# Chapter 5

Name_____ Date _____

Dear Family,

Sports and games provide an opportunity to relax and have fun with our families and friends. The nature of competition gives us an opportunity to explore mathematics at the same time.

When we are competing, we are often thinking about how we are doing. Are we hitting the ball as well as we did last year? Are we running faster now than at the beginning of the season? Are we currently winning, or is our opponent winning? Even if we are only watching a game, many of us tend to obsess over our favorite player's and team's performances.

Spend some time with your student talking about your family's favorite sport or game. What kinds of "stats" are kept about the players and events? How does that help you understand the game? For example, you and your student might talk about the following.

- How are batting averages figured out in baseball and softball? What does this tell you about the next time your favorite player is at bat?

- What does the ratio of red pieces to black pieces tell you about how a game of checkers is going? Who's winning?

- How fast can you run a 100-meter sprint? Do you think you could run the same speed in the 200-meter or the 400-meter?

Next time your team is playing their big rival, ask your student how he or she could predict who will win. Do you think it matters more what each team's average score is, or what the win-loss ratio is for the two teams? What kind of information could help you decide which team is better?

Enjoy the game!

Nombre _____ Fecha _____

# Razones y tasas

Estimada Familia:

Los deportes y juegos ofrecen una oportunidad para relajarse y divertirse con nuestras familias y amigos. La naturaleza de la competencia nos da una oportunidad para explorar las matemáticas a la vez.

Cuando estamos compitiendo, a menudo estamos pensando acerca de cómo vamos. ¿Estamos golpeando la pelota tan bien como lo hicimos el año anterior? ¿Estamos corriendo más veloz ahora que al inicio de la temporada? ¿Estamos ganando actualmente o está ganando nuestro contrincante? Incluso si sólo estamos observando un juego, muchos de nosotros solemos obsesionarnos con los rendimientos de nuestro equipo y jugador favoritos.

Pase algo de tiempo con su estudiante conversando acerca del deporte o juego favorito de su familia. ¿Qué tipo de "estadísticas" se tienen sobre los jugadores y los eventos? ¿Cómo te puede ayudar eso a entender el juego? Por ejemplo, usted y su estudiante pueden hablar acerca de lo siguiente:

- ¿Cómo se calculan los promedios de bateos en béisbol y softbol? ¿Qué les dice esto acerca de la próxima vez que su jugador favorito tenga que batear?

- ¿Qué les dice la relación de pieza rojas con respecto a las negras acerca de cómo está yendo un juego de damas? ¿Quién está ganando?

- ¿Qué tan rápido pueden correr una carrera de 100 metros de velocidad? ¿Creen que pueden correr a la misma velocidad en carreras de 200 ó 400 metros?

La próxima vez que su equipo esté jugado con su gran rival, pregunte a su estudiante cómo puede predecir quién va a ganar. ¿Crees que importa más el puntaje promedio de cada equipo o la relación ganar-perder de los dos equipos? ¿Qué tipo de información podría ayudarte a decidir cuál es el mejor equipo?

¡Disfruten el juego!

## Start Thinking!

**For use before Activity 5.1**

You want to make chocolate milk for 3 friends. The recipe calls for 12 ounces of milk for every 2 tablespoons of chocolate syrup.

Draw a model to represent how many total parts of milk and chocolate syrup you will need.

## Warm Up

**For use before Activity 5.1**

## Multiply or divide.

**1.** $7 \times 6$          **2.** $4 \times 9$          **3.** $10 \times 3$

**4.** $40 \div 4$          **5.** $27 \div 3$          **6.** $48 \div 6$

## Start Thinking!

**For use before Lesson 5.1**

A soccer ball is made up of 12 pentagons and 20 hexagons. Draw a diagram to represent the relationship between the two quantities.

Draw another diagram using objects in your classroom.

**Lesson 5.1**

## Warm Up

**For use before Lesson 5.1**

## Use a table or diagram to represent the relationship between the two quantities.
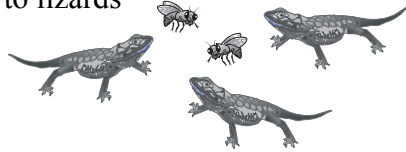
**1.** For every 4 pencils, there are 9 pens.

**2.** For every 15 girls, there are 11 boys.

**3.** For each bowl, there are 21 pretzels.

**4.** For every 16 pictures, there are 8 frames.

**5.** For every 20 apples, there is 1 basket.
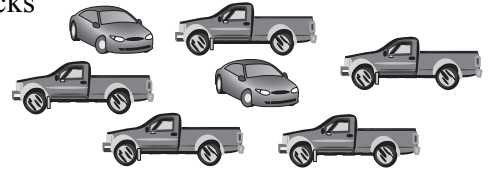
**6.** For every 6 pages, there are 17 paper clips.

Name_____ Date _____

## 5.1  Practice A

**Write the ratio in two ways. Explain what the ratio means.**
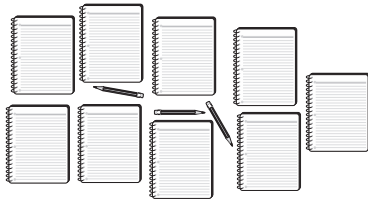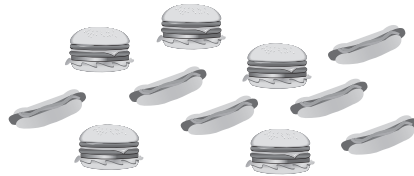
**1.** flies to lizards

**2.** cars : trucks

**3.** notebooks : pencils

**4.** hamburgers to hot dogs

**Use the table to write the ratio. Explain what the ratio means.**

| Instrument | Number |
|------------|--------|
| Tubas      | 2      |
| Flutes     | 5      |
| Trumpets   | 3      |

**5.** tubas : flutes    **6.** trumpets : tubas

**7.** flutes : tubas    **8.** trumpets : flutes

**You and a friend make a total of 45 bird houses. Use the tape diagram to find how many bird houses you make.**

**9.** You:

Friend:

**10.** You:

Friend:

**11.** There are 3 buses to carry 96 students on a field trip. Write the ratio of buses to students.

**12.** There are 18 pieces of chalk. The ratio of chalk that is yellow to chalk that is not yellow is 1 : 2. How many pieces of chalk are yellow?

**13.** The ratio of students to teachers at a school is 19 : 1. How many students are there in each total number of people?

   **a.** 100 people    **b.** 280 people    **c.** 440 people    **d.** 760 people

**14.** You spend 90 minutes practicing flip tricks and slides on your skate board. The ratio of time spent on flip tricks to time spent on slides is 7 : 8. How much time do you spend practicing slides?

Name _____ Date _____

## 5.1 Practice B

**Write the ratio. Explain what the ratio means.**

1.

circles to triangles

2.
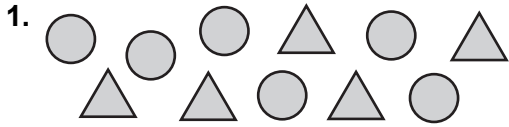
triangles to circles

**You and a friend tutor a total of 18 hours. Use the tape diagram to find how many hours you tutor.**

3. You:

   Friend:

4. You:

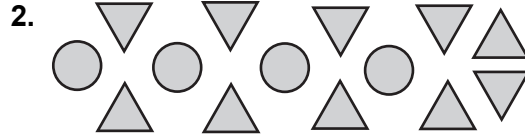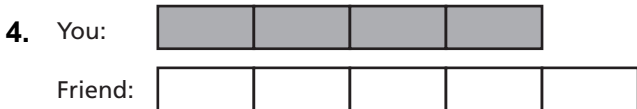   Friend:

5. In a recipe, the ratio of fluid ounces of water to fluid ounces of tomato paste is 3 : 4. You plan to make 35 fluid ounces of sauce. How many fluid ounces of tomato paste do you need?

6. A middle school band has 45 sixth and seventh graders. The ratio of sixth graders to seventh graders is 2 to 3. How many sixth graders are in the band? Explain how you got your answer.

7. The ratio of the ages (in years) of three children is 2 : 4 : 5. The sum of their ages is 33. What is the age of each child?

8. You make a necklace using blue, purple, and green beads in a ratio of 1 : 1 : 2. You use a total of 168 beads. How many green beads are in the necklace?

9. A caterer makes 3 extra sandwiches for every 20 sandwiches a customer orders.

   a. Write the ratio of ordered sandwiches to extra sandwiches.

   b. The caterer makes a total of 184 sandwiches for a customer. How many sandwiches did the customer order?

# 5.1 Enrichment and Extension

## Odds

A ratio comparing the number of ways an event can occur (called favorable outcomes) to the number of ways the event cannot occur (unfavorable outcomes) is called the odds of an event. By adding the two parts of the ratio together, you get the total number of possible outcomes.

**Example:** Find the odds that a coin will land on heads when flipped. Then find the total number of possible outcomes.

When you flip a coin, it can land on either heads or tails.

| | |
|---|---|
| Heads : Tails | Make a labeled ratio. |
| 1 : 1 | Rewrite using numbers. |
| 1 + 1 = 2 | Add both parts of the ratio to find the total number of possibilities. |

So, the odds that a coin will land on heads when flipped are 1 : 1 and the total number of possible outcomes is 2.

**Find the odds of each event happening as well as the total number of possible outcomes.**

1. A number cube is rolled, and it lands on 3.

2. A number cube is rolled, and it lands on a multiple of 2.

3. A letter is randomly chosen from the word "mirror," and you choose an "r."

4. A letter is randomly chosen from the word "mirror," and you choose an "x."

5. A spinner with eight equal sections numbered 1 through 8 is spun, and you get an even number.

6. A bag contains 4 blue marbles, 3 yellow marbles and 6 green marbles. You pick a blue marble out of the bag.

7. A standard deck of playing cards contains 52 cards. There are 13 cards of each suit (hearts, diamonds, clubs and spades). You draw a diamond card.
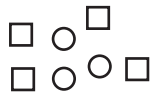
## 5.1 Puzzle Time

# Did You Hear About The...

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| G | H | I | J | K | L |

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

| 17 to 5 AND |
|---|
| 2 : 11 FAST |
| 3 to 7; 3 : 7 THAT |
| 4 to 5; 4 : 5 INTO |
| 75 COW |
| 25 SUNSHINE |
| 3 to 4; 3 : 4 TWO |
| 65 CART |
| 7 to 2 AN |
| 5 to 6; 5 : 6 HORSE |
| 3 : 5 WAS |

**Write the ratio.**

**A.** circles to squares



**B.** triangles to parallelograms



**C.** multiplication signs to equal signs
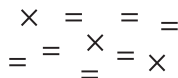


**D.** dollar signs to arrows
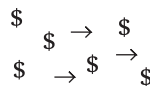


**E.** addition signs to division signs
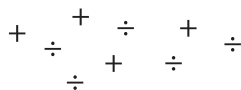


**F.** squares to triangles to circles



**Use the table to write the ratio.**

| Music | Rock | Hip Hop | Country | Jazz |
|-------|------|---------|---------|------|
| Number | 3 | 7 | 5 | 2 |

**G.** rock to music

**H.** music to country

**I.** hip hop : music

**J.** rock : country

**K.** hip hop to jazz

**L.** rock : country : hip hop

| 1 to 6; 1 : 6 MUST |
|---|
| 12 HAPPY |
| 2 to 3 to 4; 2 : 3 : 4 EACH |
| 3 : 5 : 7 OXIDENT |
| 4 to 6; 4 : 6 OXEN |
| 7 : 17 IT |
| 6 to 3; 6 : 3 BUMPED |
| 1 to 2; 1 : 2 ROCKS |
| 80 GRASS |
| 3 to 17 OTHER |
| 64 WEATHER |

**Activity 5.2**

# Start Thinking!

For use before Activity 5.2

A ratio is a comparison of two quantities.
How do ratios relate to making cookies?

**Activity 5.2**

# Warm Up

For use before Activity 5.2

## Use the figures to write the ratio.

**1.** circles to triangles

**2.** triangles to rectangles

**3.** rectangles to circles

**4.** triangles to total number
of figures
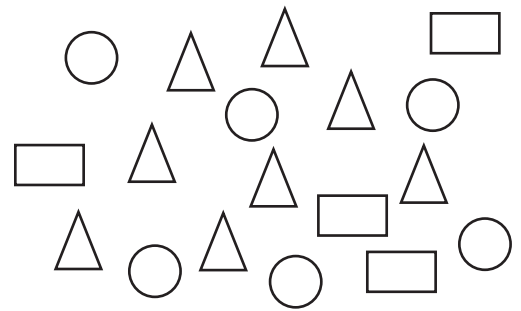
**Start Thinking!**
For use before Lesson 5.2

Your friend is mixing clothes dye to color a
white T-shirt. He mixes 2 drops of blue with
3 drops of yellow. He discovers that the color
is not dark enough.

Explain how a ratio table would help him
darken his green dye.

Lesson
**5.2**

**Warm Up**
For use before Lesson 5.2

## Write several ratios that describe the collection.

**1.** stars to hearts

**2.** squares to triangles
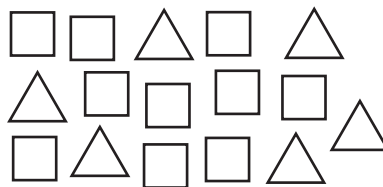
**3.** circles to arrows
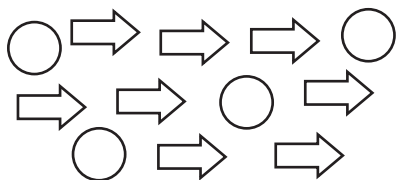
**4.** trapezoids to hexagons

Name_____ Date _____
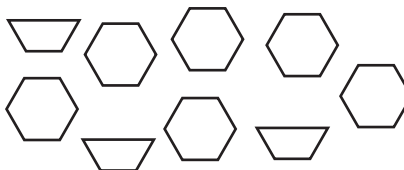
## 5.2 Practice A

**Write several ratios that describe the collection.**

**1.** paper clips to index cards

**2.** books to pencils
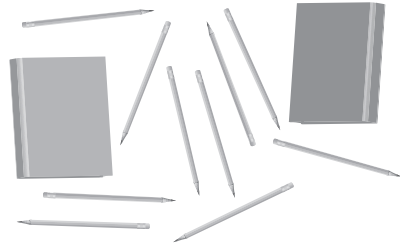
**Find the missing value in the ratio table. Then write the equivalent ratios.**

**3.**

| Cars | Trucks |
|------|--------|
| 3 | 5 |
| 6 | |

**4.**

| TVs | Computers |
|-----|-----------|
| 2 | 7 |
| | 21 |

**Complete the ratio table to solve the problem.**

**5.** For every 2 cars you wash, your friend washes 3 cars. You wash a total of 8 cars. How many does your friend wash?

| You | Friend |
|-----|--------|
| 2 | 3 |
| | |
| | |
| 8 | |

**6.** Your closet has 5 shirts for every 2 sweaters. Your closet has 30 shirts. How many sweaters are in your closet?

| Shirts | Sweaters |
|--------|----------|
| 5 | 2 |
| 10 | |
| | 10 |
| 30 | |

**7.** You are making a salad. The ratio of olives to croutons is 5 : 3. You put 12 croutons in your salad. How many olives do you put in your salad?

Name _____ Date _____

## 5.2 Practice B

**Find the missing value in the ratio table. Then write the equivalent ratios.**

**1.**

| Flutes | Clarinets |
|--------|-----------|
| 10 | 8 |
| 5 | |
| | 16 |

**2.**

| Green | Blue |
|-------|------|
| 12 | 16 |
| | 4 |
| 36 | |

**Complete the ratio table to solve the problem.**

**3.** You baked 42 chocolate cupcakes and 28 red velvet cupcakes. You package them in boxes that have the same ratio of chocolate to red velvet as the total cupcakes. How many red velvet cupcakes are in a box that has 24 chocolate cupcakes?

| Chocolate | Red Velvet |
|-----------|------------|
| 42 | 28 |
| | |
| 24 | |

**4.** The number of free song downloads is determined using a ratio. When you purchase 40 songs, you get 24 free song downloads. How many songs must you purchase in order to get 18 free song downloads?

| Purchase | Free |
|----------|------|
| 40 | 24 |
| | |
| | 18 |

**5.** Describe and correct the error in making the ratio table.

| | A | B |
|---|----|----|
| | 64 | 32 |
| | 56 | 24 |
| | 48 | 16 |

## **5.2** **Enrichment and Extension**

## **The Golden Ratio**

1.  Which of the rectangles below do you think is most visually pleasing?

    Rectangle A          Rectangle B          Rectangle C
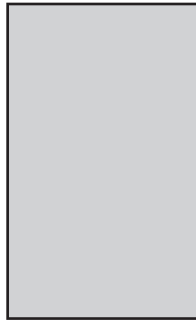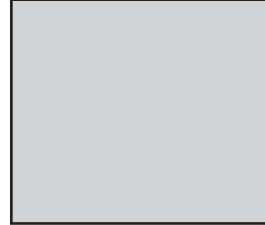
2.  In Exercise 1, many people will choose Rectangle B. This rectangle is an example of a *golden rectangle*. The ratio of the length to the width in a golden rectangle is called the *golden ratio*. Use a ruler to approximate the golden ratio.

3.  Consider the following pattern, called the *Fibonacci sequence*.

    0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, . . .

    **a.** Describe the pattern.

    **b.** Find the next three numbers in the pattern.

    **c.** Starting at the third number in the pattern, find the ratio of each number to the previous number.

    **d.** Write each ratio in part (c) as $a : 1$, where $a$ is rounded to the nearest thousandth, if necessary.

    **e.** The ratios are approaching the golden ratio. Make a new approximation of the golden ratio.

4.  List several common rectangular objects that are close to the shape of a golden rectangle.

5.  Use the Internet or another resource to find three other names for the golden ratio.

# 5.2 Puzzle Time

## How Can A Leopard Change His Spots?

Write the letter of each answer in the box containing the exercise number.

**Find the missing value(s) in the ratio table.**

**1.**

| Butterflies | 2 | |
|---|---|---|
| Flowers | 7 | 14 |

**2.**

| Nickels | 6 | 12 |
|---|---|---|
| Dimes | 11 | |

**3.**

| Apples | 5 | | 15 |
|---|---|---|---|
| Oranges | 6 | 12 | |

**4.**

| Carrots | | 8 | 16 | |
|---|---|---|---|---|
| Cucumbers | | 3 | | 9 |

**5.**

| Cats | 3 | | 9 |
|---|---|---|---|
| Dogs | 2 | 4 | |

**6.**

| Pens | 3 | 6 | |
|---|---|---|---|
| Pencils | 4 | | 12 |

**Answers**

**I.** 6, 6

**Y.** 22

**M.** 8

**V.** 4

**G.** 6, 24

**N.** 12

**O.** 10, 18

**B.** 8, 9

**Complete the ratio table to solve the problem.**

**7.** For every 2 laps you swim, your friend swims 3 laps. You swim a total of 8 laps. How many laps does your friend swim?

| You | 2 | 8 |
|---|---|---|
| Friend | 3 | |

**8.** An amusement park sells 5 bottles of water for every 2 bottles of juice. In one hour, the amusement park sells 20 bottles of water. How many bottles of juice does the amusement park sell?

| Water | 5 | 20 |
|---|---|---|
| Juice | 2 | |

| 6 | 2 | | 8 | 3 | 1 | 5 | 7 | 4 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**Activity 5.3**

## Start Thinking!
**For use before Activity 5.3**

A grocery store has three options for your favorite hot breakfast cereal: single serving containers, a box of several single serving packets, and a large container. How can you decide which is the best buy for your money?

**Activity 5.3**

## Warm Up
**For use before Activity 5.3**

## Complete the statement.

**1.** 1 hour = __?__ minutes

**2.** 1 week = __?__ days

**3.** 1 foot = __?__ yard

**4.** 1 foot = __?__ inches

**5.** 1 year = __?__ days

**6.** 1 year = __?__ weeks

## Start Thinking!
For use before Lesson 5.3

What is the speed limit on your street?

A speed limit is an example of a ratio using two different units.

What are the two units in the speed limit?

What is another example of a ratio using two different units that you use in your day-to-day life?

Lesson
5.3

## Warm Up
For use before Lesson 5.3

## Write a rate that represents the situation.

**1.** Dollars

| 0 | $15 | $30 | $45 | $60 |

| 0 | 1 | 2 | 3 | 4 |

Hours

**2.** Miles

| 0 | 110 | 220 | 330 | 440 |

| 0 | 2 | 4 | 6 | 8 |

Hours

**3.** Feet

| 0 | 5 | 10 | 15 | 20 |

| 0 | 1 | 2 | 3 | 4 |

Seconds

**4.** Degrees

| 0 | 8 | 16 | 24 | 32 |

| 0 | 2 | 4 | 6 | 8 |

Hours

Name_____ Date _____
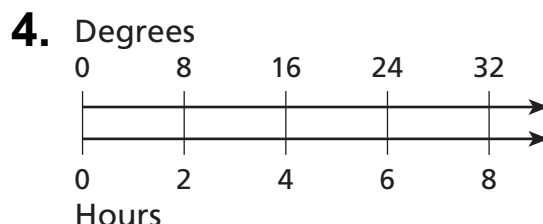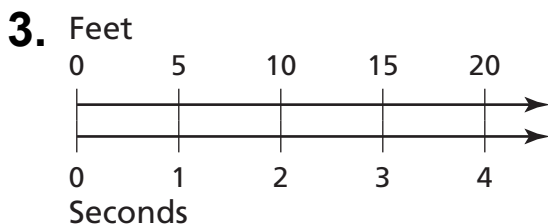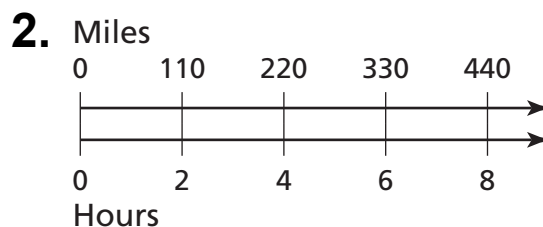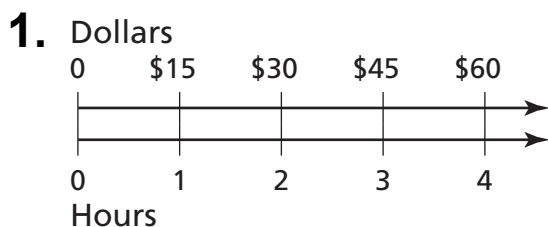
## 5.3 Practice A

**Write a rate that represents the situation.**

**1.** Kilograms

| 0 | 5 | 10 | 15 | 20 | 25 |
|---|---|----|----|----|----|

| 0 | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|----|

Cans

**2.** Strokes

| 0 | 10 | 20 | 30 | 40 | 50 | 60 |
|---|----|----|----|----|----|----|

| 0 | 3 | 6 | 9 | 12 | 15 | 18 |
|---|---|---|---|----|----|----|

Holes
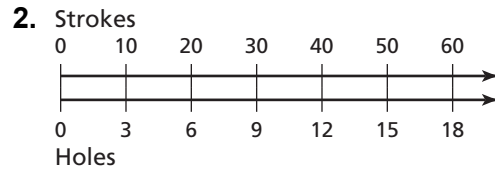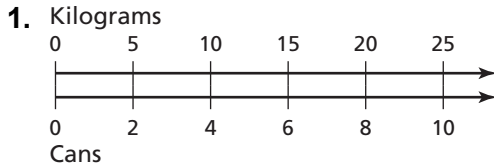
**Write a unit rate for the situation.**

**3.** $44 in 4 days

**4.** 12 haircuts in 4 hours

**5.** 256 heartbeats in 4 minutes

**6.** 15 liters in 3 minutes

**7.** 12 cans for 6 people

**8.** 27 outs in 9 innings

**9.** 85 drops in 5 minutes

**10.** 36 children from 12 families

**Decide whether the rates are equivalent.**

**11.** 17 heartbeats in 15 seconds,
68 heartbeats in 60 seconds

**12.** 96 miles on 4 gallons,
380 miles on 15 gallons

**13.** You receive 9 text messages in 12 minutes. What is the rate of text messages per hour?

**14.** You studied for 14 hours last week. What was your unit rate of hours of study per day?

**15.** In a walk for charity, you walk at a rate of 100 meters per minute. How long does it take you to walk 2 kilometers?

**16.** A deli sells a sandwich spread for $6.40 per pound. How much do you have to pay for 24 ounces of the spread?

**17.** You can buy 3 sandwiches for $4.95 or 4 sandwiches for $6.72. Which is the better buy?

**18.** You can buy 20 ounces of cereal for $4.40 or 16 ounces of the same brand for $3.68. Which is the better buy?

Name _____ Date _____

## 5.3 Practice B

**Write a rate that represents the situation.**

**1.** Feet

| 0 | 20 | 40 | 60 | 80 | 100 |

| 0 | 6 | 12 | 18 | 24 | 30 |
Min

**2.** Apples

| 0 | 50 | 100 | 150 | 200 | 250 |

| 0 | 11 | 22 | 33 | 44 | 55 |
Baskets
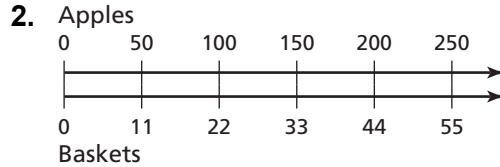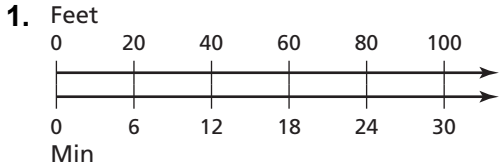
**Write a unit rate for the situation.**

**3.** 6 kittens in 3 boxes

**4.** $96 for 16 hours of work

**5.** 72 biscuits from 9 batches

**6.** 1800 revolutions in 50 seconds

**Decide whether the rates are equivalent.**

**7.** 35 kilometer in 25 minutes,
14 kilometers in 10 minutes

**8.** 25 minutes for $3,
1 hour for $6

**9.** An aquarium is leaking water at a rate of three quarts per day. How many fluid ounces of water is this each hour?

**10.** A glacier flows at a rate of 20 meters per day. What is the flow rate in kilometers per year?

**11.** A teacher keeps track of how many books are read by students in each class. Which grade has read a higher rate of books per student? How many more books does the other grade need to read to have the same rate?

|  | Grade 6 | | Grade 7 | |
|---|---|---|---|---|
|  | Class A | Class B | Class C | Class D |
| **Students** | 25 | 31 | 21 | 23 |
| **Books Read** | 181 | 155 | 116 | 126 |

**12.** Charles Lindbergh made the first solo airplane flight from New York to Paris. His flight covered about 3610 miles in 33.5 hours.

**a.** Find the unit rate in miles per hour.

**b.** Find the unit rate in hours per mile.

**c.** Which is a better description of Lindbergh's rate, *about two miles per minute* or *about two minutes per mile*? Explain your reasoning.

## 5.3 Enrichment and Extension

# How much does it cost to travel one mile?

**Your aunt and uncle each fill their cars' gas tanks at the gas station whose sign is shown. Your aunt gets 18 gallons of regular unleaded. Her car averages 32 miles per gallon. Your uncle gets 12 gallons of premium unleaded. His car averages 30 miles per gallon.**

| | |
|---|---|
| Regular Unleaded | **3.69** |
| Mid-grade Unleaded | **3.79** |
| Premium Unleaded | **3.89** |

1. Find your aunt's unit cost for each mile she drives.

2. Find your uncle's unit cost for each mile he drives.

3. Whose vehicle is getting the better value? Explain.

4. Your uncle switches to mid-grade unleaded, and his car still averages about 30 miles per gallon. How does his unit cost change? Is he getting the better value for his vehicle compared to your aunt? Explain.

5. Suppose over time, gas prices decrease to about 80% of their current prices. Does this change your answer to Exercise 3? Explain.

6. The United States uses about 146,000,000,000 gallons of gasoline each year.

   a. How many gallons does the United States use every day?

   b. Use compatible numbers to estimate how many gallons the United States uses every minute.

   c. Use compatible numbers to estimate how many gallons the United States uses every second.

# 5.3 Puzzle Time

## Where Does An Umpire Like To Sit When He Is Eating Dinner?

Write the letter of each answer in the box containing the exercise number.

**Write a rate that represents the situation.**

1. 45 meters in 6 seconds

2. 3 meters in 4 seconds

3. 2.80 meters in 5 seconds

4. 12 meters in 3 seconds

5. 35 meters in 20 seconds

6. 10 meters in 60 seconds

**Write a unit rate for the situation.**

7. $45.00 for 9 pounds

8. $24 for 3 pounds

9. $390 for 6 pounds

10. $42 for 21 pounds

11. $180 for 10 pounds

12. $864 for 8 pounds

**Decide whether the rates are equivalent.**

13. 9 miles in 3 hours

    27 miles in 6 hours

14. 152 points in 8 games

    171 points in 9 games

**Answers**

T. $108 per pound

P. 35 meters : 20 seconds

E. 45 meters : 6 seconds

B. 12 meters : 3 seconds

E. $8 per pound

T. 3 meters : 4 seconds

I. 2.80 meters : 5 seconds

A. $18 per pound

L. $5 per pound

D. 10 meters : 60 seconds

H. $65 per pound

N. $2 per pound

E. yes

H. no

| 4 | 1 | 9 | 3 | 10 | 6 | | 12 | 13 | 8 | | 5 | 7 | 11 | 2 | 14 |
|---|---|---|---|----|---|---|----|----|---|---|---|---|----|---|----|
|   |   |   |   |    |   |   |    |    |   |   |   |   |    |   |    |

**Activity 5.4**

# Start Thinking!

**For use before Activity 5.4**

In model railroading, there are two scales that are frequently used, the *O* scale and the *HO* scale. The ratio of the *O*-scale model to a full-size railroad is 1 inch to 48 inches. The ratio of the *HO*-scale model to the full-size railroad is 1 inch to 87 inches. Make a ratio table for each scale. Use 1–6 inches for the models.

**Activity 5.4**

# Warm Up

**For use before Activity 5.4**

## Write the unit rate for the situation.

**1.** $60 earned in 4 hours

**2.** 110 miles in 2 hours

**3.** 14 cups in 7 servings

**4.** $16.20 for 4 pounds

**5.** 15 feet in 3 seconds

**6.** 24 degrees in 6 hours

Describe a situation that can be represented by the graph.
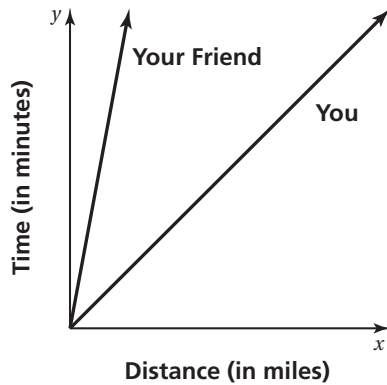
## Determine which car gets better gas mileage.

1.

| Car | A | B |
|---|---|---|
| Distance (miles) | 100 | 95 |
| Gallons used | 4 | 5 |

2.

| Car | A | B |
|---|---|---|
| Distance (miles) | 341 | 270 |
| Gallons used | 22 | 15 |

Name_____ Date _____

## 5.4 Practice A

**Determine which car gets the better gas mileage.**

1.
| Car | A | B |
|---|---|---|
| Distance (miles) | 130 | 125 |
| Gallons used | 8 | 9 |

2.
| Car | A | B |
|---|---|---|
| Distance (miles) | 400 | 440 |
| Gallons used | 12 | 15 |

**Determine which is the better buy.**

3.
| Chord Charts | A | B |
|---|---|---|
| Cost (dollars) | 13 | 18 |
| Downloads | 10 | 15 |

4.
| Pens | A | B |
|---|---|---|
| Cost (dollars) | 5 | 2 |
| Pens | 20 | 7 |

5. Protein Bar A has 15 grams of protein in a 40 gram bar. Protein Bar B has 20 grams of protein in a 60 gram bar. Which bar has more protein per gram?

**Complete the ratio tables and graph the ordered pairs from the table. What can you conclude?**

6.

| Miami, FL | |
|---|---|
| Time (min) | Temperature Drop (F) |
| 5 | 2 |
| 10 | |
| 15 | |
| 20 | |

| Orlando, FL | |
|---|---|
| Time (min) | Temperature Drop (F) |
| 3 | 1 |
| 6 | |
| 9 | |
| 12 | |

7. You are choosing a song for your dance recital. Song A has 11 beats in 10 seconds. Song B has 7 beats in 6 seconds. Which song has the greater rate?

Name _____ Date _____

**Determine which car gets the better gas mileage.**

**1.**

| Car | A | B |
|---|---|---|
| Distance (miles) | 510 | 550 |
| Gallons used | 18 | 20 |

**2.**

| Car | A | B |
|---|---|---|
| Distance (miles) | 460 | 430 |
| Gallons used | 35 | 32 |

**Determine which is the better buy.**

**3.**

| Tissues | A | B |
|---|---|---|
| Cost (dollars) | 4.50 | 3.25 |
| Boxes | 5 | 3 |

**4.**

| Frozen Waffles | A | B |
|---|---|---|
| Cost (dollars) | 2.29 | 3.59 |
| Waffles | 8 | 12 |

**Complete the ratio tables and graph the ordered pairs from the table. What can you conclude?**

**5.**

| Ranch Dressing | |
|---|---|
| Tablespoons | Milligrams of Sodium |
| 4 | 580 |
| 8 | |
| 12 | |
| 16 | |

| Ketchup | |
|---|---|
| Tablespoons | Milligrams of Sodium |
| 3 | 400 |
| 6 | |
| 9 | |
| 12 | |

**6.** The deli offers a fruit salad with 5 blueberries for every 3 pieces of cantaloupe. The deli changes the mixture to have 6 blueberries for every 4 pieces of cantaloupe, but the number of pieces of fruit in the salad does not change.

**a.** Create a ratio table for each salad. How many blueberries are in the smallest possible salad?

**b.** Blueberries cost less than cantaloupe. Should the company charge more or less for the new salad? Explain your reasoning.

Name_____ Date _____

## Finding the Best Buy

**Determine which is the best buy.**

**1.**

| Peanuts | A | B | C |
|---|---|---|---|
| Cost (dollars) | 2.80 | 6.20 | 6.99 |
| Size (ounces) | 10 | 20 | 24 |

**2.**

| Spaghetti Sauce | A | B | C |
|---|---|---|---|
| Cost (dollars) | 2.32 | 2.72 | 2.24 |
| Size (ounces) | 40 | 48 | 32 |

**3.**

| Hot Dogs | A | B | C |
|---|---|---|---|
| Cost (dollars) | 2.99 | 4.49 | 3.29 |
| Size (amount) | 5 | 8 | 6 |

**4.**

| Laundry Detergent | A | B | C |
|---|---|---|---|
| Cost (dollars) | 5.10 | 7.09 | 7.94 |
| Size (ounces) | 30 | 42 | 50 |

**5.**

| Cooler | A | B | C | D |
|---|---|---|---|---|
| Cost (dollars) | 29.88 | 18.88 | 39.88 | 34.88 |
| Size (quarts) | 50 | 27 | 70 | 62 |

**6.**

| Water | A | B | C | D |
|---|---|---|---|---|
| Cost (dollars) | 2.98 | 3.28 | 3.48 | 3.98 |
| Size (bottles) | 12 | 18 | 24 | 28 |

**7.** Aisha went to the local gas station to get a gallon of milk. She saw that the store had quart containers of milk for $1.19 while a gallon was $4.66. Aisha bought four quarts instead of the gallon because she thought it would be cheaper for the same amount of milk. Did Aisha save money?

Name _____ Date _____



## 5.4 Puzzle Time

## What Do You Call A Frog With A Cast On Each Of Its Back Legs?

Write the letter of each answer in the box containing the exercise number.

**Determine which car gets the better gas mileage.**

1.
| Car | A | B |
|---|---|---|
| Distance (miles) | 180 | 175 |
| Gallons Used | 6 | 7 |

    **Y.** Car A        **Z.** Car B

2.
| Car | A | B |
|---|---|---|
| Distance (miles) | 234 | 140 |
| Gallons Used | 9 | 5 |

    **N.** Car A        **O.** Car B

3.
| Car | A | B |
|---|---|---|
| Distance (miles) | 400 | 630 |
| Gallons Used | 20 | 18 |

    **T.** Car A        **U.** Car B

4.
| Car | A | B |
|---|---|---|
| Distance (miles) | 315 | 228 |
| Gallons Used | 15 | 12 |

    **P.** Car A        **Q.** Car B

**Determine which is the better buy.**

5.
| Apples | A | B |
|---|---|---|
| Cost (dollars) | 3.75 | 4.50 |
| Pounds | 3 | 5 |

    **M.** Brand A        **N.** Brand B

6.
| Toothpaste | A | B |
|---|---|---|
| Cost (dollars) | 2.64 | 3.60 |
| Ounces | 6 | 8 |

    **P.** Brand A        **Q.** Brand B

7. Participant A did 120 jumping jacks in 10 minutes. Participant B did 140 jumping jacks in 14 minutes. Which participant had the greater jumping jack rate?

    **H.** Participant A            **I.** Participant B

| 3 | 5 | 7 | 2 | 4 | 6 | 1 |
|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |

**Activity 5.5**

## Start Thinking!

**For use before Activity 5.5**

Percents are used commonly in day-to-day life. What are some instances in which you have come across percents in your day-to-day life?

**Activity 5.5**

## Warm Up

**For use before Activity 5.5**

### Rewrite the fraction with a denominator of 100.

**1.** $\dfrac{12}{20}$

**2.** $\dfrac{1}{4}$

**3.** $\dfrac{15}{25}$

**4.** $\dfrac{33}{50}$

**5.** $\dfrac{27}{20}$

**6.** $\dfrac{54}{10}$

Which models have an equivalent portion shaded? How do you know?

**A.**



**B.**



**C.**



**D.**
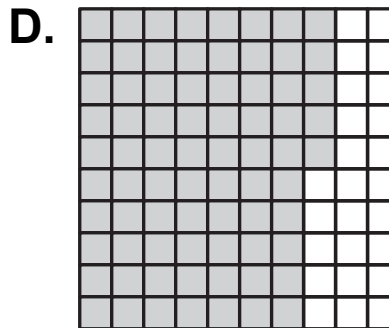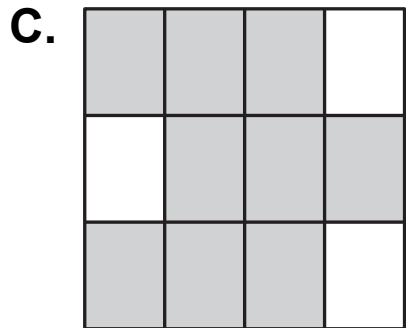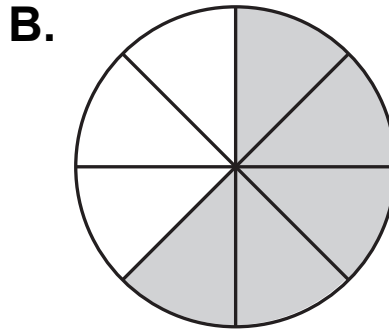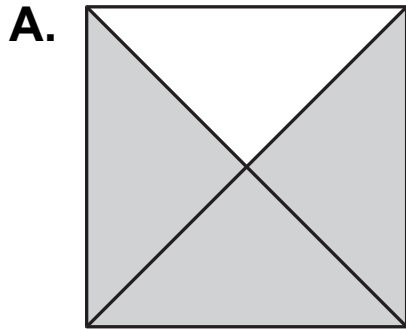


**Lesson 5.5** **Warm Up**
For use before Lesson 5.5

## Use a 10-by-10 grid to model the percent.

**1.** $4\%$      **2.** $36\%$      **3.** $63\%$

**4.** $72\%$      **5.** $87\%$      **6.** $99\%$

Name_____ Date _____

## 5.5 Practice A

**Use a 10-by-10 grid to model the percent.**

**1.** 5%　　　　**2.** 45%　　　　**3.** 52%　　　　**4.** 27%

**Write the percent as a fraction or mixed number in simplest form.**

**5.** 20%　　　　**6.** 25%　　　　**7.** 65%　　　　**8.** 44%

**9.** 32%　　　　**10.** 9%　　　　**11.** 250%　　　　**12.** 120%

**13.** Describe and correct the error in writing 8% as a fraction.

$$\times \quad 8\% = \frac{8}{10} = \frac{4}{5}$$

**Write the fraction or mixed number as a percent.**

**14.** $\dfrac{6}{25}$　　　　**15.** $\dfrac{3}{20}$　　　　**16.** $\dfrac{7}{10}$　　　　**17.** $\dfrac{3}{4}$

**18.** $\dfrac{9}{50}$　　　　**19.** $\dfrac{12}{25}$　　　　**20.** $1\dfrac{3}{5}$　　　　**21.** $2\dfrac{4}{25}$

**22.** Describe and correct the error in writing $\dfrac{39}{40}$ as a percent.

$$\times \quad \frac{39}{40} = 0.975 = \frac{9.75}{100} = 9.75\%$$

**23.** Of the students in your class, 25% walk to school. What fraction of the students walk to school?

**24.** At the age of 4 months, a puppy's weight is 275% of its weight at the age of 2 months. How many times heavier is the puppy at 4 months than at 2 months? Write your answer as a mixed number in simplest form.

**Find the percent.**

**25.** 4 is what percent of 10?　　　　**26.** 11 is what percent of 40?

**27.** Four out of every five visitors at an amusement park buy day passes. What percent of the visitors buy day passes?

**28.** Only 6 of the 75 trees in a park are at least 30 feet tall. What percent of the trees are under 30 feet tall?

**Write a fraction and a percent to represent the shaded portion of the model.**

**29.**　　　　**30.**　　　　**31.**

Name _____ Date _____
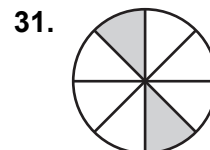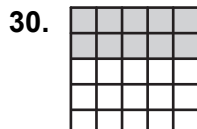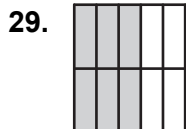
**Write the percent as a fraction or mixed number in simplest form.**

**1.** 35%          **2.** 81.4%          **3.** 210%          **4.** 0.8%

**Write the fraction or mixed number as a percent.**

**5.** $\dfrac{37}{50}$          **6.** $\dfrac{21}{25}$          **7.** $\dfrac{3}{16}$          **8.** $\dfrac{19}{40}$

**9.** $3\dfrac{1}{4}$          **10.** $2\dfrac{1}{2}$          **11.** $1\dfrac{4}{5}$          **12.** $5\dfrac{7}{50}$

**Find the percent.**

**13.** 12 is what percent of 40?          **14.** 6 is what percent of 16?

**15.** On a school bus, 22 of the 40 students are in window seats. What fraction of the students are in window seats?

**16.** You and a friend are selling lemonade. You sell three times as many cups as your friend. What percent of the cups sold were sold by your friend? Explain.

**17.** The United States flag is actually 105% as tall as the state flag of Florida. Write this percent as a mixed number and explain why the perspective in the figure may be misleading.
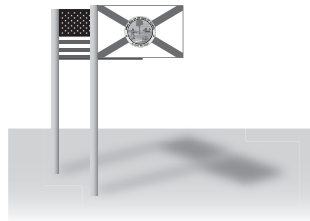
**18.** At a zoo, an anaconda is 118% as long as a Burmese python and $1\dfrac{3}{20}$ times as long as a reticulated python. Which is longer, the Burmese python or the reticulated python? Explain.

**19.** Copy the square. Then draw another square with sides that are $\dfrac{1}{2}$ as long. What percent of the area of the original square is the area of the smaller square?
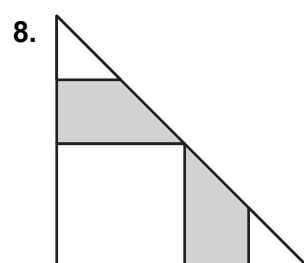
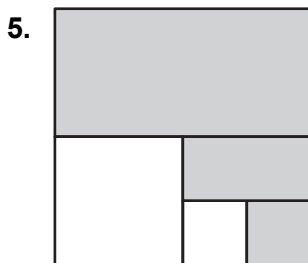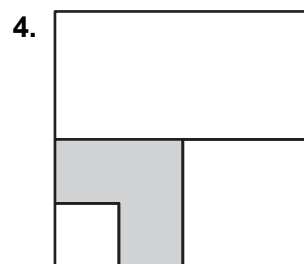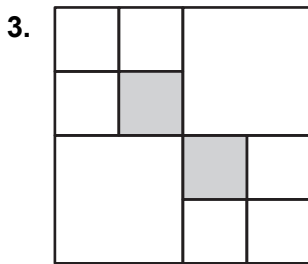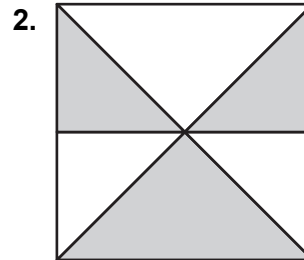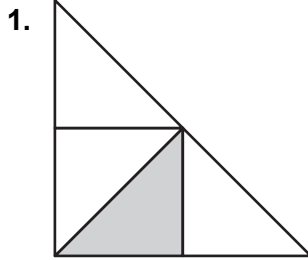**20.** The weight of a tree is doubling every 3 years. In how many years will the weight of the tree be 1600% of its weight now?

Name_____ Date _____

## 5.5 Enrichment and Extension

## Geometry

**Write a fraction and a percent to represent the shaded portion of the model.**

1.

2.

3.

4.

5.

6.

7.

8.
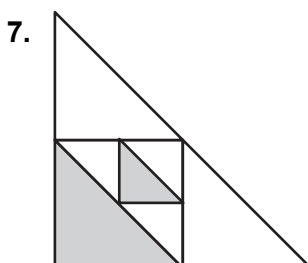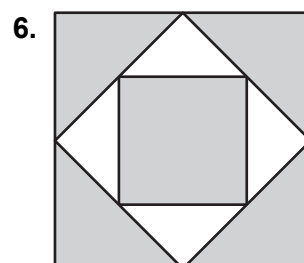
## 5.5 Puzzle Time

## What Did The Alien From Outer Space Say To The Green Book?

Write the letter of each answer in the box containing the exercise number.

**Write the percent as a fraction or mixed number in simplest form.**

**1.** 35%

**2.** 30%

**3.** 55%

**4.** 84%

**5.** 59%

**6.** 43.9%

**7.** 144%

**8.** 2.5%

**9.** 334%

**10.** 132.6%

**11.** 0.8%

**Write the fraction as a percent.**

**12.** $\dfrac{1}{5}$

**13.** $\dfrac{2}{5}$

**14.** $\dfrac{11}{25}$

**15.** $\dfrac{3}{25}$

**16.** $\dfrac{29}{50}$

**17.** $2\dfrac{16}{25}$

**18.** $3\dfrac{1}{20}$

**19.** $1\dfrac{7}{10}$

**Answers for Exercises 1–11**

**E.** $1\dfrac{163}{500}$

**R.** $1\dfrac{11}{25}$

**D.** $\dfrac{439}{1000}$

**A.** $\dfrac{11}{20}$

**O.** $\dfrac{7}{20}$

**L.** $\dfrac{1}{40}$

**T.** $\dfrac{59}{100}$

**E.** $\dfrac{1}{125}$

**R.** $3\dfrac{17}{50}$

**U.** $\dfrac{3}{10}$

**S.** $\dfrac{21}{25}$

**Answers for Exercises 12–19**

**R.** 58%

**O.** 40%

**E.** 305%

**A.** 264%

**M.** 20%

**Y.** 170%

**D.** 12%

**E.** 44%

| 8 | 14 | 3 | 6 | | 12 | 18 | | 5 | 1 | | 19 | 13 | 2 | 9 | | 16 | 10 | 17 | 15 | 11 | 7 | 4 |
|---|----|---|---|---|----|----|---|---|---|---|----|----|---|---|---|----|----|----|----|----|---|---|

**Start Thinking!**

For use before Activity 5.6

1% of 500 is 5. Use this fact to answer the following questions. Be sure to explain your reasoning.

What is 2% of 500?

What is 3% of 500?

What is 4% of 500?

What is 5% of 500?

What is $n$% of 500?

**Activity 5.6**

**Warm Up**

For use before Activity 5.6

**Multiply.**

**1.** $\dfrac{1}{10} \times 120$        **2.** $\dfrac{2}{5} \times 150$

**3.** $\dfrac{1}{2} \times 26$        **4.** $\dfrac{3}{10} \times 100$

**5.** $\dfrac{1}{4} \times 20$        **6.** $\dfrac{1}{100} \times 920$

**Start Thinking!**
For use before Lesson 5.6

Research the sales tax rates in various U.S. states.

Write a word problem that compares the cost of buying an item in one state with buying the same priced item in a state with a different sales tax rate.

Exchange word problems with a classmate and solve your classmate's problem.

**Lesson 5.6** **Warm Up**
For use before Lesson 5.6

**Find the percent of the number. Explain your method.**

**1.** 25% of 40

**2.** 30% of 50

**3.** 5% of 16

**4.** 10% of 46

**5.** 15% of 80

**6.** 2% of 500

Name_____ Date _____

## 5.6 Practice A

**Find the percent of the number. Explain your method.**

**1.** 25% of 80    **2.** 60% of 20    **3.** 20% of 50    **4.** 30% of 70

**5.** 35% of 80    **6.** 62% of 50    **7.** 3% of 90    **8.** 91% of 60

**9.** 50% of 64    **10.** 40% of 35    **11.** 8% of 75    **12.** 40% of 85

**13.** 52% of 44    **14.** 13% of 58    **15.** 110% of 40    **16.** 250% of 18

**17.** Describe and correct the error in finding 4% of 65.

$$\times \quad 4\% \text{ of } 65 = 0.4 \times 65 = 26$$

**Find the whole. Explain your method.**

**18.** 20% of what number is 12?    **19.** 30% of what number is 15?

**20.** 75% of what number is 24?    **21.** 65% of what number is 39?

**22.** Yesterday, 5% of the 120 sixth graders at a school were late. How many sixth graders were late?

**23.** The sale price of a pair of pants is 65% of the regular price of $25. How much do you save by buying the pants on sale?

**24.** Your family drives 126 miles from Key West to the Florida mainland. About 15% of this distance is spent on bridges. How many miles of bridges do you travel over?

**25.** Before a century plant dies, a tall flower stem grows from its center. The flower stem grows for only two months to reach 40% of a height of 25 feet. How tall is the flower stem after two months?

Name _____ Date _____

**Find the percent of the number. Explain your method.**

**1.** 60% of 40      **2.** 10% of 80      **3.** 25% of 70      **4.** 15% of 30

**5.** 6% of 15      **6.** 65% of 60      **7.** 78% of 81      **8.** 14% of 106

**9.** 160% of 75      **10.** 230% of 45      **11.** 514% of 205      **12.** 115% of 130

**Copy and complete the statement using <, >, or =.**

**13.** 55% of 60 __?__ 60% of 65      **14.** 20% of 80 __?__ 80% of 20

**15.** 36% of 150 __?__ 27% of 200      **16.** 110% of 3 __?__ 0.9% of 300

**17.** How many hours is 75% of 3 days?      **18.** How many feet is 20% of 4 miles?

**19.** A restaurant serves you a 16-fluid ounce glass of juice that is 30% ice. How many fluid ounces of juice do you actually get?

**20.** The table shows the grading scale for one of your classes.

| Letter grade | A | B | C | D |
|---|---|---|---|---|
| Percent range | 90–100% | 80–89% | 70–79% | 60–69% |

Tell the letter grade that you earn for each score.

**a.** You earn 14 out of a possible 20 points on a quiz.

**b.** You earn 66 out of a possible 80 points on a test.

**c.** You earn 216 out of a possible 250 points for a report.

**21.** A 15% discount saves you $5 off the price of an electronic game. How much do you save off the regular price if the discount is raised to 45%? Explain your reasoning.

**22.** Draw two different rectangles with perimeters that are each 80% of the perimeter of the rectangle shown. Show the length and width of each rectangle.

45 ft

75 ft

**23.** A monitor that regularly costs $100 is on sale for 15% off. The salesperson offers you 20% off the sale price. What percent of the original price is the salesperson's price?

**24.** A store pays a manufacturer $20 for a hat. To make a profit, the store prices the hat 60% higher than the amount they paid. Later, a sale reduces the price of the hat by 10%. Finally, a clearance sale reduces the sale price by 40%. What is the clearance price? Will this price give the store a profit?

## 5.6 Enrichment and Extension

## Smart Shopping

**In Exercises 1–3, which store has the better buy? Explain. Assume no sales tax.**

1. Identical sweaters are sold in two different stores.

   - The sale price in Store A is 25% off the regular price of $34.96.

   - The sale price in Store B is 20% off the regular price of $29.75.

2. An identical pair of sneakers is sold in two different stores.

   - The sale price in Store A is 30% off the regular price of $69.99.

   - The sale price in Store B is 15% off the regular price of $63.80 plus an additional 10% off of the sale price.

3. Identical video game systems are sold in two different stores.

   - The sale price in Store A is 10% off the regular price of $250 plus an additional 15% off of the sale price.

   - The sale price in Store B is 15% off the regular price of $250 plus an additional 10% off of the sale price.

4. Your aunt is buying a new couch. The regular price of the couch is $799. The store sale price is 20% off the regular price. Your aunt uses a newspaper coupon for an additional 5% off of any sale price item. For having an account with the store, she also gets an additional 10% off her final price.

   a. How much does your aunt pay for the couch?

   b. Does it make a difference in what order you use the percents when calculating the price your aunt pays for the couch?

## 5.6 Puzzle Time

## Why Was The Math Textbook Feeling Sad?

Write the letter of each answer in the box containing the exercise number.

**Find the percent of the number.**

**1.** 10% of 50

**2.** 20% of 30

**3.** 25% of 40

**4.** 4% of 50

**5.** 40% of 60

**6.** 50% of 38

**7.** 60% of 70

**8.** 75% of 20

**9.** 15% of 10

**10.** 16% of 80

**11.** 17% of 25

**12.** 42% of 20

**Find the whole.**

**13.** 30% of what number is 9?

**14.** 50% of what number is 11?

**15.** 25% of what number is 20?

**16.** 60% of what number is 21?

**17.** 75% of what number is 12?

**18.** 10% of what number is 6?

**19.** 120% of what number is 48?

**20.** 150% of what number is 75?

**21.** The length of a rectangle is 16 inches. If the width is 50% of its length, what is the width of the rectangle?

**22.** In your math class, 60% of the students are girls. If there are 15 girls in the class, how many students are in your math class?

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**Answers for Exercises 1–12**

**D.** $8\frac{2}{5}$    **F.** $1\frac{1}{2}$

**O.** 6    **S.** 19

**L.** 42    **M.** $4\frac{1}{4}$

**H.** 24    **L.** 10

**A.** $12\frac{4}{5}$    **E.** 5

**G.** 2    **P.** 15

**Answers for Exercises 13–22**

**T.** 60    **S.** 35

**P.** 22    **B.** 50

**I.** 8    **R.** 30

**E.** 40    **E.** 25

**L.** 80    **E.** 16

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| 8 | 13 | 2 | 20 | 7 | 22 | 11 | 16 | | 9 | 21 | 3 | 15 | 1 | 12 | | 18 | 5 | 17 | | 14 | 10 | 4 | 19 | 6 |
|---|----|---|----|---|----|----|----|--|---|----|---|----|---|----|--|----|---|----|--|----|----|---|----|---|
|   |    |   |    |   |    |    |    |  |   |    |   |    |   |    |  |    |   |    |  |    |    |   |    |   |

**Activity 5.7**

## Start Thinking!

**For use before Activity 5.7**

Discuss with a partner which unit of measure will work best in each case. Explain your choice.

Length of a football field

Length of your pinky

Height of a tree

**Activity 5.7**

## Warm Up

**For use before Activity 5.7**

## Copy and complete the statement using <, >, or =.

**1.** 3 yd __?__ 21 ft

**2.** 14 ft __?__ 4 yd

**3.** 91 in. __?__ 5 yd

**4.** 10 cm __?__ 1 m

**5.** 2 km __?__ 2 m

**6.** 15 m __?__ 15 km

## Start Thinking!
For use before Lesson 5.7

Can you fit an entire gallon of milk into a 2-liter bottle? Explain.

## Warm Up
For use before Lesson 5.7

**Answer the question. Explain your answer.**

**1.** Which speed is faster:  8 km/h or 6 mi/h?

**2.** Which dog is heavier:  16 kg or 30 lb?

## 5.7 Practice A

**Answer the question. Explain your answer.**

1. Which key is longer: 5 cm or 2 in.?

2. Which package is heavier: 85 g or 3 oz?

**Copy and complete the statement. Round to the nearest hundredth, if necessary.**

3. 500 cm = __?__ m

4. 9 qt = __?__ c

5. 10 ft ≈ __?__ m

6. 2000 m ≈ __?__ ft

7. 4 qt ≈ __?__ L

8. 50 g ≈ __?__ oz

9. 1.4 lb ≈ __?__ kg

10. A hurricane has a large eye of about 80 miles. How many kilometers wide is the eye?

**Copy and complete the statement using < or >.**

11. 3 kg __?__ 100 oz

12. 2 yd __?__ 200 cm

13. 15 gal __?__ 50 L

14. 100,000 cm __?__ 1 mi

**Copy and complete the statement.**

15. 2 in./sec ≈ __?__ cm/sec

16. 2 ft/day ≈ __?__ m/day

17. 8 L/h ≈ __?__ gal/h

18. 80 oz/yr ≈ __?__ g/yr

19. The maximum sustained winds reached by a hurricane were 230 kilometers per hour.

    a. What is this wind speed in miles per hour?

    b. What is this wind speed in meters per hour?

    c. What is this wind speed in meters per minute?

    d. Use the Internet to determine the highest category attained by the hurricane.

20. A book is 15 centimeters long and 6 centimeters wide. What are the length and width of the book in inches? Round your answers to the nearest hundredth.

21. You have a liter bottle of orange juice. You want to divide the juice into one-cup amounts. How many cups can you pour? How much juice will be left over? Explain your answer.

Name _____ Date _____

## 5.7 Practice B

**Copy and complete the statement. Round to the nearest hundredth, if necessary.**

1. 7 qt = __?__ gal

2. 3 km = __?__ m

3. 30 oz ≈ __?__ lb

4. 5.9 in. ≈ __?__ cm

5. 51 km ≈ __?__ mi

6. 14.5 oz ≈ __?__ g

7. 120.5 lb ≈ __?__ kg

8. 7.25 L ≈ __?__ qt

9. 1150 cm ≈ __?__ in.

10. Your cat weighs 10.4 pounds. How many kilograms does your cat weigh?

**Copy and complete the statement using < or >.**

11. 29 ft __?__ 880 cm

12. 10 pt __?__ 5 L

13. 42 km __?__ 26.2 mi

14. 350 g __?__ 12 oz

**Copy and complete the statement.**

15. 42 gal/min ≈ __?__ L/min

16. 32 ft/sec ≈ __?__ m/sec

17. 15 kg/yr ≈ __?__ oz/yr

18. 5.7 km/h ≈ __?__ ft/h

19. The An-225 airplane is quoted as having a maximum takeoff weight of over 1.3 million pounds.

    a. What is this weight in kilograms?

    b. The FAI, the world governing body for air sports and aeronautical world records, attributes a slightly lower weight of 1.12 million pounds. Convert this to kilograms.

    c. The record in part (b) was set by an An-225 in 1989 for the largest mass ever lifted by an airplane to an altitude of 6500 feet. Convert this altitude to kilometers.

20. At the equator, Earth's surface moves about 4000 kilometers per day.

    a. What is this speed in miles per hour?

    b. What is this speed in meters per minute?

    c. You stand at a place 200 miles north of the equator. Are you moving *more than* or *less than* 4000 kilometers per day?

21. Your car's gasoline tank holds 18 gallons of gasoline. On a trip in Canada, the tank is one quarter full. You want to fill the tank. How many liters of gasoline are needed to fill the tank? Explain your answer.

Name_____ Date_____

## **5.7** **Enrichment and Extension**

## Converting a Rate

Sometimes you have to convert both the numerator and denominator of a rate.

**Example:** Convert 65 miles per hour to meters per second.

Use 1 mi ≈ 1.6 km, 1000 m = 1 km, 1 h = 60 min, and 1 min = 60 sec.

$$\frac{65 \text{ mi}}{1 \text{ h}} \approx \frac{65 \text{ mi}}{1 \text{ h}} \times \frac{1.6 \text{ km}}{1 \text{ mi}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ sec}} = \frac{104,000 \text{ m}}{3600 \text{ sec}} \approx 28.89 \text{ m/sec}$$

So, 65 miles per hour is about 28.89 meters per second.

**Copy and complete each statement. Round to the nearest hundredth, if necessary.**

**1.** 45 mi/h ≈ __?__ km/min

**2.** 92 gal/min ≈ __?__ L/sec

**3.** 1500 L/h ≈ __?__ pt/sec

**4.** 75 m/min ≈ __?__ mi/h

**5.** 12.8 in./day ≈ __?__ cm/h

**6.** 0.5 kg/day ≈ __?__ lb/week

**7.** 35 km/h ≈ __?__ ft/min

**8.** 58 L/sec ≈ __?__ gal/day

**9.** 17 lb/yr ≈ __?__ g/day

**10.** 25 mi/h ≈ __?__ m/sec

**11.** A needle palm tree at the park is growing an average of 4.35 centimeters per day. A cabbage palm tree next to it is growing an average of 1.26 inches per day. Which one is growing faster? Explain.

**12.** Change 30 miles per hour, 50 miles per hour, and 70 miles per hour into miles per minute. Explain why speed limits are posted in miles per hour and not miles per minute or miles per second.

**13.** Jose wants to buy a filter for his pool. One filter has a flow rate of 75 gallons per minute. Another filter has a flow rate of 2 liters per second.

    **a.** When purchasing a filter for a pool, is it better to have a faster or slower flow rate? Explain.

    **b.** Which filter has the faster flow rate?

## 5.7 Puzzle Time

## How Do You Fix A Broken Pizza?

Write the letter of each answer in the box containing the exercise number.

**Complete the statement. Round to the nearest hundredth, if necessary.**

1.  72 in. = __?__ cm

2.  3 qt ≈ __?__ L

3.  15 lb ≈ __?__ kg

4.  120 mi ≈ __?__ km

5.  7 L ≈ __?__ qt

6.  75 kg ≈ __?__ lb

7.  5 km ≈ __?__ mi

8.  54 cm ≈ __?__ in.

9.  $\dfrac{24 \text{ in.}}{h} = \dfrac{? \text{ cm}}{h}$

10.  $\dfrac{32 \text{ lb}}{\text{day}} \approx \dfrac{? \text{ kg}}{\text{day}}$

11.  $\dfrac{52 \text{ L}}{\text{year}} \approx \dfrac{? \text{ qt}}{\text{year}}$

12.  $\dfrac{7 \text{ km}}{\text{min}} \approx \dfrac{? \text{ mi}}{\text{min}}$

13.  Felicia is 63 inches tall. What is her height in centimeters?

14.  Your backpack weighs 6 kilograms. What is its weight in pounds?

15.  If the speed limit is 65 miles per hour, how many kilometers per hour can a person drive without speeding?

**Answers**

P. 160.02

I. 182.88

W. 21.06

T. 13.2

H. 193.2

A. 2.85

T. 14.4

O. 3.1

A. 104.65

S. 165

T. 55.12

O. 7.42

E. 6.75

M. 4.34

T. 60.96

| 8 | 1 | 11 | 4 | | 14 | 5 | 12 | 2 | 9 | 7 | | 13 | 15 | 6 | 10 | 3 |
|---|---|----|---|---|----|---|----|---|---|---|---|----|----|---|----|---|

## Chapter 5 Technology Connection
**For use after Section 5.7**

# Using Unit Analysis

When a problem requires the use of more than one conversion factor, you can use unit analysis to you help decide which form of the conversion factor to use. As its name implies, unit analysis helps to narrow your focus to the cancellation of units so that your end product has the correct units.

**EXAMPLE** The current world record in the men's 100-meter dash is 9.58 seconds. Express this rate as miles per hour.

**SOLUTION**

**Step 1** Analyze the units of the problem to see what you start with and what you need to end with. For the units involving distance, you will need to convert from meters to feet then from feet to miles. For the units involving time, you will need to convert from seconds to minutes then from minutes to hours.

**Step 2** Write the original rate and then arrange your conversion factors so that units will cancel diagonally.

$$\frac{100 \text{ meters}}{9.58 \text{ seconds}} \times \frac{3.28 \text{ feet}}{1 \text{ meter}} \times \frac{1 \text{ mile}}{5280 \text{ feet}} \times \frac{60 \text{ seconds}}{1 \text{ minute}} \times \frac{60 \text{ minutes}}{1 \text{ hour}}$$

Notice that the remaining units are miles per hour.

**Step 3** To find the value of the number, divide the product of the numerators by the product of the denominators. On your calculator, enter:

$$\boxed{(}\; 100 \times 3.28 \times 60 \times 60 \;\boxed{)}\;\boxed{\div}\;\boxed{(}\; 9.58 \times 5280 \;\boxed{)}\;\boxed{=}$$

**ANSWER** The speed of the current world record holder in the men's 100-meter dash is about 23.34 miles per hour.

**Use unit analysis and your calculator to find the following conversions.**

1. If a snail crawls 2 inches every minute, how many feet could it crawl in one day?

2. If a rocket is traveling at 150 feet per second, how fast is it traveling in miles per hour?