

Chapter 6

Resource Masters



Mathematics

Applications and Concepts

Course 2



Glencoe

New York, New York Columbus, Ohio Chicago, Illinois Peoria, Illinois Woodland Hills, California

6-1**Study Guide and Intervention*****Estimating with Fractions***

Use rounding to estimate with fractions.

Estimating: For mixed numbers, round to the nearest whole number.

$$4\frac{1}{6} + 3\frac{7}{8} \rightarrow 4 + 4 = 8$$

 $4\frac{1}{6} + 3\frac{7}{8}$ is *about* 8.

For fractions, round to

0, $\frac{1}{2}$, or 1.

$$\frac{11}{12} - \frac{4}{9} \rightarrow 1 - \frac{1}{2} = \frac{1}{2}$$

 $\frac{11}{12} - \frac{4}{9}$ is *about* $\frac{1}{2}$.**EXAMPLE 1** Estimate $2\frac{2}{3} \times 4\frac{1}{4}$.

$$2\frac{2}{3} \times 4\frac{1}{4} \rightarrow 3 \times 4 = 12$$

The product is *about* 12.**EXAMPLE 2** Estimate $\frac{6}{7} - \frac{3}{5}$. $\frac{6}{7}$ is about 1. $\frac{3}{5}$ is about $\frac{1}{2}$.

$$\frac{6}{7} - \frac{3}{5} \rightarrow 1 - \frac{1}{2} = \frac{1}{2}$$

The difference is *about* $\frac{1}{2}$.**EXERCISES****Estimate.**

1. $4\frac{1}{3} + 3\frac{4}{5}$

2. $2\frac{1}{6} \times 3\frac{2}{3}$

3. $\frac{7}{12} - \frac{1}{10}$

4. $5\frac{1}{4} - 1\frac{1}{2}$

5. $4\frac{3}{4} + 1\frac{1}{5}$

6. $\frac{5}{9} \times \frac{13}{14}$

7. $\frac{1}{6} \div \frac{8}{9}$

8. $\frac{6}{7} \div \frac{9}{10}$

9. $13\frac{4}{5} \div 1\frac{7}{8}$

10. $12\frac{1}{4} \div 5\frac{7}{8}$

6-1**Practice: Skills*****Estimating with Fractions*****Estimate.**

1. $\frac{4}{5} + \frac{2}{11}$

2. $\frac{4}{7} + \frac{1}{5}$

3. $\frac{7}{9} - \frac{1}{5}$

4. $\frac{9}{10} - \frac{1}{23}$

5. $\frac{3}{5} + \frac{9}{11}$

6. $\frac{4}{5} - \frac{4}{9}$

7. $5\frac{1}{7} + 7\frac{9}{11}$

8. $3\frac{10}{11} - 2\frac{1}{6}$

9. $5\frac{1}{4} - \frac{1}{7}$

10. $8\frac{3}{7} - 2\frac{1}{2}$

11. $2\frac{1}{8} + 6\frac{9}{10}$

12. $10\frac{1}{8} - 3\frac{1}{4}$

13. $\frac{4}{5} \times \frac{8}{9}$

14. $\frac{6}{7} \div \frac{10}{11}$

15. $3\frac{6}{7} \times 2\frac{1}{10}$

16. $16\frac{1}{3} \div 3\frac{8}{9}$

17. $31\frac{3}{4} \div 2\frac{1}{8}$

18. $3\frac{4}{5} \cdot 1\frac{1}{4}$

19. $12 \div 2\frac{6}{7}$

20. $44\frac{1}{5} \div 3\frac{7}{8}$

21. $10\frac{1}{7} \cdot 4\frac{1}{3}$

22. $5\frac{1}{8} \cdot 6\frac{9}{11}$

23. $\frac{3}{12} \div 4\frac{4}{5}$

24. $2\frac{1}{2} \div 3\frac{1}{3}$

25. Estimate $36\frac{1}{4}$ divided by 6.26. Estimate the sum of $7\frac{9}{10}$, $2\frac{1}{5}$, and $3\frac{2}{3}$.

6-1**Practice: Word Problems*****Estimating with Fractions***

COOKING For Exercises 1–4, use the recipe shown below.

Lightning Creamed Potatoes
$\frac{1}{3}$ cup water
$1\frac{1}{2}$ teaspoon salt
$3\frac{3}{4}$ cups pared potatoes, cut in bite-size pieces
$\frac{1}{3}$ cup finely chopped onion
$\frac{1}{2}$ cup light cream

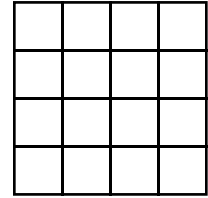
serves 6

<p>1. Daniel wants to serve twelve people the Lightning Creamed Potatoes. Estimate how much salt he will need if he doubles the recipe.</p>	<p>2. Rosita wants to triple the recipe above. Estimate how many cups of pared potatoes she will need.</p>
<p>3. Alvin is going to serve six people. He only has $1\frac{1}{4}$ cups of pared potatoes. About how many cups of potatoes will he have to borrow?</p>	<p>4. Katrina wants to make half of the recipe. About how many cups of potatoes will she need?</p>
<p>5. CARPENTRY A board is $17\frac{3}{4}$ inches long. Carmen wants to shorten the length by about $1\frac{7}{8}$ inches. Estimate the length of the board after the board has been shortened.</p>	<p>6. TRACK Akira ran two miles. He ran the first mile in $7\frac{3}{4}$ minutes and the second mile in $8\frac{3}{4}$ minutes. Estimate how long it took Akira to run two miles.</p>

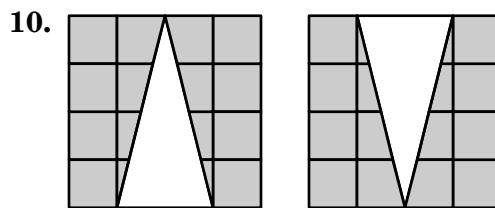
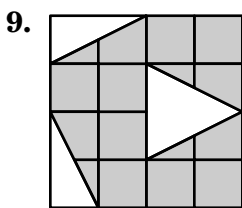
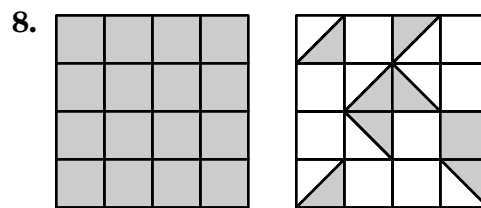
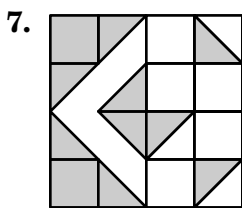
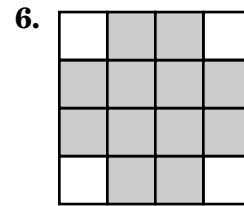
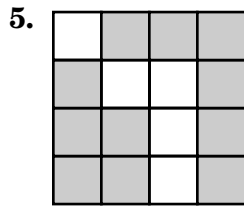
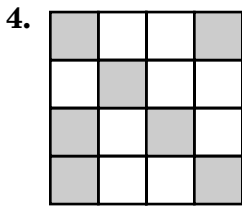
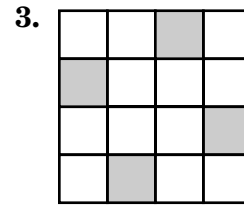
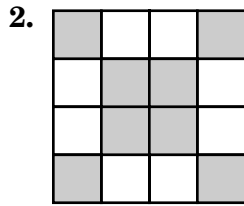
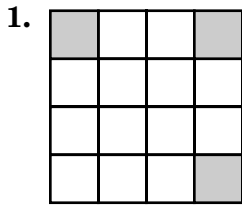
6-1 Enrichment

Fractional Areas

The figure at the right shows one square inch. Each small square equals $\frac{1}{16}$ of a square inch.



Write a fraction or mixed number for the shaded area of each drawing.



6-2**Study Guide and Intervention****Adding and Subtracting Fractions**

Like fractions are fractions that have the same denominator. To add or subtract like fractions, add or subtract the numerators and write the result over the denominator.

Simplify if necessary.

To add or subtract *unlike fractions*, rename the fractions with a least common denominator. Then add or subtract as with like fractions.

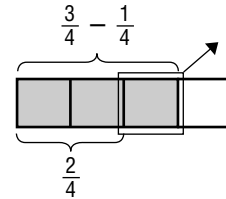
EXAMPLE 1 Subtract $\frac{3}{4} - \frac{1}{4}$. Write in simplest form.

$$\begin{aligned}\frac{3}{4} - \frac{1}{4} &= \frac{3-1}{4} \\ &= \frac{2}{4} \\ &= \frac{1}{2}\end{aligned}$$

Subtract the numerators.

Write the difference over the denominator.

Simplify.



EXAMPLE 2 Add $\frac{2}{3} + \frac{1}{12}$. Write in simplest form.

The least common denominator of 3 and 12 is 12.

$$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

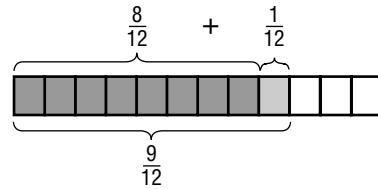
Rename $\frac{2}{3}$ using the LCD.

$$\frac{2}{3} \rightarrow \frac{8}{12}$$

$$+ \frac{1}{12} \rightarrow + \frac{1}{12}$$

$$\frac{9}{12} \text{ or } \frac{3}{4}$$

Add the numerators and simplify.

**EXERCISES**

Add or subtract. Write in simplest form.

1. $\frac{5}{8} + \frac{1}{8}$

2. $\frac{7}{9} - \frac{2}{9}$

3. $\frac{1}{2} + \frac{3}{4}$

4. $\frac{7}{8} - \frac{5}{6}$

5. $\frac{5}{9} + \frac{5}{6}$

6. $\frac{3}{8} - \frac{1}{12}$

7. $\frac{3}{10} + \frac{7}{12}$

8. $\frac{2}{5} - \frac{1}{3}$

9. $\frac{7}{15} + \frac{5}{6}$

10. $\frac{7}{9} - \frac{1}{2}$

6-2**Practice: Skills*****Adding and Subtracting Fractions***

Add or subtract. Write in simplest form.

1. $\frac{3}{8} + \frac{3}{8}$

2. $\frac{7}{10} - \frac{5}{10}$

3. $\frac{9}{10} + \frac{3}{10}$

4. $\frac{4}{7} - \frac{2}{7}$

5. $\frac{2}{3} + \frac{2}{3}$

6. $\frac{5}{9} - \frac{2}{9}$

7. $\frac{8}{15} - \frac{1}{5}$

8. $\frac{5}{6} + \frac{5}{12}$

9. $\frac{3}{5} - \frac{3}{10}$

10. $\frac{7}{16} + \frac{3}{8}$

11. $\frac{19}{20} - \frac{3}{10}$

12. $\frac{5}{9} + \frac{7}{9}$

13. $\frac{4}{9} - \frac{1}{12}$

14. $\frac{2}{3} + \frac{3}{7}$

15. $\frac{3}{4} + \frac{1}{7}$

16. $\frac{7}{8} - \frac{2}{3}$

17. $\frac{8}{9} - \frac{5}{6}$

18. $\frac{5}{12} - \frac{3}{10}$

19. $\frac{7}{9} + \frac{2}{3}$

20. $\frac{3}{5} + \frac{4}{11}$

21. $\frac{11}{12} - \frac{1}{4}$

ALGEBRA Evaluate each expression if $a = \frac{5}{6}$ and $b = \frac{3}{8}$.

22. $a + b$

23. $a - b$

24. $\frac{9}{10} - a$

6-2**Practice: Word Problems*****Adding and Subtracting Fractions***

RETAIL STORES For Exercises 1–4 use the table below. It shows what fraction of the stores at a mall fall into seven categories.

Type of Store	Fraction of Stores in Mall
jewelry	$\frac{1}{30}$
clothing	$\frac{8}{15}$
gifts	$\frac{3}{20}$
electronics	$\frac{1}{20}$
department	$\frac{1}{15}$
shoes	$\frac{1}{15}$
athletic	$\frac{1}{10}$

1. What fraction of the stores are jewelry or gift stores?	2. What fraction of the stores are clothing or electronics stores?
3. Which type of store has the greatest number of stores?	4. How many more clothing stores are there than athletic stores? Write as a fraction.
5. SEWING Jin wants to make a scarf and matching hat for his sister. The patterns call for $\frac{7}{8}$ yard of fabric for the scarf and $\frac{1}{2}$ yard of fabric for the hat. How much fabric should Jin buy?	6. RESTAURANT Ms. Malle owns a restaurant. Typically, $\frac{1}{5}$ of the customers order fish, while $\frac{1}{4}$ of the customers order poultry. What fraction of her customers order either fish or poultry?

6-2**Reading to Learn Mathematics*****Adding and Subtracting Fractions***

Pre-Activity *Complete the Mini Lab at the top of page 244 in your textbook. Write your answers below.*

1. Find $\frac{3}{8}$ inch on a ruler. From that point, add $\frac{4}{8}$ inch. What is the result?
2. Use a ruler to add $\frac{1}{4}$ inch and $\frac{2}{4}$ inch.
3. **Make a conjecture** about how to find each sum. Check using a ruler.
 - a. $\frac{5}{8} + \frac{7}{8}$
 - b. $\frac{3}{16} + \frac{1}{16}$
 - c. $\frac{1}{2} + \frac{3}{4}$

Reading the Lesson

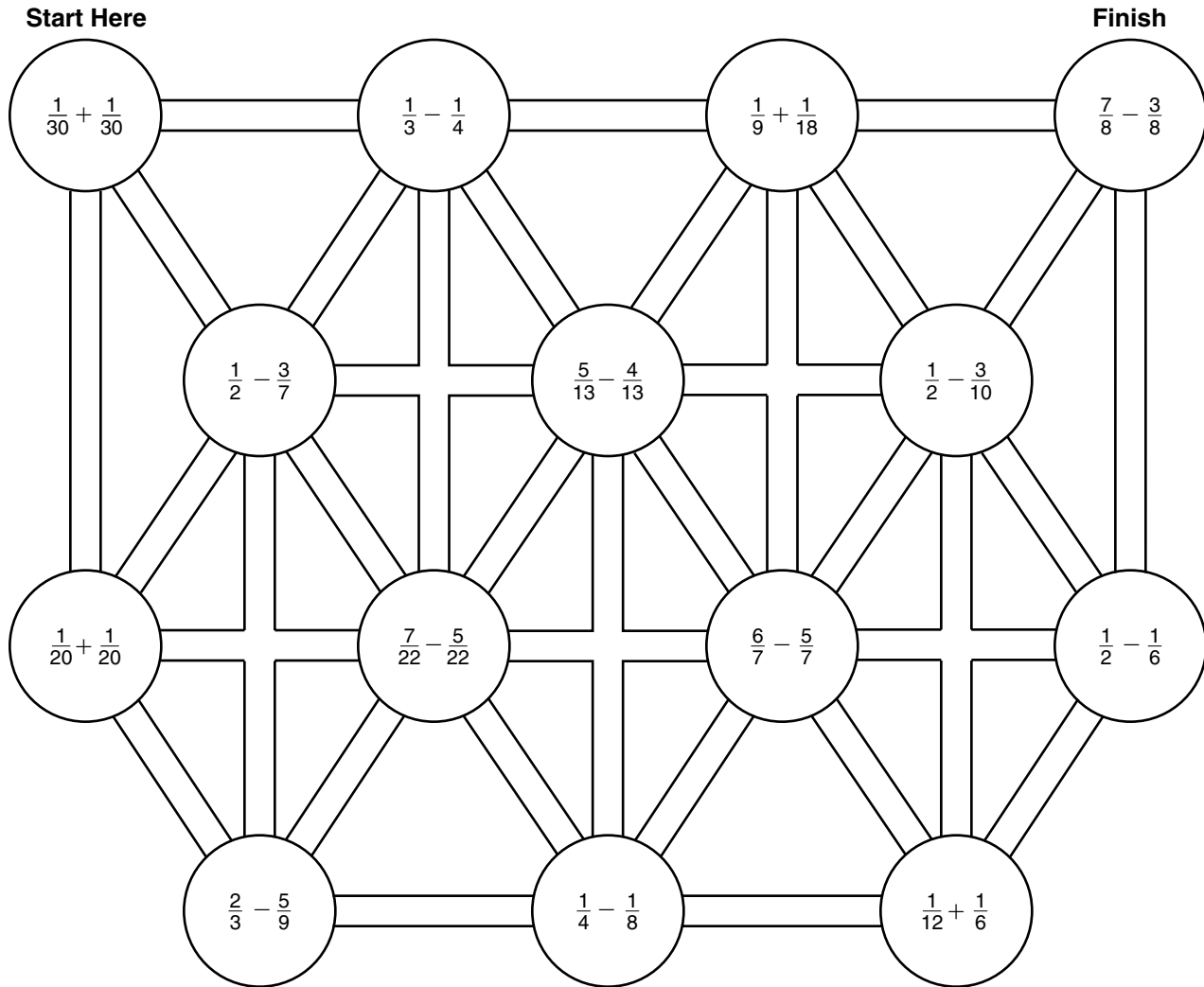
4. Describe the steps you take to add or subtract like fractions.
5. How are like fractions different from unlike fractions?
6. What does LCD stand for, and what does it mean? What is the LCD used for?

Helping You Remember

7. Describe how the procedure for adding or subtracting unlike fractions is different from the procedure for adding or subtracting like fractions.

6-2**Enrichment****Fractions Maze**

To solve this maze, start at the upper left corner. Then, draw a line to the next circle with the smallest sum or difference. The answers written in order will form a pattern.



Describe the pattern in the fractions along the line you drew from start to finish.

6-3**Study Guide and Intervention****Adding and Subtracting Mixed Numbers**

To add or subtract mixed numbers:

1. Add or subtract the fractions. Rename using the LCD if necessary.
2. Add or subtract the whole numbers.
3. Simplify if necessary.

EXAMPLE 1 Find $14\frac{1}{2} + 18\frac{2}{3}$.

$$14\frac{1}{2} \rightarrow 14\frac{3}{6} \quad \text{Rename the fractions.}$$

$$+18\frac{2}{3} \rightarrow +18\frac{4}{6} \quad \text{Add the whole numbers and add the fractions.}$$

$$\underline{\hspace{1.5cm}} \quad \underline{\hspace{1.5cm}} \quad \underline{\hspace{1.5cm}}$$

$$32\frac{7}{6} \text{ or } 33\frac{1}{6} \quad \text{Simplify.}$$

EXAMPLE 2 Find $21 - 12\frac{5}{8}$.

$$21 \rightarrow 20\frac{8}{8} \quad \text{Rename 21 as } 20\frac{8}{8}.$$

$$-12\frac{5}{8} \rightarrow -12\frac{5}{8} \quad \text{First subtract the whole numbers and then the fractions.}$$

$$\underline{\hspace{1.5cm}}$$

$$8\frac{3}{8}$$

EXERCISES

Add or subtract. Write in simplest form.

1. $7\frac{3}{4} + 2\frac{3}{4}$

2. $14\frac{2}{9} - 6\frac{1}{9}$

3. $9\frac{1}{5} - 4\frac{3}{4}$

4. $7\frac{1}{8} + 5\frac{3}{8}$

5. $7\frac{3}{4} + 2\frac{2}{3}$

6. $5\frac{1}{2} - 5\frac{1}{3}$

7. $5\frac{1}{2} - 3\frac{1}{4}$

8. $6\frac{1}{3} + 2\frac{1}{6}$

9. $9 - 3\frac{2}{5}$

10. $2\frac{2}{3} + 7\frac{1}{2}$

11. $6\frac{1}{2} - 6\frac{1}{3}$

12. $18\frac{1}{2} + 5\frac{5}{8}$

6-3**Practice: Skills*****Adding and Subtracting Mixed Numbers***

Add or subtract. Write in simplest form.

1. $3\frac{2}{7} + 2\frac{1}{7}$

2. $7\frac{1}{3} + 7\frac{1}{3}$

3. $9\frac{3}{5} - 2\frac{1}{5}$

4. $7\frac{3}{4} - 5\frac{1}{4}$

5. $3\frac{1}{4} + 5\frac{1}{4}$

6. $6\frac{3}{4} - 5\frac{3}{4}$

7. $12\frac{1}{8} + 9\frac{3}{8}$

8. $5\frac{2}{3} - 2\frac{1}{3}$

9. $14\frac{3}{5} - 9\frac{2}{5}$

10. $5\frac{1}{2} + 3\frac{1}{4}$

11. $2\frac{1}{3} + 6\frac{1}{6}$

12. $6\frac{1}{3} - 6\frac{1}{4}$

13. $7\frac{5}{6} - 2\frac{2}{3}$

14. $6\frac{7}{10} + 5\frac{1}{4}$

15. $12\frac{3}{8} - 9\frac{1}{3}$

16. $12\frac{13}{15} + 4\frac{1}{9}$

17. $15\frac{2}{3} - 7\frac{1}{5}$

18. $4\frac{7}{12} - 2\frac{3}{16}$

19. $8\frac{3}{4} + 3\frac{2}{5}$

20. $12\frac{1}{3} - 8\frac{5}{5}$

21. $8 - 3\frac{2}{5}$

22. $7\frac{7}{9} + 6\frac{7}{8}$

23. $7\frac{7}{9} - 6\frac{7}{8}$

24. $10\frac{3}{8} + 7\frac{11}{12}$

6-3**Practice: Word Problems*****Adding and Subtracting Mixed Numbers***

HEIGHT For Exercises 1–6, use the table below. It shows the heights of five students. Write all answers in simplest form.

Student	Height (ft)
Karen	$5\frac{1}{6}$
Arturo	6
Felisa	$4\frac{11}{12}$
Max	$5\frac{3}{4}$
Silvia	$5\frac{1}{4}$

1. How much taller is Max than Felisa?	2. How much shorter is Karen than Arturo?
3. If Silvia stood on a box that was $1\frac{5}{6}$ feet high, how far would the top of her head be from the floor?	4. What is the sum of Felisa and Silvia's heights?
5. The distance from the floor to Karen's knee is $1\frac{1}{4}$ feet. What is the distance from her knee to the top of her head?	6. Max grew $\frac{1}{3}$ foot last year. How tall was he last year?

6-3**Reading to Learn Mathematics*****Adding and Subtracting Mixed Numbers***

Pre-Activity *Read the introduction at the top of page 248 in your textbook. Write your answers below.*

1. Jupiter is $5\frac{2}{5}$ AU from the Sun and Saturn's distance is $9\frac{1}{2}$ AU. Write an expression to find how much closer to the Sun Jupiter is than Saturn.
2. Find the difference of the fractional parts of the mixed numbers.
3. Find the difference of the whole numbers.
4. **Make a conjecture** about how to find $9\frac{1}{2} - 5\frac{2}{5}$. Then use your conjecture to find the difference.

Reading the Lesson

5. In the examples of adding and subtracting mixed numbers, the first step indicated is to estimate the result using whole numbers.
 - a. Why do you think it's a good idea to use an estimate?
 - b. How do you find the whole numbers used in the estimates?
6. What must you do if the fraction part of a mixed number is greater than the fraction part of the mixed number you are subtracting from? Give an example different from the one used in the example in your textbook.

Helping You Remember

7. Work with a partner. Take turns thinking of a mixed number and having your partner tell you how to rename the mixed number in the way described in this lesson. Repeat until each of you can rename mixed numbers easily.

6-3**Enrichment****Arithmetic Sequences of Fractions**

Each term in an *arithmetic* sequence is created by adding or subtracting the same number to the term before. The number added or subtracted is called the *common difference*.

The sequence below is an increasing arithmetic sequence with a common difference of $\frac{1}{4}$.

$$\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, 1\frac{1}{8}$$

Below is a decreasing arithmetic sequence with a common difference of $1\frac{1}{5}$.

$$7\frac{3}{5}, 6\frac{2}{5}, 5\frac{1}{5}, 4, 2\frac{4}{5}$$

Write the common difference for each arithmetic sequence.

1. $\frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \frac{7}{8}, 1, 1\frac{1}{8}$

2. $1\frac{1}{3}, 3\frac{5}{6}, 6\frac{1}{3}, 8\frac{5}{6}$

3. $4\frac{1}{2}, 4\frac{2}{5}, 4\frac{3}{10}, 4\frac{1}{5}$

4. $11, 9\frac{2}{3}, 8\frac{1}{3}, 7, 5\frac{2}{3}$

Write the next term in each arithmetic sequence.

5. $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{11}{12}, 1$

6. $\frac{13}{20}, \frac{11}{20}, \frac{9}{20}, \frac{7}{20}$

7. $5\frac{1}{5}, 5\frac{7}{10}, 6\frac{1}{5}, 6\frac{7}{10}$

8. $4\frac{11}{12}, 3\frac{3}{4}, 2\frac{7}{12}, 1\frac{5}{12}$

Write the first five terms in each sequence.

9. This increasing sequence starts with $\frac{1}{6}$ and has a common difference of $1\frac{1}{5}$.

10. This decreasing sequence starts with $6\frac{1}{3}$ and has a common difference of $\frac{3}{4}$.

6-4**Study Guide and Intervention*****Multiplying Fractions and Mixed Numbers***

To multiply fractions, multiply the numerators and multiply the denominators.

$$\frac{5}{6} \times \frac{3}{5} = \frac{5 \times 3}{6 \times 5} = \frac{15}{30} = \frac{1}{2}$$

To multiply mixed numbers, rename each mixed number as a fraction. Then multiply the fractions.

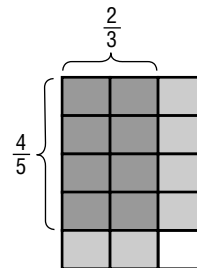
$$2\frac{2}{3} \times 1\frac{1}{4} = \frac{8}{3} \times \frac{5}{4} = \frac{40}{12} = 3\frac{1}{3}$$

EXAMPLE 1 Find $\frac{2}{3} \times \frac{4}{5}$. Write in simplest form.

$$\begin{aligned} \frac{2}{3} \times \frac{4}{5} &= \frac{2 \times 4}{3 \times 5} && \leftarrow \text{Multiply the numerators.} \\ & && \leftarrow \text{Multiply the denominators.} \\ &= \frac{8}{15} && \text{Simplify.} \end{aligned}$$

EXAMPLE 2 Find $\frac{1}{3} \times 2\frac{1}{2}$. Write in simplest form.

$$\begin{aligned} \frac{1}{3} \times 2\frac{1}{2} &= \frac{1}{3} \times \frac{5}{2} && \text{Rename } 2\frac{1}{2} \text{ as an improper fraction, } \frac{5}{2}. \\ &= \frac{1 \times 5}{3 \times 2} && \text{Multiply.} \\ &= \frac{5}{6} && \text{Simplify.} \end{aligned}$$

**EXERCISES**

Multiply. Write in simplest form.

1. $\frac{2}{3} \times \frac{2}{3}$

2. $\frac{1}{2} \times \frac{7}{8}$

3. $\frac{1}{3} \times \frac{3}{5}$

4. $\frac{5}{9} \times 4$

5. $1\frac{2}{3} \times \frac{3}{5}$

6. $3\frac{3}{4} \times 1\frac{1}{6}$

7. $\frac{3}{4} \times 1\frac{2}{3}$

8. $3\frac{1}{3} \times 2\frac{1}{2}$

9. $4\frac{1}{5} \times \frac{1}{7}$

10. $\frac{7}{5} \times 8$

11. $2\frac{1}{3} \times \frac{4}{6}$

12. $\frac{1}{8} \times 2\frac{3}{4}$

6-4**Practice: Skills*****Multiplying Fractions and Mixed Numbers*****Multiply. Write in simplest form.**

1. $\frac{1}{2} \times \frac{4}{5}$

2. $\frac{1}{9} \times \frac{3}{5}$

3. $\frac{15}{24} \times \frac{3}{20}$

4. $\frac{1}{7} \times \frac{1}{5}$

5. $\frac{5}{7} \times \frac{14}{15}$

6. $\frac{9}{10} \times \frac{5}{9}$

7. $\frac{4}{11} \times \frac{3}{8}$

8. $\frac{2}{3} \times \frac{7}{9}$

9. $\frac{9}{13} \times \frac{26}{27}$

10. $\frac{4}{9} \times 5$

11. $7 \times \frac{2}{7}$

12. $2\frac{4}{5} \times \frac{1}{3}$

13. $4\frac{1}{2} \times \frac{1}{3}$

14. $5\frac{3}{4} \times 12$

15. $14 \times 2\frac{3}{7}$

16. $2\frac{3}{5} \times 1\frac{3}{7}$

17. $1\frac{4}{9} \times 2\frac{4}{7}$

18. $5\frac{5}{6} \times 6\frac{3}{8}$

19. $10\frac{7}{9} \times 4\frac{1}{4}$

20. $9\frac{7}{9} \times 7\frac{3}{4}$

21. $3\frac{3}{4} \times 2\frac{4}{7}$

6-4**Practice: Word Problems*****Multiplying Fractions and Mixed Numbers***

<p>1. POPULATION If $\frac{4}{5}$ of the population of a certain town is considered to be middle class and the population of the town is 2,000, how many people are considered middle class?</p>	<p>2. READING Robin has read $\frac{3}{4}$ of a book. Mark said he had read $\frac{1}{2}$ as much as Robin. What fraction of the book has Mark read?</p>
<p>3. RADIO A radio station spends $\frac{1}{40}$ of each 24 hours on public service announcements. How much time is spent on public service announcements each day?</p>	<p>4. SALE A bicycle is on sale for $\frac{2}{3}$ of its original price. If the original price is \$354, what is the sale price?</p>
<p>5. STUDENT POPULATION One sixth of the students at a local college are seniors. The number of freshmen students is $2\frac{1}{2}$ times that amount. What fraction of the students are freshmen?</p>	<p>6. SEWING Anna wants to make 4 sets of curtains. Each set requires $5\frac{1}{8}$ yards of fabric. How much fabric does she need?</p>
<p>7. RUNNING It takes Awan $8\frac{1}{3}$ minutes to run one mile. It takes Kate $1\frac{1}{5}$ times longer. How long does it take Kate to run one mile?</p>	<p>8. STOCK Carl bought some stock at \$25 a share. The stock increased to $1\frac{1}{2}$ times its value. How much is the stock per share?</p>

6-4**Reading to Learn Mathematics*****Multiplying Fractions and Mixed Numbers***

Pre-Activity *Read the introduction at the top of page 254 in your textbook. Write your answers below.*

1. What part of the rectangle represents $\frac{1}{3}$?
2. What part of the rectangle represents $\frac{2}{5}$ of $\frac{1}{3}$?
3. **Make a conjecture** about what fraction of U.S. land is publicly owned forests.

Reading the Lesson

4. What is the rule for multiplying fractions? Give an example.
5. What does GCF stand for? How is it helpful in the multiplication of fractions? Give an example.

Helping You Remember

6. In this lesson, you learned two methods to multiply mixed numbers. Work with a partner and describe how to use one of the methods to find $\frac{3}{5} \times 3\frac{2}{3}$. Have your partner describe how to use the other method to find the result.

6-4**Enrichment****Changing Measures of Length**

Fractions and mixed numbers are frequently used with customary measures.

The problems on this page will give you a chance to practice using multiplication of fractions as you change measures of lengths to different equivalent forms.

$$12 \text{ inches (in.)} = 1 \text{ foot (ft)}$$

$$3 \text{ feet} = 1 \text{ yard (yd)}$$

$$5\frac{1}{2} \text{ yards} = 1 \text{ rod (rd)}$$

$$320 \text{ rods} = 1 \text{ mile (mi)}$$

Use a fraction or a mixed number to complete each statement. Refer to the table above as needed.

1. 12 ft 6 in. = ft

2. 1 rod = ft

3. $\frac{5}{8}$ yd = in.

4. 10 ft = yd

5. 7 yd 2 ft = yd

6. 1,540 yd = mi

7. 1,000 rd = mi

8. 27 in. = yd

Use a whole number to complete each statement. Refer to the table above as needed.

9. $10\frac{1}{2}$ ft = 10 ft in.

10. $12\frac{1}{2}$ yd = in.

11. 1 mi = ft

12. 1 mi = yd

13. $\frac{1}{10}$ mi = yd

14. $\frac{3}{4}$ ft = in.

15. 10 rd = ft

16. $\frac{3}{8}$ mi = ft

6-5**Study Guide and Intervention****Algebra: Solving Equations**

Multiplicative inverses, or **reciprocals**, are two numbers whose product is 1. To solve an equation in which the coefficient is a fraction, multiply each side of the equation by the reciprocal of the coefficient.

EXAMPLE 1 Find the multiplicative inverse of $3\frac{1}{4}$.

$$3\frac{1}{4} = \frac{13}{4}$$

Rename the mixed number as an improper fraction.

$$\frac{13}{4} \cdot \frac{4}{13} = 1$$

Multiply $\frac{13}{4}$ by $\frac{4}{13}$ to get the product 1.

The multiplicative inverse of $3\frac{1}{4}$ is $\frac{4}{13}$.

EXAMPLE 2 Solve $\frac{4}{5}x = 8$. Check your solution.

$$\frac{4}{5}x = 8$$

Write the equation.

$$\left(\frac{5}{4}\right)\frac{4}{5}x = \left(\frac{5}{4}\right)8$$

Multiply each side by the reciprocal of $\frac{4}{5}$, $\frac{5}{4}$.

$$x = 10$$

Simplify.

The solution is 10.

EXERCISES

Find the multiplicative inverse of each number.

1. $\frac{4}{9}$

2. $\frac{12}{13}$

3. $-\frac{15}{4}$

4. $6\frac{1}{7}$

Solve each equation. Check your solution.

5. $\frac{3}{5}x = 12$

6. $16 = \frac{10}{3}a$

7. $\frac{c}{2} = 7$

8. $\frac{15}{7}y = 3$

9. $\frac{m}{6} = -4$

10. $14 = -\frac{7}{9}b$

6-5**Practice: Skills****Algebra: Solving Equations**

Find the multiplicative inverse of each number.

1. $\frac{3}{7}$

2. $-\frac{4}{11}$

3. $\frac{7}{2}$

4. $\frac{9}{5}$

5. -5

6. $6\frac{1}{3}$

7. $4\frac{1}{9}$

8. $17\frac{1}{2}$

9. $-15\frac{2}{3}$

Solve each equation. Check your solution.

10. $\frac{x}{10} = 3$

11. $7 = \frac{m}{4}$

12. $\frac{a}{5} = -11$

13. $-8 = \frac{t}{5}$

14. $\frac{3}{4}c = 12$

15. $-7 = -\frac{w}{6}$

16. $\frac{3}{5}y = 6$

17. $15 = \frac{3}{7}b$

18. $\frac{6}{7}c = 18$

19. $\frac{7}{3}x = \frac{2}{3}$

20. $\frac{11}{12} = \frac{3}{4}h$

21. $\frac{9}{14}y = \frac{3}{7}$

22. $\frac{m}{2.6} = -5$

23. $0.6 = \frac{n}{5}$

24. $\frac{r}{2.6} = -1.3$

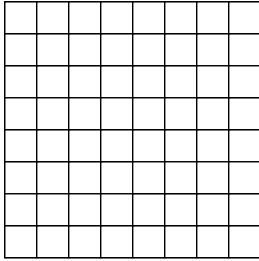
6-5**Practice: Word Problems****Algebra: Solving Equations**

<p>1. BIKING The speed s that Brandon can ride his bike if he rides $\frac{3}{5}$ of an hour and travels 4 miles is given by the equation $4 = \frac{3}{5}s$. What is Brandon's speed?</p>	<p>2. BAND The woodwind section of the middle school band makes up $\frac{1}{4}$ of the band. There are 9 members in the woodwind section. Use the equation $\frac{1}{4}m = 9$ to find the number of members m in the band.</p>
<p>3. SALE A coat is selling for $\frac{3}{4}$ of the original price. The sale price is \$180. The original price p can be found using the equation $\frac{3}{4}p = 180$. Find the original price.</p>	<p>4. SALARIES Aaron's annual salary is $\frac{2}{3}$ as much as Juanita's salary. Aaron makes \$46,000. Find Juanita's salary x using the equation $46,000 = \frac{2}{3}x$.</p>
<p>5. ENDANGERED SPECIES In the U. S., there are $\frac{14}{29}$ as many endangered species of birds as of reptiles. The number of endangered species of birds b can be compared to the 14 endangered species of reptiles using $\frac{14}{29}b = 14$. Find the number of endangered species of birds.</p>	<p>6. SALES TAX The sticker price p of a purchase with $\frac{1}{10}$ sales tax and a total price (including tax) of \$5.28 can be found using the equation $\frac{11}{10}p = 5.28$. What is the sticker price?</p>
<p>7. SEWING Each costume uses $\frac{3}{4}$ yard of fabric. The number of costumes c that can be made using $11\frac{1}{4}$ yards of fabric can be found using the equation $\frac{3}{4}c = 11\frac{1}{4}$. Find the number of costumes that can be made.</p>	<p>8. SAVINGS Jasmine saves \$46 each month from her part-time job. She saves $\frac{2}{5}$ of her earnings. Her earnings a can be found by using the equation $\frac{2}{5}a = 46$. Find her earnings.</p>

6-5**Reading to Learn Mathematics****Algebra: Solving Equations**

Pre-Activity Complete the Mini Lab at the top of page 258 in your textbook.
Write your answers below.

1. What is the product?
2. Use grid paper to model $\frac{1}{3} \cdot 3$. What is the product?



3. Complete the table below.

$\frac{1}{2} \cdot 2 =$ _____	$\frac{2}{3} \cdot \frac{3}{2} =$ _____	$\frac{5}{6} \cdot$ _____ $= 1$
$\frac{1}{3} \cdot 3 =$ _____	$\frac{3}{5} \cdot \frac{5}{3} =$ _____	$\frac{9}{20} \cdot$ _____ $= 1$
$\frac{1}{4} \cdot \frac{4}{1} =$ _____	$\frac{11}{12} \cdot \frac{12}{11} =$ _____	_____ $\cdot \frac{17}{8} = 1$

Reading the Lesson

4. Write the Multiplication Property of Equality.
5. When the coefficient of x in an equation is a fraction, explain how the reciprocal, or multiplicative inverse, of the coefficient is used to solve the equation.

Helping You Remember

6. The word *inverse* comes from a Latin verb that means “to turn upside down.” How does this definition relate to the content of this lesson?

6-5

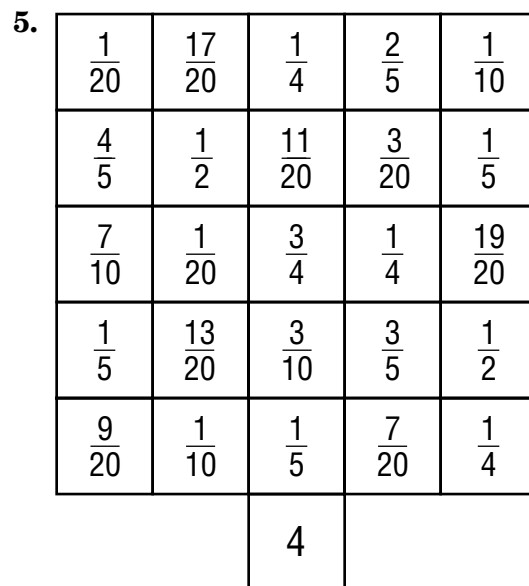
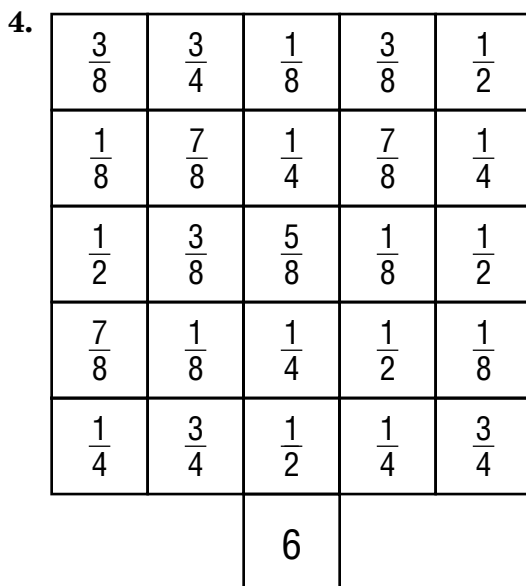
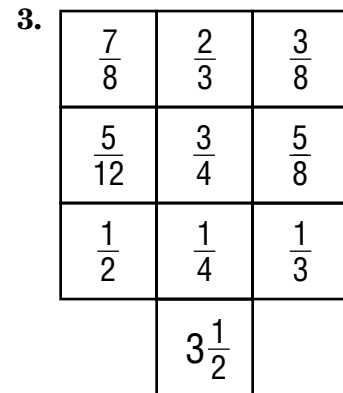
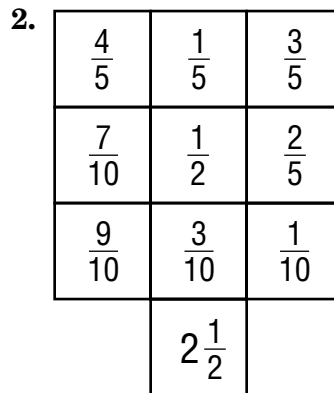
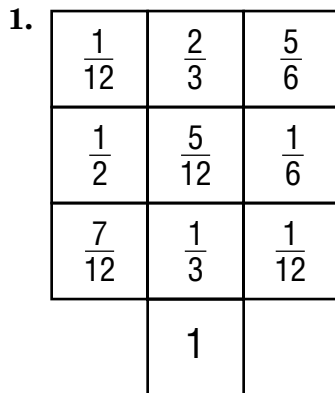
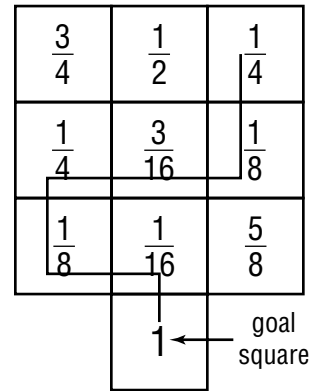
Enrichment

Trail Blazers

Each puzzle on this page is called a **trail blazer**. To solve it, you must find a trail that begins at any one of the small squares and ends at the goal square, following these rules.

1. The sum of all the fractions on the trail must equal the number in the goal square.
2. The trail can only go horizontally or vertically.
3. The trail cannot retrace or cross itself.

When you are solving a trail blazer, try to eliminate possibilities. For instance, in the puzzle at the right, you know that you cannot include $\frac{3}{4}$ using $\frac{3}{4} + \frac{1}{4} = 1$ because you can't reach the goal box. $\frac{3}{4} + \frac{1}{2} = 1\frac{1}{4}$ will not work either as the goal for the entire trail is only 1.



6-6**Study Guide and Intervention*****Dividing Fractions and Mixed Numbers***

To divide by a fraction, multiply by its multiplicative inverse or reciprocal.

To divide by a mixed number, rename the mixed number as an improper fraction.

EXAMPLE 1 Find $3\frac{1}{3} \div \frac{2}{9}$. Write in simplest form.

$$3\frac{1}{3} \div \frac{2}{9} = \frac{10}{3} \div \frac{2}{9}$$

$$= \frac{10}{3} \cdot \frac{9}{2}$$

$$= \frac{\cancel{10}^5}{\cancel{3}_1} \cdot \frac{\cancel{9}^3}{\cancel{2}_1}$$

$$= 15$$

Rename $3\frac{1}{3}$ as an improper fraction.

Multiply by the reciprocal of $\frac{2}{9}$, which is $\frac{9}{2}$.

Divide out common factors.

Multiply.

EXERCISES

Divide. Write in simplest form.

1. $\frac{2}{3} \div \frac{1}{4}$

2. $\frac{2}{5} \div \frac{5}{6}$

3. $\frac{1}{2} \div \frac{1}{5}$

4. $5 \div \frac{1}{2}$

5. $\frac{5}{8} \div 10$

6. $7\frac{1}{3} \div 2$

7. $\frac{5}{6} \div 3\frac{1}{2}$

8. $36 \div 1\frac{1}{2}$

9. $2\frac{1}{2} \div 10$

10. $5\frac{2}{5} \div 1\frac{4}{5}$

11. $6\frac{2}{3} \div 3\frac{1}{9}$

12. $4\frac{1}{4} \div \frac{3}{8}$

13. $4\frac{6}{7} \div 2\frac{3}{7}$

14. $12 \div 2\frac{1}{2}$

15. $4\frac{1}{6} \div 3\frac{1}{6}$

6-6**Practice: Skills*****Dividing Fractions and Mixed Numbers***

Divide. Write in simplest form.

1. $\frac{1}{6} \div \frac{1}{5}$

2. $5 \div \frac{3}{5}$

3. $\frac{6}{7} \div \frac{1}{7}$

4. $\frac{3}{4} \div \frac{1}{2}$

5. $8 \div \frac{1}{3}$

6. $\frac{1}{5} \div \frac{1}{4}$

7. $7 \div \frac{3}{7}$

8. $\frac{4}{7} \div \frac{8}{9}$

9. $8\frac{1}{3} \div 5$

10. $\frac{9}{7} \div \frac{3}{14}$

11. $\frac{12}{5} \div \frac{3}{10}$

12. $5 \div 3\frac{3}{4}$

13. $6\frac{4}{5} \div 17$

14. $7\frac{1}{3} \div 4$

15. $\frac{3}{4} \div 5\frac{1}{2}$

16. $\frac{2}{7} \div 1\frac{13}{14}$

17. $\frac{3}{8} \div 6\frac{1}{4}$

18. $7\frac{1}{2} \div 2\frac{5}{6}$

19. $3\frac{4}{9} \div 2\frac{1}{3}$

20. $2\frac{2}{3} \div 1\frac{1}{6}$

21. $4\frac{3}{4} \div 2\frac{1}{2}$

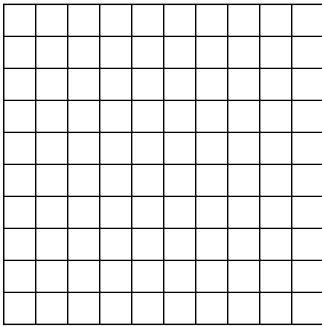
6-6**Practice: Word Problems*****Dividing Fractions and Mixed Numbers***

<p>1. PUPPETS If a puppet requires $\frac{3}{4}$ yards of material, how many puppets can be made from 9 yards of material?</p>	<p>2. COOKING A batch of cookies requires $1\frac{1}{2}$ cups of sugar. How many batches can Ty make with $7\frac{1}{2}$ cups of sugar?</p>
<p>3. FOOD Julia has $3\frac{1}{2}$ pounds of dog food. She plans to split it equally among her 7 dogs. How much will dog food will each dog receive?</p>	<p>4. SNOW CONES Roger has a 28-pound block of ice for his snow cone stand. If each snow cone requires $\frac{2}{3}$ pound of ice, how many snow cones can Roger make?</p>
<p>5. APPLES Juan took 6 apples and cut each into one-eighths. How many pieces of apple did he have?</p>	<p>6. VACATION The Torres family drove 1,375 miles during their $6\frac{1}{4}$-day vacation. Find the average number of miles they traveled each day.</p>
<p>7. RUNNING Hugo just joined the cross-country team and can run at a rate of $\frac{1}{7}$ mile each minute. How long will it take him to run a 5-mile race?</p>	<p>8. LUMBER Mrs. Shin has a piece of lumber that is $11\frac{5}{8}$ inches wide. She plans to split the width of lumber into 3 equal pieces. How wide will each piece be?</p>

6-6**Reading to Learn Mathematics*****Dividing Fractions and Mixed Numbers***

Pre-Activity Complete the Mini Lab at the top of page 264 in your textbook. Write your answers below.

- How many thirds are in 2 units?
- What is $2 \div \frac{1}{3}$?
- Draw a model to show $3 \div \frac{1}{2}$.



- What is $3 \div \frac{1}{2}$?

Reading the Lesson

- How does dividing a number by a fraction involve multiplication?
- Rewrite each of the following division expressions as multiplication expressions.

a. $\frac{7}{8} \div \frac{2}{3}$

b. $14 \div 3\frac{2}{5}$

c. $\frac{5}{6} \div 2\frac{1}{4}$

d. $2\frac{1}{3} \div 1\frac{1}{6}$

Helping You Remember

- To divide a mixed number by another mixed number can take up to 5 steps. List the steps in order.

6-6**Enrichment****Continued Fractions**

The expression at the right is an example of a *continued fraction*. Although continued fractions may look complicated, they are just a combination of addition and division. Here is one way to simplify a continued fraction.

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{9}}}$$

$$\begin{aligned} 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{9}}} &= 1 + \left[1 \div \left(1 + \left[1 \div \left(1 + \frac{1}{9} \right) \right] \right) \right] \\ &= 1 + \left[1 \div \left(1 + \left[1 \div \frac{10}{9} \right] \right) \right] \\ &= 1 + \left[1 \div \left(1 + \frac{9}{10} \right) \right] \\ &= 1 + \left[1 \div \frac{19}{10} \right] \\ &= 1 + \frac{10}{19} \\ &= \frac{29}{19} \end{aligned}$$

Write each continued fraction as an improper fraction.

1. $1 + \frac{1}{3 + \frac{1}{3}}$

2. $2 + \frac{1}{2 + \frac{1}{2}}$

3. $1 + \frac{2}{3 + \frac{2}{3}}$

4. $1 + \frac{3}{3 + \frac{1}{4}}$

5. $5 + \frac{1}{1 + \frac{1}{5}}$

6. $2 + \frac{2}{2 + \frac{2}{5}}$

7. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}$

8. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{3}}}$

9. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{5}}}$

10. $2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2}}}$

11. $3 + \frac{1}{3 + \frac{2}{1 + \frac{1}{3}}}$

12. $6 + \frac{1}{1 + \frac{1}{3 + \frac{1}{3}}}$

6-7**Study Guide and Intervention****Measurement: Changing Customary Units**

Customary Units		
Length	Weight	Capacity
1 foot (ft) = 12 inches (in.)	1 pound (lb) = 16 ounces (oz)	1 cup (c) = 8 fluid ounces (fl oz)
1 yard (yd) = 3 feet	1 ton (T) = 2,000 pounds	1 pint (pt) = 2 cups
1 mile (mi) = 5,280 feet		1 quart (qt) = 2 pints
		1 gallon (gal) = 4 quarts

EXAMPLE 1 $5\frac{1}{2}$ lb = ? oz

To change from larger units to smaller units, multiply.

$$5\frac{1}{2} \times 16 = 88$$

Since 1 pound is 16 ounces, multiply by 16.

$$5\frac{1}{2} \text{ pounds} = 88 \text{ ounces}$$

EXAMPLE 2 28 fl oz = ? c

To change from smaller units to larger units, divide.

$$28 \div 8 = 3\frac{1}{2}$$

Since 8 fluid ounces are in 1 cup, divide by 8.

$$28 \text{ fluid ounces} = 3\frac{1}{2} \text{ cups}$$

EXERCISES**Complete.**

1. 5 lb = _____ oz

2. 48 in. = _____ ft

3. 6 yd = _____ ft

4. 7 qt = _____ pt

5. 8,000 lb = _____ T

6. $3\frac{1}{4}$ mi = _____ ft

7. 4 c = _____ fl oz

8. 6 c = _____ pt

9. $\frac{1}{2}$ gal = _____ qt

10. 3 ft = _____ in.

11. 9 qt = _____ gal

12. 30 fl oz = _____ c

13. 6,864 ft = _____ mi

14. 40 oz = _____ lb

15. 9 pt = _____ c

16. 18 ft = _____ yd

17. 11 pt = _____ qt

18. $2\frac{3}{4}$ T = _____ lb

6-7**Practice: Skills****Measurement: Changing Customary Units****Complete.**

1. 3 lb = _____ oz

2. 16 qt = _____ gal

3. 24 in. = _____ ft

4. 12 ft = _____ yd

5. 3 mi = _____ ft

6. 12,000 lb = _____ T

7. 64 oz = _____ lb

8. 6 pt = _____ qt

9. 3 pt = _____ c

10. $5\frac{1}{2}$ ft = _____ in.

11. 22 yd = _____ ft

12. $\frac{1}{4}$ mi = _____ ft

13. 15 T = _____ lb

14. 7 lb = _____ oz

15. $8\frac{1}{2}$ qt = _____ pt

16. 5 gal = _____ qt

17. 8 c = _____ pt

18. 16 in = _____ ft

19. 24 fl oz = _____ c

20. 60 ft = _____ yd

21. 6,600 ft = _____ mi

22. 7.5 T = _____ lb

23. 88 oz = _____ lb

24. 70 qt = _____ gal

6-7**Practice: Word Problems****Measurement: Changing Customary Units**

<p>1. WEIGHT The average weight of a baby at birth is 7 pounds. How many ounces is this?</p>	<p>2. WATERFALLS The height of Niagara Falls is 182 feet. How many yards high is it?</p>
<p>3. GASOLINE The gasoline tank of a minivan holds 18 gallons. How many quarts is this?</p>	<p>4. TELEPHONES Portable telephones can weigh as little as 8 ounces. How many pounds is this?</p>
<p>5. RECIPE A recipe for ice cream calls for 56 fluid ounces of milk. How many cups of milk is this?</p>	<p>6. STATUE The Statue of Liberty weighs 450,000 pounds. How many tons is this?</p>
<p>7. TUNNEL The Ted Williams Tunnel under Boston Harbor is 8,448 feet long. How many yards is this?</p>	<p>8. COAL The United States exports over 200 billion pounds of coal. How many tons is this?</p>

6-7**Reading to Learn Mathematics****Measurement: Changing Customary Units**

Pre-Activity *Read the introduction at the top of page 267 in your textbook. Write your answers below.*

1. There are 2,000 pounds in 1 ton. How many pounds are in 150 tons?
2. What operation did you use to find the weight in pounds? Explain.

Reading the Lesson

3. To the right of each customary unit write its abbreviation.

inch	mile	ton	pint
foot	ounce	fluid ounce	quart
yard	pound	cup	gallon

Complete each sentence.

4. To convert from larger units to smaller units, _____ .
5. To convert from smaller units to larger units, _____ .

Helping You Remember

6. Complete the table.

Customary Units of Length	Customary Units of Weight	Customary Units of Capacity
1 foot = _____ inches	1 pound = _____ ounces	1 cup = _____ fluid ounces
1 yard = _____ feet	1 ton = _____ pounds	1 pint = _____ cups
1 mile = _____ feet	1 gallon = _____ quarts	1 quart = _____ pints

6-7**Enrichment****Changing Measurements with Factors of 1**

Multiplying an expression by the number 1 does not change its value. This property of multiplication can be used to change measurements.

Let's say you wanted to change 4.5 hours to seconds. Start by multiplying 4.5 by the number 1 written in the form $\frac{60 \text{ minutes}}{1 \text{ hour}}$. This first step changes 4.5 hours to minutes.

$$4.5 \text{ hours} \times \frac{60 \text{ minutes}}{1 \text{ hour}}$$

Now, multiply by the number 1 again. This time use the fact that

$$1 = \frac{60 \text{ seconds}}{1 \text{ minute}}$$

$$4.5 \cancel{\text{ hours}} \times \frac{60 \cancel{\text{ minutes}}}{1 \cancel{\text{ hour}}} \times \frac{60 \text{ seconds}}{1 \cancel{\text{ minute}}} = 16,200 \text{ seconds}$$

Complete by writing the last factor and the answer. You may need to use a table of measurements to find the factors.

1. Change 5 pints to fluid ounces.

$$5 \text{ pints} \times \frac{2 \text{ cups}}{1 \text{ pint}} \times$$

2. Change 0.8 miles to inches.

$$0.8 \text{ mile} \times \frac{5,280 \text{ feet}}{1 \text{ mile}} \times$$

3. Change 4 square yards to square inches.

$$4 \text{ yd}^2 \times \frac{9 \text{ ft}^2}{1 \text{ yd}^2} \times$$

4. Change 12 bushels to pints.

$$12 \text{ bushels} \times \frac{4 \text{ pecks}}{1 \text{ bushel}} \times \frac{8 \text{ quarts}}{1 \text{ peck}} \times$$

5. Change one-half of an acre to square inches.

$$\frac{1}{2} \text{ acre} \times \frac{4,840 \text{ yd}^2}{1 \text{ acre}} \times \frac{9 \text{ ft}^2}{1 \text{ yd}^2} \times$$

6-8**Study Guide and Intervention****Geometry: Perimeter and Area**

The distance around a geometric figure is called the **perimeter**.

To find the perimeter of any geometric figure, add the measures of its sides.

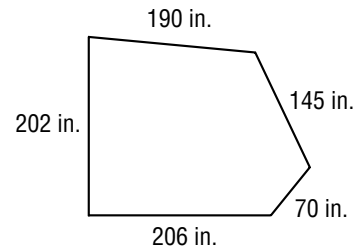
The perimeter of a rectangle is twice the length ℓ plus twice the width w .

$$P = 2\ell + 2w$$

EXAMPLE 1 Find the perimeter of the figure at the right.

$$\begin{aligned} P &= 145 + 70 + 206 + 202 + 190 \\ &= 813 \end{aligned}$$

The perimeter is 813 inches.



The measure of the surface enclosed by a geometric figure is called the **area**.

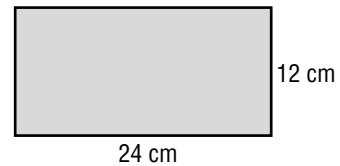
The area of a rectangle is the product of the length ℓ and width w .

$$A = \ell \cdot w$$

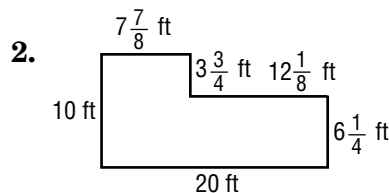
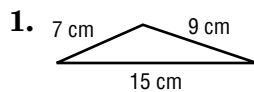
EXAMPLE 2 Find the area of the rectangle.

$$\begin{aligned} A &= \ell \cdot w \\ &= 24 \cdot 12 \\ &= 288 \end{aligned}$$

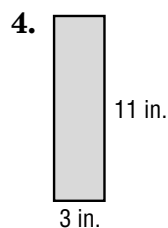
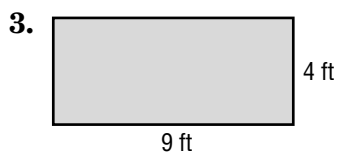
The area is 288 square centimeters.

**EXERCISES**

Find the perimeter of each figure.



Find the perimeter and area of each rectangle.



5. $\ell = 8$ ft, $w = 5$ ft

6. $\ell = 3.5$ m, $w = 2$ m

7. $\ell = 8$ yd, $w = 4\frac{1}{3}$ yd

8. $\ell = 29$ cm, $w = 7.3$ cm

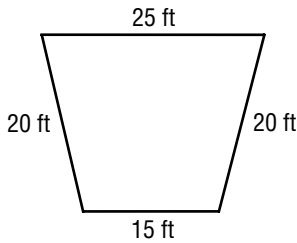
6-8

Practice: Skills

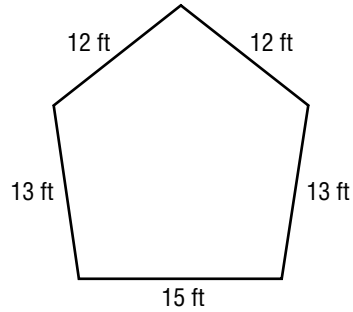
Geometry: Perimeter and Area

Find the perimeter of each figure.

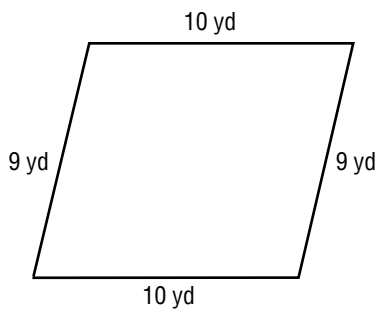
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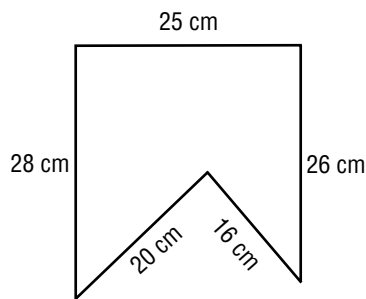
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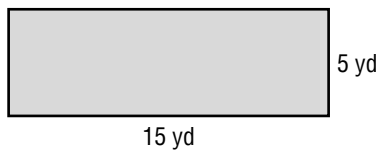


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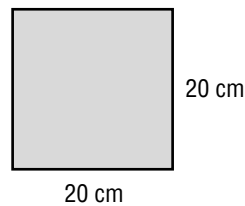


Find the perimeter and area of each rectangle.

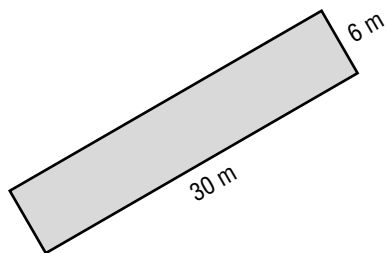
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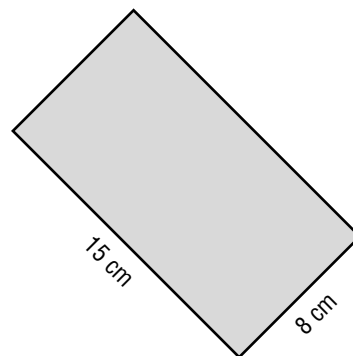
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7.



8.



9. $\ell = 6$ yd, $w = 4$ yd

10. $\ell = 8.2$ m, $w = 7.1$ m

11. $\ell = 50$ in., $w = 10$ in.

12. $\ell = 10$ cm, $w = 4\frac{1}{2}$ cm

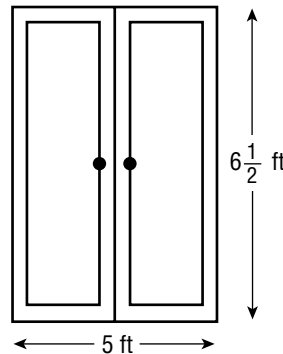
13. $\ell = 4.5$ ft, $w = 3$ ft

14. $\ell = 7\frac{1}{2}$ mm, $w = 6\frac{3}{8}$ mm

6-8**Practice: Word Problems****Geometry: Perimeter and Area**

1. PYRAMID The Great Pyramid in Egypt has a square base with sides 230 meters long. Find the perimeter and area of the base of the Great Pyramid.

2. WINDOWS Mrs. Johnson was planning to caulk around the frame of her patio doors that measure 5 feet by $6\frac{1}{2}$ feet. In order to help her to know how much caulk to buy, find the perimeter of the doors.



3. PENTAGON The Pentagon is a five-sided building that houses the U.S. Department of Defense in Arlington, Virginia. If each side of the Pentagon measures 921 feet, what is the walking distance around its exterior?

4. FENCING Mr. Lao is planning to build a rectangular cattle pen that measures 50 feet by 75 feet. Find the total length of fencing that he will need to purchase.

5. CARPET Mr. Yuji plans on buying carpet for his bedroom that measures 12 feet by 12 feet. So he will know how much carpet to buy, find the area of his bedroom.

6. BORDER Mrs. Jackson is going to put up a wallpaper border along the top of the walls in her dining room. If the dining room measures 16 meters by 12 meters, how much border should she buy?

7. LOBBY A hotel lobby measures 40 yards by 60 yards. Find the area and perimeter of the lobby's floor.

8. MURAL An artist painted a mural measuring 9 feet by $20\frac{1}{2}$ feet. Find the area and perimeter of the mural.

6-8**Reading to Learn Mathematics*****Geometry: Perimeter and Area***

Pre-Activity *Read the introduction at the top of page 270 in your textbook. Write your answers below.*

1. If you walked around the outer edge of the entire park, how far would you walk?
2. Describe how you found the distance.
3. Explain how you can use both multiplication and addition to find the distance.

Reading the Lesson

4. Why can't you use the formula $2\ell + 2w$ to find the perimeter of an irregular figure?
5. How is the perimeter of a figure different from the area of the figure?
6. Explain how to find the perimeter and area of a rectangle whose length is 8 feet and whose width is 2 feet.

Helping You Remember

7. The word *perimeter* comes from two Greek words that mean "a measure (*metron*) around (*peri*).” Tell how you can find the perimeter of a rectangle.

6-8**Enrichment****Squares and Rectangles**

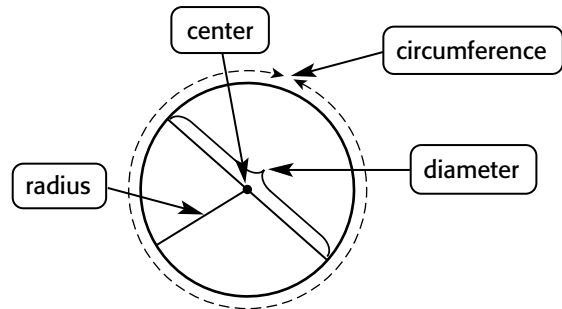
The perimeter and area of a square are found by using the formulas $P = 4s$ and $A = s^2$. The perimeter and area of a rectangle are found by using formulas $P = 2\ell + 2w$ and $A = \ell w$.

Use these formulas to help answer the following questions.

1. A piece of rope 72 inches long must be cut into two pieces. Each piece of rope will be used to form a square. Where should the rope be cut if the perimeter of one square must be $\frac{1}{3}$ of the perimeter of the other square?
2. A piece of rope 60 inches long must be cut into two pieces. Each piece of rope will be used to form a rectangle. Where should the rope be cut if the perimeter of one rectangle must be twice as great as the perimeter of the other rectangle?
3. A piece of rope 100 inches long must be cut into two pieces. Each piece of rope will be used to form a square. Where should the rope be cut if the sides of one square must be 4 inches longer than the sides of the other square?
4. A piece of rope 80 centimeters long must be cut into two pieces. Each piece of rope will be used to form a rectangle. Where would the rope be cut if the area of one rectangle must be $\frac{1}{4}$ of the area of the other rectangle?
5. A piece of rope 144 inches long must be cut into two pieces. Each piece of rope will be used to form a square. Where should the rope be cut if the area of one square must be 9 times greater than the area of the other square?

6-9**Study Guide and Intervention****Geometry: Circles and Circumference**

A **circle** is the set of all points in a plane that are the same distance from a given point, called the **center**. The **diameter** d is the distance across the circle through its center. The **radius** r is the distance from the center to any point on the circle. The **circumference** C is the distance around the circle. The circumference C of a circle is equal to its diameter d times π , or 2 times its radius r times π .



EXAMPLE 1 Find the circumference of a circle with a diameter of 7.5 centimeters.

$$C = \pi d$$

$$C \approx 3.14 \times 7.5 \quad \text{Use 3.14 for } \pi.$$

$$C \approx 23.55 \quad \text{The circumference of the circle is about 23.55 centimeters.}$$

EXAMPLE 2 If the radius of a circle is 14 inches, what is its circumference?

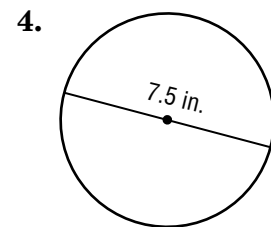
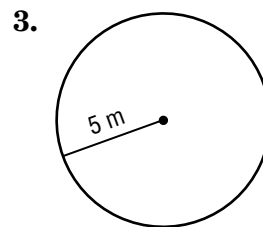
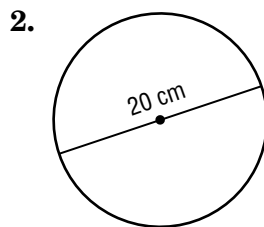
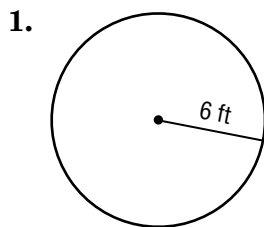
$$C = 2\pi r$$

$$C \approx 2 \times \frac{22}{7} \times 14 \quad \text{Use } \frac{22}{7} \text{ for } \pi.$$

$$C \approx 88 \quad \text{The circumference of the circle is about 88 inches.}$$

EXERCISES

Find the circumference of each circle. Use 3.14 or $\frac{22}{7}$ for π . Round to the nearest tenth if necessary.



5. diameter = 15 km

6. radius = 21 mi

7. radius = 50 m

8. diameter = 600 ft

9. radius = 62 mm

10. diameter = 7 km

11. radius = 95 in.

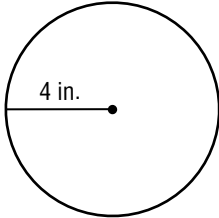
12. diameter = 6.3 m

13. diameter = $5\frac{1}{4}$ cm

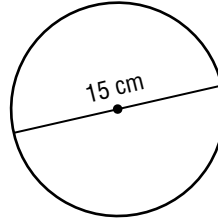
6-9**Practice: Skills****Geometry: Circles and Circumference**

Find the circumference of each circle. Use 3.14 or $\frac{22}{7}$ for π . Round to the nearest tenth if necessary.

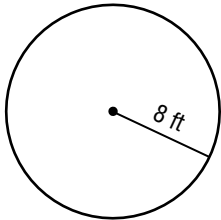
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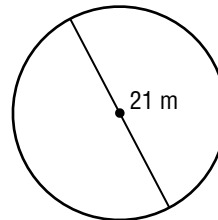
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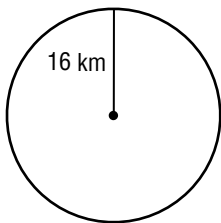
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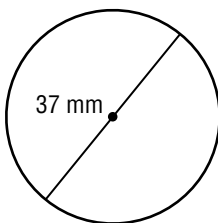
4.



5.



6.



7. radius = 3 km

8. radius = 46 cm

9. diameter = 30 in.

10. diameter = 25 m

11. radius = 5 ft

12. diameter = $9\frac{1}{2}$ in.

13. radius = $3\frac{1}{2}$ ft

14. diameter = 9.7 mm

15. radius = 5.2 km

16. diameter = 25 m

17. radius = 22 ft

18. diameter = 9.4 in.

19. radius = 100 m

20. radius = 65 mi

21. diameter = $10\frac{1}{2}$ in.

22. diameter = 8.5 cm

6-9**Practice: Word Problems****Geometry: Circles and Circumference**

<p>1. PLATES A manufacturing company is producing dinner plates with a diameter of 12 inches. They plan to put a gold edge on each plate. Determine how much gold edging they need for each plate by finding the circumference of each plate. Round to the nearest tenth.</p>	<p>2. MONEY A dime has a radius of $8\frac{1}{2}$ millimeters. Find the circumference of a dime to the nearest tenth.</p>
<p>3. MERRY-GO-ROUND Mr. Osterhout is putting trim around the edge of a circular merry-go-round that has a diameter of 15 feet. How much trim does he need to buy to the nearest tenth?</p>	<p>4. PIZZA Find the circumference of a pizza with a diameter of 10 inches. Round to the nearest tenth.</p>
<p>5. RACING A circular racetrack has a diameter of $\frac{1}{2}$ mile. How far does a car travel in one lap around the track? Round to the nearest tenth.</p>	<p>6. TIRE A bicycle tire has a radius of 15 inches. What is the circumference of the tire? Round to the nearest tenth.</p>
<p>7. EQUATOR Earth's diameter at the equator is 7,926 miles. Find the distance around Earth at its equator to the nearest tenth.</p>	<p>8. SATURN The ring system around Saturn has a diameter of 170,000 miles. Find the circumference of the ring system.</p>

6-9**Reading to Learn Mathematics*****Geometry: Circles and Circumference***

Pre-Activity *Read the introduction at the top of page 275 in your textbook. Write your answers below.*

1. Which point appears to be the center of the Ferris wheel?
2. Is the distance from G to F greater than, less than, or equal to the distance from G to J ?

Reading the Lesson

3. The Greek letter π represents a nonterminating and nonrepeating number. What does this mean?
4. When is the symbol \approx used when finding the circumference of a circle? Why is this symbol used?
5. What two numbers are used in this lesson as approximations for π ?

Helping You Remember

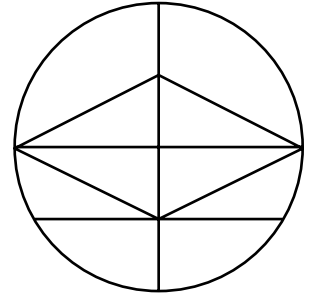
6. The word *diameter* comes from two Greek words that mean “a measure (*metron*) through (*dia*).” What is the diameter of a circle?
7. One of the definitions given for *radius* is *semidiameter*. Think of the relationship between radius and diameter. What do you think *semidiameter* means?

6-9

Enrichment

A Circle Puzzle

The circle at the right has been divided into ten pieces. Notice that the vertical diameter is marked off into four congruent segments.

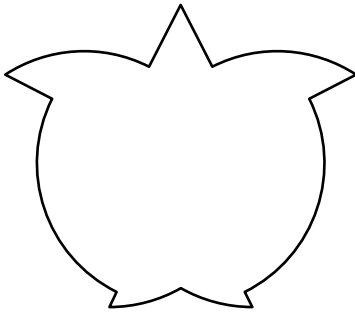


Trace the circle and cut it into ten parts to make a set of puzzle pieces.

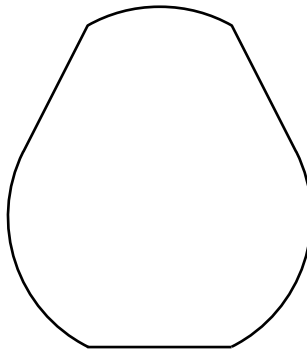
1. Separate the pieces and put them back together to form the circle. Try this first without looking at the solution.

The puzzle pieces can be used to make many shapes. Use all ten pieces to make each shape shown. Record your solutions.

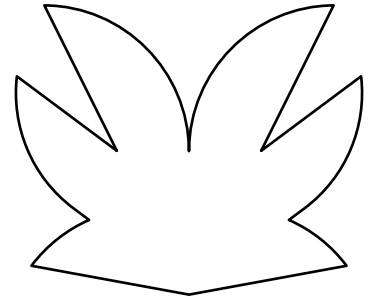
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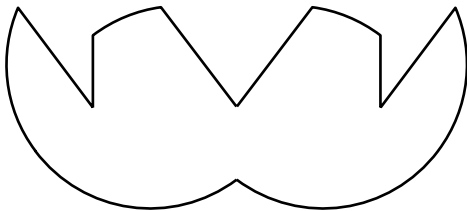
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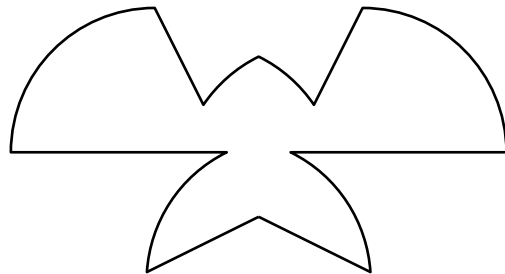
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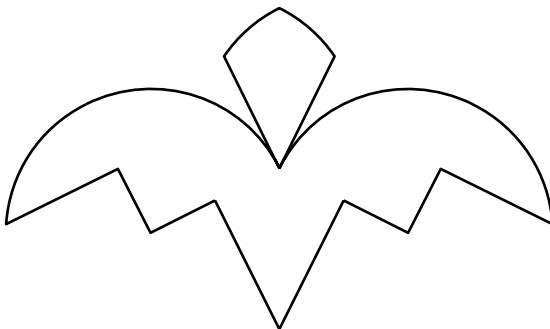
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