

15. $\dfrac{24 \text{ hours}}{1 \text{ day}} = \dfrac{?}{3 \text{ days}}$

$\dfrac{24}{1} \xrightarrow[\times 3]{\times 3} \dfrac{72}{3}$

72 hours

16. $\dfrac{12 \text{ bagels}}{1 \text{ dozen}} = \dfrac{36 \text{ bagels}}{?}$

17. $\dfrac{4 \text{ oranges}}{3 \text{ apples}} = \dfrac{?}{15 \text{ apples}}$

18. $\dfrac{5 \text{ fiction books}}{2 \text{ non-fiction books}} = \dfrac{?}{6 \text{ non-fiction books}}$

19. $\dfrac{12 \text{ eggs}}{\$3.25} = \dfrac{48 \text{ eggs}}{?}$

20. $\dfrac{6 \text{ scones}}{\$6.30} = \dfrac{18 \text{ scones}}{?}$

21. $\dfrac{8 \text{ artichokes}}{\$4.50} = \dfrac{?}{\$9.00}$

22. $\dfrac{1 \text{ pack of gum}}{\$0.75} = \dfrac{?}{\$2.25}$

1

Scale down the ratio to complete each proportion.

23. $\dfrac{72 \text{ oz red paint}}{48 \text{ oz blue paint}} = \dfrac{3 \text{ oz red paint}}{?}$

$\dfrac{72}{48} \xrightarrow[\div 24]{\div 24} \dfrac{3}{2}$

2 oz blue paint

24. $\dfrac{15 \text{ red tulips}}{9 \text{ yellow tulips}} = \dfrac{5 \text{ red tulips}}{?}$

25. $\dfrac{138 \text{ students}}{6 \text{ teachers}} = \dfrac{?}{1 \text{ teacher}}$

26. $\dfrac{112 \text{ energy bars}}{14 \text{ value packs}} = \dfrac{?}{1 \text{ value pack}}$

27. $\dfrac{12 \text{ eggs}}{\$3.60} = \dfrac{1 \text{ egg}}{?}$

28. $\dfrac{8 \text{ pack of yogurt cups}}{\$2.56} = \dfrac{1 \text{ yogurt cup}}{?}$

29. $\dfrac{12 \text{ pencils}}{\$1.32} = \dfrac{?}{\$0.22}$

30. $\dfrac{4 \text{ lb bananas}}{\$2.36} = \dfrac{?}{\$1.18}$

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Scale down the rate to determine each unit rate.

31. $\dfrac{75 \text{ miles}}{3 \text{ hours}}$

$$\dfrac{75}{3} \xrightarrow[\div 3]{\div 3} \dfrac{25}{1}$$

25 miles per hour

32. $\dfrac{130 \text{ miles}}{2 \text{ hours}}$

33. $\dfrac{\$48}{4 \text{ pounds}}$

34. $\dfrac{\$4}{8 \text{ pounds}}$

35. $\dfrac{45 \text{ students}}{3 \text{ teachers}}$

36. $\dfrac{153 \text{ miles}}{9 \text{ gallons}}$

37. $\dfrac{24 \text{ bracelets}}{6 \text{ hours}}$

38. $\dfrac{\$28}{8 \text{ gallons}}$

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Making Punch
Ratios, Rates, and Mixture Problems

Problem Set

Use ratios to answer each question.

1. Gerain and Deon are each making trail mix. Gerain's recipe calls for 3 parts raisins to 2 parts almonds. Deon's recipe calls for 4 parts raisins to 3 parts almonds. Which recipe has a higher concentration of almonds?

   Gerain's recipe: $\dfrac{2 \text{ parts almonds}}{5 \text{ total parts}} = \dfrac{14}{35}$

   Deon's recipe: $\dfrac{3 \text{ parts almonds}}{7 \text{ total parts}} = \dfrac{15}{35}$

   Because $\dfrac{15}{35} > \dfrac{14}{35}$, Deon's recipe has a higher concentration of almonds.

2. Taisha and Shakina are each making punch. Taisha's recipe calls for 5 parts pineapple juice to 3 parts orange sherbet. Shakina's recipe calls for 8 parts pineapple juice to 6 parts orange sherbet. Which recipe will have a stronger orange flavor?

1

3. Jin and Nami are each making Hawaiian snack mix. Jin's recipe calls for 5 parts dried pineapple to 2 parts macadamia nuts. Nami's recipe calls for 3 parts dried pineapple to 1 part macadamia nuts. Which recipe has a higher concentration of macadamia nuts?

4. Juanita and Lydia are each making lemonade. Juanita's recipe calls for 4 parts lemon juice to 2 parts sugar syrup. Lydia's recipe calls for 5 parts lemon juice to 3 parts sugar syrup. Which recipe has a stronger lemon flavor?

5. Leon and Cisco are each making snack mix. Leon's recipe calls for 8 parts pretzels to 3 parts peanuts. Cisco's recipe calls for 6 parts pretzels to 2 parts peanuts. Which recipe has a higher concentration of peanuts?

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6. Belinda and Cristina are each making a wildflower seed mix to plant in their gardens. Belinda's mix calls for 8 parts poppy seeds to 5 parts daisy seeds. Cristina's mix calls for 10 parts poppy seeds to 8 parts daisy seeds. Which mix will produce a higher concentration of poppy flowers?

1

Use ratios to answer each question.

7. Carmen is making a strawberry drink. The recipe calls for 5 parts strawberry juice to 3 parts water. Carmen would like to make 64 fluid ounces of the strawberry drink. How many fluid ounces of strawberry juice and water does Carmen need?

Number of fluid ounces in one part of the recipe:

$$\frac{64 \text{ fluid ounces}}{8 \text{ parts}} = \frac{8 \text{ fluid ounces}}{1 \text{ part}}$$

Number of fluid ounces of strawberry juice:

$$\frac{8 \text{ fluid ounces}}{1 \text{ part}} = \frac{x}{5 \text{ parts}}$$

$$(1)(x) = (8)(5)$$

$$x = 40$$

Number of fluid ounces of water:

$$\frac{8 \text{ fluid ounces}}{1 \text{ part}} = \frac{x}{3 \text{ parts}}$$

$$(1)(x) = (8)(3)$$

$$x = 24$$

Carmen will need 40 fluid ounces of strawberry juice and 24 fluid ounces of water to make 64 fluid ounces of strawberry drink.

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8. Elena is making a grape drink. The recipe calls for 2 parts grape juice concentrate to 6 parts water. Elena would like to make 80 fluid ounces of the grape drink. How many fluid ounces of grape juice concentrate and water does Elena need?

1

9. Jose is making a trail mix. The recipe calls for 3 parts golden raisins to 2 parts cashews. Jose would like to make 30 cups of trail mix. How many cups of golden raisins and cashews does Jose need?

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10. Miguel is making a snack mix. The recipe calls for 6 parts of spicy tortilla chips to 3 parts of corn chips. Miguel would like to make 45 cups of snack mix. How many cups of spicy tortilla chips and corn chips does Miguel need?

1

11. Carla is making a bean salad. The recipe calls for 4 parts green beans to 3 parts yellow wax beans. Carla would like to make 56 ounces of bean salad. How many ounces of green beans and yellow wax beans does Carla need?

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12. Shawna is making smoothies. The recipe calls for 2 parts yogurt to 3 parts blueberries. Shawna wants to make 10 cups of smoothie mix. How many cups of yogurt and blueberries does Shawna need?

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For the Birds
Rates and Proportions

Vocabulary

Define the term in your own words.

1. convert

Problem Set

Write the ratio described by each problem situation. Write the ratio as a decimal. Round to the nearest thousandth, if necessary.

1. An adult female elephant weighs about 8000 pounds. A newborn baby elephants weighs about 200 pounds. Write the ratio of the baby elephant's weight to the adult female elephant's weight.

$$\frac{200 \text{ lb}}{8000 \text{ lb}} = 0.025$$

2. An adult pygmy shrew weighs about 3.5 grams. A newborn pygmy shrew weighs just about 0.25 gram. Write the ratio of the newborn pygmy shrew's weight to the adult pygmy shrew's weight.

3. An adult tiger weighs about 650 pounds. A baby tiger weighs about 2 pounds at birth. Write the ratio of the newborn tiger's weight to the adult tiger's weight.

4. An adult blue whale weighs about 200 tons. A baby blue whale weighs about 3 tons at birth. Write the ratio of the newborn blue whale's weight to the adult blue whale's weight.

1

5. An adult male giraffe weighs about 3000 pounds. A baby giraffe weighs about 110 pounds at birth. Write the ratio of the newborn giraffe's weight to the adult male giraffe's weight.

6. An adult female polar bear weighs about 750 pounds. A baby polar bear cub weighs about 1.3 pounds at birth. Write the ratio of the newborn polar bear's weight to the adult female polar bear's weight.

Write the rate described by each problem situation.

7. Gina rode her bike 2 miles in 30 minutes.

2 miles per 30 minutes, or $\dfrac{2 \text{ miles}}{30 \text{ minutes}}$

8. Isabella drove 300 miles in 5 hours.

9. Marcus jogged 3 miles in 45 minutes.

10. In 1 hour, Monique made 4 bead necklaces.

11. In 3 hours, Jacob mowed 4 lawns.

12. In 25 minutes, Norton read 14 pages.

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Convert each rate.

13. Convert the rate 5 feet per 3 seconds to yards per hour.

$$\frac{5 \text{ ft}}{3 \text{ sec}} \times \frac{3600 \text{ sec}}{1 \text{ hr}} = \frac{18,000 \text{ ft}}{3 \text{ hr}}$$

$$= \frac{6000 \text{ ft}}{1 \text{ hr}}$$

$$\frac{6000 \text{ ft}}{1 \text{ hr}} \times \frac{1 \text{ yd}}{3 \text{ ft}} = \frac{6000 \text{ yd}}{3 \text{ hr}}$$

$$= \frac{2000 \text{ yd}}{1 \text{ hr}}$$

The rate 5 feet per 3 seconds is equivalent to 2000 yards per hour.

14. Convert the rate 1000 fluid ounces per 2 hours to cups per minute.

1

15. Convert the rate of 10 yards per 5 minutes to feet per hour.

16. Convert the rate of 48 feet per hour to inches per minute.

17. Convert the rate of 12 pints per 15 minutes to quarts per hour.

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18. Convert the rate of 48 ounces per 2 hours to pounds per day.

Scale each ratio up or down as needed to complete the proportion.

19. $\dfrac{16\text{ oz}}{1\text{ lb}} = \dfrac{?}{3\text{ lb}}$

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

48 ounces

20. $\dfrac{4c}{1qt} = \dfrac{32\text{ c}}{?}$

21. $\dfrac{6000\text{ lb}}{3\text{ t}} = \dfrac{?}{1\text{ t}}$

22. $\dfrac{20\text{ qt}}{5\text{ gal}} = \dfrac{4\text{ qt}}{?}$

1

23. $\dfrac{36 \text{ in.}}{1 \text{ yd}} = \dfrac{108 \text{ in.}}{?}$

24. $\dfrac{5280 \text{ ft}}{1 \text{ mi}} = \dfrac{?}{4 \text{ mi}}$

25. $\dfrac{10{,}800 \text{ sec}}{3 \text{ hrs}} = \dfrac{3600 \text{ sec}}{?}$

26. $\dfrac{216 \text{ in.}}{6 \text{ yd}} = \dfrac{?}{1 \text{ yd}}$

Convert each measurement using a rate.

27. How many pints are in 36 cups?

$36 \, \cancel{c} \times \dfrac{1 \text{ pt}}{2 \, \cancel{c}} = 18 \text{ pt}$

There are 18 pints in 36 cups.

28. How many feet are in 15 yards?

29. How many feet are in 96 inches?

30. How many seconds are in 4 hours?

31. How many ounces are in 7 pounds?

32. How many tons are in 18,000 pounds?

Lesson 1.4   Skills Practice

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Tutor Time!
Using Tables to Solve Problems

Problem Set

Complete each table.

1. The ratio of boys to girls participating in intramural basketball is 7 boys to 4 girls.

Boys	7	21	42	84
Girls	4	12	24	48

2. Perry is delivering newspapers. In 2 hours he delivers 60 newspapers.

Newspapers		60	90	105
Hours	1	2		

3. Joelle's new printer can print 10 photos in 5 minutes.

Photos		10	25	50
Minutes	1	5		

4. Denisa is mixing blue paint and white paint to create a shade of light blue paint. She creates the shade she likes by mixing 12 ounces of blue paint with 8 ounces of white paint.

Blue paint (oz)		12	18	
White paint (oz)	1	8		18

1

5. Belinda is making fruit salad. The recipe calls for 3 cups of sliced peaches to 2 cups of halved grapes.

Peaches (c)		3		6
Grapes (c)	1	2	3	

6. Mattie is stuffing envelopes. She stuffs 100 envelopes in 1 hour.

Envelopes			100	
Hours	0.25	0.5	1	2

Determine the unit rate to answer each question.

7. Luis mowed 8 lawns this week and earned $56. How much would Luis have earned if he had mowed 10 lawns?

$$\frac{\$56}{8 \text{ lawns}} = \frac{\$7}{1 \text{ lawn}}$$

The unit rate is $7 per lawn.

$$10 \text{ lawns} \times \frac{\$7}{1 \text{ lawn}} = \$70$$

If Luis had mowed 10 lawns, he would have earned $70.

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8. Eva babysat for two families this weekend. She babysat 4 hours for the Rodgers family and 5 hours for the Mitchell family. She made a total of $58.50 for the weekend. Both families pay her the same amount per hour. How much did she earn from the Rodgers family?

9. Rita made 12 pairs of earrings in 2 hours. How many pairs of earrings could she make in 3 hours?

1

10. Pedro planted 12 plants in his garden in 45 minutes. How long did it take him to plant 5 plants?

11. Raul walked 2.5 miles in 1 hour and 15 minutes. How long did it take Raul to walk 0.5 mile?

12. Perry earned $96 shoveling snow from 8 driveways. How much would Perry have earned if he had shoveled 10 driveways?

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Looks Can Be Deceiving!
Using Proportions to Solve Problems

Vocabulary

Describe a situation in which you would use each of the following.

1. variable

2. means and extremes method

3. solve a proportion

4. inverse operations

Problem Set

Tell which method (scaling, unit rate, or means and extremes) you would use to solve for each variable and explain why.

1. $\frac{2}{3} = \frac{20}{x}$

Use the scaling method because it is easy to see that the numerator is multiplied by 10, so the denominator must also be multiplied by 10.

2. $\frac{16}{4} = \frac{100}{x}$

1

3. $\dfrac{23}{48} = \dfrac{50}{x}$

4. $\dfrac{49}{7} = \dfrac{x}{5}$

5. $\dfrac{37}{15} = \dfrac{x}{8}$

6. $\dfrac{63}{36} = \dfrac{x}{4}$

Solve for each variable using the means and extremes method. Round to the nearest hundredth, if necessary.

7. $\dfrac{4}{28} = \dfrac{x}{35}$

$(28)(x) = (4)(35)$

$\dfrac{28x}{28} = \dfrac{140}{28}$

$x = 5$

8. $12 : 6 = 60 : x$

9. $560 : 80 = x : 300$

10. $\dfrac{41}{282} = \dfrac{7}{x}$

1

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11. $\dfrac{39}{9} = \dfrac{x}{2}$ **12.** $74:31 = 2:x$

13. $\dfrac{x}{3} = \dfrac{1351}{7}$ **14.** $26:x = 117:9$

Use the given information to answer each question.

15. In the first quarter (3 months), a store sold 32 limited-edition action figures. If this quarter's sales represent a typical sales pattern, how many action figures should they expect to sell in a year?

$\dfrac{32}{3} = \dfrac{f}{12}$

$f = 128$

The store should expect to sell 128 action figures in a year.

1

16. A recipe calls for $3\frac{1}{2}$ cups of flour and $\frac{3}{4}$ cup of sugar. If you want to make the recipe with 6 cups of flour, about how much sugar will you need?

17. Marlene is planning a trip. She knows that her car gets 38 miles to the gallon on the highway. If her trip is going to be 274 miles and one gallon of gas is $2.30, about how much should she expect to pay for gas?

18. It takes Roger about 8 minutes to type a 500-word document. How long will it take him to type a 12-page essay with 275 words per page?

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The Price Is . . . Close
Using Unit Rates in Real World Applications

Problem Set

Calculate the unit rates for each item.

1. A bottle of fruit juice contains 63 ounces and costs $2.25. Calculate the unit rate showing ounces per dollar and the unit rate showing dollars per ounce.

$$\frac{63 \text{ oz}}{\$2.25} = \frac{28 \text{ oz}}{\$1}$$

$$\frac{\$2.25}{63 \text{ oz}} \approx \frac{\$0.04}{1 \text{ oz}}$$

The unit rate is 28 ounces per dollar or about $0.04 per ounce.

2. A dozen scones cost $5.95. Calculate the unit rate showing scones per dollar and the unit rate showing dollars per scone.

1

3. A 2.5 pound bag of apples costs $2.99. Calculate the unit rate showing pounds of apples per dollar and the unit rate showing dollars per pound of apples.

4. An 8 pound bag of oranges costs $4.95. Calculate the unit rate showing pounds of oranges per dollar and the unit rate showing dollars per pound of oranges.

5. A box of 40 envelopes costs $2.50. Calculate the unit rate showing number of envelopes per dollar and the unit rate showing dollars per envelope.

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6. A package of 200 cotton balls costs $1.99. Calculate the unit rate showing cotton balls per dollar and the unit rate showing dollars per cotton ball.

Estimate the unit rates of each item to determine which is the better buy.

7. A 4 liter bottle of laundry detergent costs $7.99. A 6.5 liter bottle of laundry detergent costs $16.99. Which is the better buy?

$$\frac{\$7.99}{4\text{ L}} \approx \frac{\$8}{4\text{ L}}$$

$$= \frac{\$2}{1\text{ L}}$$

$$\frac{\$16.99}{6.5\text{ L}} \approx \frac{\$17}{6.5\text{ L}}$$

$$\approx \frac{\$2.60}{1\text{ L}}$$

Because $2 < $2.60, the 4 liter bottle is the better buy.

1

8. A 64 ounce bottle of apple juice costs $1.99. A 140 ounce bottle of apple juice costs $2.80. Which is the better buy?

9. A sleeve of 4 golf balls costs $6.99. A 20 pack of golf balls costs $24.95. Which is the better buy?

1

10. A 2.2 pound package of chicken costs $5.99. A 5.1 pound package of chicken costs $9.95. Which one is the better buy?

11. A 4 pack of dinner rolls costs $2.20. A 12 pack of dinner rolls costs $5.40. Which is the better buy?

1

12. An 18 ounce jar of peanut butter costs $1.29. A 64 ounce jar of peanut butter costs $3.80. Which is the better buy?