

Study Links

Common Core Units 7-9

Everyday Math Grade 5



Name: _____

Teacher: _____



Fractions and Ratios

In Unit 4, your child reviewed equivalent fractions. In this unit, we will apply this knowledge to compute with fractions and mixed numbers. Students will learn that the key to fraction computation with unlike denominators is to find common denominators.

Unit 8 also introduces fraction multiplication. Students will use folded paper to represent fractions of a whole. Then the class will study fraction multiplication using area models, which are diagrams that show a *whole* divided into parts. This concept building will lead to a rule for multiplying fractions:

$$\frac{a}{b} * \frac{c}{d} = \frac{a * c}{b * d}$$

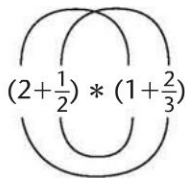
Example: $\frac{2}{5} * \frac{3}{4} = \frac{2 * 3}{5 * 4} = \frac{6}{20}$, or $\frac{3}{10}$

For mixed-number multiplication, students will rename the mixed numbers as fractions, then use the rule to multiply. Finally they rename the product as a mixed number.

Example: $2\frac{1}{2} * 1\frac{2}{3} = \frac{5}{2} * \frac{5}{3} = \frac{5 * 5}{2 * 3} = \frac{25}{6} = 4\frac{1}{6}$

Your child might want to use partial products to solve this problem:

$2\frac{1}{2} * 1\frac{2}{3}$ can be thought of as $(2 + \frac{1}{2}) * (1 + \frac{2}{3})$. There are 4 partial products, as shown below.



$$2 * 1 = 2$$

$$2 * \frac{2}{3} = \frac{4}{3}$$

$$\frac{1}{2} * 1 = \frac{1}{2}$$

$$\frac{1}{2} * \frac{2}{3} = \frac{2}{6}$$



Add the partial products: $2 + \frac{4}{3} + \frac{1}{2} + \frac{2}{6} = 2 + \frac{8}{6} + \frac{3}{6} + \frac{2}{6} = 2 + \frac{13}{6} = 4\frac{1}{6}$

Your child will play several games such as, *Build-It* and *Fraction Action*, *Fraction Friction*, to practice sorting fractions and adding fractions with unlike denominators.

Finally, as part of the American Tour, students will explore data related to population distribution and household sizes.

Please keep this Family Letter for reference as your child works through Unit 8.

Vocabulary

Important terms in Unit 8:

area model A model for multiplication problems in which the length and width of a rectangle represent the factors and the area represents the product.

discount The amount by which a price of an item is reduced in a sale, usually given as a fraction or percent of the original price, or as a “percent off.” For example, a \$4 item on sale for \$3 is discounted to 75% or $\frac{3}{4}$ of its original price. A \$10.00 item at 10% off costs \$9.00, or $\frac{1}{10}$ less than the usual price.

majority A number or amount that is more than half of a total number or amount.

quick common denominator The product of the denominators of two or more fractions. For example, the quick common denominator of $\frac{3}{4}$ and $\frac{5}{6}$ is $4 * 6 = 24$. In general, the quick common denominator of $\frac{a}{b}$ and $\frac{c}{d}$ is $b * d$.

unit fraction A fraction whose numerator is 1. For example, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{8}$, and $\frac{1}{20}$ are unit fractions. Unit fractions are especially useful in converting between measurement systems. For example, because 1 foot = 12 inches you can multiply a number of inches by $\frac{1}{12}$ to convert to feet.

unit percent One percent (1%).

Building Skills through Games

In Unit 8, your child will practice skills with fractions and other numbers by playing the following games. For detailed instructions of most games, see the *Student Reference Book*.

Build-It See *Student Reference Book*, p. 300. This game for partners requires a deck of 16 *Build-It* fraction cards. This game provides practice in comparing and ordering fractions.

Factor Captor See *Student Reference Book*, p. 306. Partners play this game with a calculator and paper and pencil. This game provides practice finding factors of a number.

Mixed-Number Spin See *Student Reference Book*, p. 322. Partners use a spinner to randomly select fractions and mixed numbers, used to complete number sentences. This game provides practice in adding and subtracting fractions and mixed numbers.

Frac-Tac-Toe See *Student Reference Book*, p. 274–276. This game for partners requires a deck of number cards 0–10 and a gameboard similar to a bingo card. The game provides practice converting between fractions, decimals, and percents.

Fraction Action, Fraction Friction See *Student Reference Book*, p. 312. This game for partners requires a set of 16 *Fraction Action*, *Fraction Friction* cards. The game provides practice adding fractions with unlike denominators.

Name That Number See *Student Reference Book*, p. 325. Partners play a card game. This game provides practice in using order of operations to write number sentences.

STUDY LINK
8•1

Comparing Fractions



Circle the greater fraction for each pair.

1. $\frac{3}{8}$ or $\frac{3}{6}$

2. $\frac{2}{3}$ or $\frac{2}{9}$

3. $\frac{4}{7}$ or $\frac{5}{6}$

4. $\frac{19}{20}$ or $\frac{4}{8}$

5. $\frac{11}{21}$ or $\frac{9}{17}$

6. $\frac{4}{7}$ or $\frac{6}{11}$

7. Explain how you got your answer for Problem 5.

Write the decimal equivalent for each fraction.

8. $\frac{3}{4} =$ _____

9. $\frac{2}{3} =$ _____

10. $\frac{5}{8} =$ _____

11. $\frac{7}{10} =$ _____

12. $\frac{11}{20} =$ _____

13. $\frac{21}{25} =$ _____

14. Explain how you can do Problem 10 without using a calculator.

Use $>$, $<$, or $=$ to make each number sentence true.

15. $\frac{1}{2} + \frac{5}{8}$ _____ 1

16. $\frac{2}{3} + \frac{2}{6}$ _____ 1

17. $\frac{7}{9} + \frac{3}{5}$ _____ 1

18. 1 _____ $\frac{6}{10} + \frac{5}{20}$

19. 1 _____ $\frac{3}{8} + \frac{4}{9}$

20. 1 _____ $\frac{6}{7} + \frac{1}{8}$

21. Explain how you found the answer to Problem 20.

Practice

22. $675 * 42 =$ _____

23. $28,350 \div 675 =$ _____

24. $67.5 - 0.42 =$ _____

25. $28,350 + 42 + 67.08 =$ _____

STUDY LINK
8•2

Adding Mixed Numbers



Rename each mixed number in simplest form.

1. $3\frac{6}{5} = \underline{4\frac{1}{5}}$

2. $\frac{16}{8} = \underline{\hspace{2cm}}$

3. $9\frac{5}{3} = \underline{\hspace{2cm}}$

4. $1\frac{7}{5} = \underline{\hspace{2cm}}$

5. $4\frac{6}{4} = \underline{\hspace{2cm}}$

6. $5\frac{10}{6} = \underline{\hspace{2cm}}$



Add. Write each sum as a whole number or mixed number in simplest form.

7. $3\frac{1}{4} + 2\frac{3}{4} = \underline{\hspace{2cm}}$

8. $4\frac{1}{5} + 3\frac{4}{5} = \underline{\hspace{2cm}}$

9. $9\frac{1}{3} + 4\frac{2}{3} = \underline{\hspace{2cm}}$

10. $3\frac{5}{7} + 8\frac{6}{7} = \underline{\hspace{2cm}}$

11. $\frac{15}{8} + 3\frac{3}{8} = \underline{\hspace{2cm}}$

12. $4\frac{2}{9} + 5\frac{5}{9} = \underline{\hspace{2cm}}$

Add.

13.
$$\begin{array}{r} 2\frac{5}{8} \\ + 6\frac{3}{4} \\ \hline \end{array}$$

14.
$$\begin{array}{r} 7\frac{1}{2} \\ + 3\frac{2}{3} \\ \hline \end{array}$$

15.
$$\begin{array}{r} 4\frac{6}{9} \\ + 3\frac{7}{12} \\ \hline \end{array}$$

16.
$$\begin{array}{r} 5\frac{3}{4} \\ + 2\frac{4}{5} \\ \hline \end{array}$$

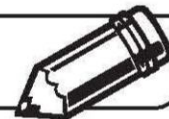
Practice

17. $3,540 \div 6 = \underline{\hspace{2cm}}$

18. $1,770 \div 3 = \underline{\hspace{2cm}}$

19. $7,080 / 12 = \underline{\hspace{2cm}}$

20. $(590 * 5) \div 2 = \underline{\hspace{2cm}}$

LESSON
8•2**Solving Mixed-Number Addition Problems**

Add. Write each sum as a mixed number in simplest form. Show your work.

1. $5\frac{1}{5} + 2\frac{4}{5} =$ _____

2. $3\frac{2}{5} + 5\frac{3}{10} =$ _____

3. $4\frac{3}{4} + 2\frac{1}{12} =$ _____

4. $4\frac{2}{3} + 2\frac{3}{4} =$ _____

5. Josiah was painting his garage. Before lunch, he painted $1\frac{2}{3}$ walls. After lunch, he painted another $1\frac{2}{3}$ walls. How many walls did he paint during the day?

6. Julie's mom made muffins for Julie and her friends to share. Julie ate $1\frac{3}{4}$ muffins. Her friends ate $3\frac{1}{2}$ muffins. How many muffins did Julie and her friends eat altogether?

Without adding the mixed numbers, insert $<$, $>$, or $=$. Explain how you got your answer.

7. $1\frac{3}{8} + 6\frac{2}{3}$ _____ 8

8. 5 _____ $2\frac{1}{5} + 2\frac{7}{8}$

STUDY LINK
8•3

Subtracting Mixed Numbers



Fill in the missing numbers.

1. $3\frac{3}{8} = 2\frac{\square}{8}$

2. $4\frac{5}{6} = \square\frac{11}{6}$

3. $2\frac{1}{9} = 1\frac{\square}{9}$

4. $6\frac{3}{7} = \square\frac{10}{7}$

5. $4\frac{3}{5} = 3\frac{\square}{5}$

6. $7\frac{2}{3} = \square\frac{\square}{3}$

Subtract. Write your answers in simplest form.

7.
$$\begin{array}{r} 5\frac{3}{4} \\ - 3\frac{1}{4} \\ \hline \end{array}$$

8.
$$\begin{array}{r} 6\frac{2}{3} \\ - 4\frac{1}{3} \\ \hline \end{array}$$

9.
$$\begin{array}{r} 5\frac{4}{5} \\ - 3\frac{3}{5} \\ \hline \end{array}$$

10. $4 - \frac{3}{8} = \underline{\hspace{2cm}}$

11. $6 - \frac{5}{9} = \underline{\hspace{2cm}}$

12. $5 - 2\frac{3}{10} = \underline{\hspace{2cm}}$

13. $7 - 4\frac{3}{4} = \underline{\hspace{2cm}}$

14. $3\frac{2}{5} - 1\frac{3}{5} = \underline{\hspace{2cm}}$

15. $4\frac{3}{8} - 3\frac{7}{8} = \underline{\hspace{2cm}}$

Practice

16. $654 * 205 = \underline{\hspace{2cm}}$

17. $654 * 502 = \underline{\hspace{2cm}}$

18. $654 * 250 = \underline{\hspace{2cm}}$

19. $654 * 520 = \underline{\hspace{2cm}}$

STUDY LINK
8•4

More Fraction Problems



1. Circle all the fractions below that are greater than $\frac{3}{4}$.

$$\frac{4}{5} \quad \frac{13}{20} \quad \frac{1}{2} \quad \frac{18}{25} \quad \frac{9}{12} \quad \frac{155}{200} \quad \frac{7}{11}$$

Rewrite each expression by renaming the fractions with a common denominator. Then decide whether the sum or difference is greater than $\frac{1}{2}$, less than $\frac{1}{2}$, or equal to $\frac{1}{2}$. Circle your answer.

2. $\frac{1}{10} + \frac{2}{7}$ _____ $> \frac{1}{2}$ $< \frac{1}{2}$ $= \frac{1}{2}$

3. $\frac{5}{6} - \frac{1}{4}$ _____ $> \frac{1}{2}$ $< \frac{1}{2}$ $= \frac{1}{2}$

4. $\frac{18}{20} - \frac{2}{5}$ _____ $> \frac{1}{2}$ $< \frac{1}{2}$ $= \frac{1}{2}$

5. $\frac{3}{4} - \frac{1}{3}$ _____ $> \frac{1}{2}$ $< \frac{1}{2}$ $= \frac{1}{2}$

Fraction Puzzle

6. Select and place three different numbers so the sum is as large as possible.

Procedure: Select three different numbers from this list: 1, 2, 3, 4, 5, 6.

◆ Write the same number in each square.

◆ Write a different number in the circle.

◆ Write a third number in the hexagon.

◆ Add the two fractions.

$$\frac{\square}{\bigcirc} + \frac{\hexagon}{\square} = \underline{\hspace{2cm}}$$

Example: $\frac{\boxed{2}}{\bigcirc(4)} + \frac{\hexagon(3)}{\boxed{2}} = \frac{8}{4} = 2$

Practice

7. $3 - 2.564 =$ _____

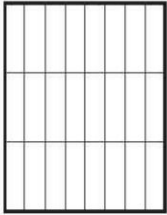
8. $3 * 2.564 =$ _____

9. $16 - 5.438 =$ _____

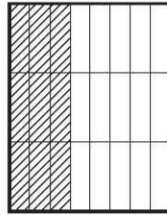
10. $3,049 / 15 =$ _____

STUDY LINK
8•5

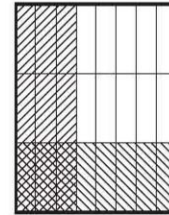
Fractions of a Fraction


Example:


The whole rectangle represents ONE.



Shade $\frac{3}{4}$ of the interior.



Shade $\frac{1}{3}$ of the interior in a different way.

The double shading shows that $\frac{1}{3}$ of $\frac{3}{4}$ is $\frac{3}{24}$, or $\frac{1}{8}$.

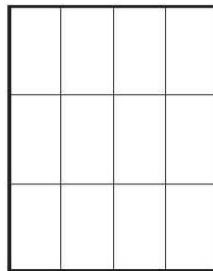
In each of the following problems, the whole rectangle represents ONE.

1. Shade $\frac{3}{4}$ of the interior.

Shade $\frac{1}{3}$ of the interior in a different way.

The double shading shows that

$\frac{1}{3}$ of $\frac{3}{4}$ is _____.

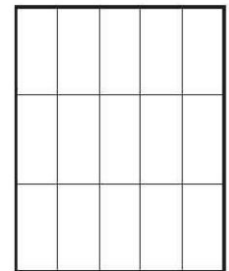


2. Shade $\frac{3}{5}$ of the interior.

Shade $\frac{2}{3}$ of the interior in a different way.

The double shading shows that

$\frac{2}{3}$ of $\frac{3}{5}$ is _____.

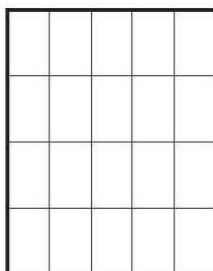


3. Shade $\frac{4}{5}$.

Shade $\frac{3}{4}$ of the interior in a different way.

The double shading shows that

$\frac{3}{4}$ of $\frac{4}{5}$ is _____.

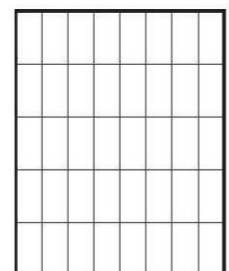


4. Shade $\frac{5}{8}$.

Shade $\frac{3}{5}$ of the interior in a different way.

The double shading shows that

$\frac{3}{5}$ of $\frac{5}{8}$ is _____.



5. Nina and Phillip cut Mr. Ferguson's lawn. Nina worked alone on her half, but Phillip shared his half equally with his friends, Ezra and Benjamin. What fraction of the earnings should each person get?

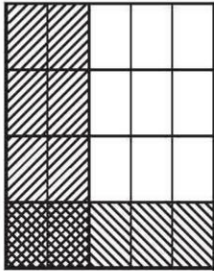
STUDY LINK
8•6

Multiplying Fractions

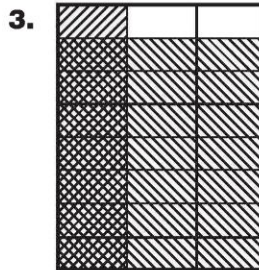
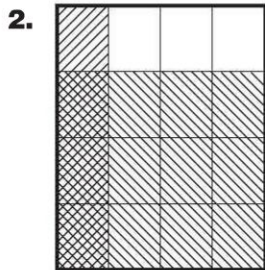
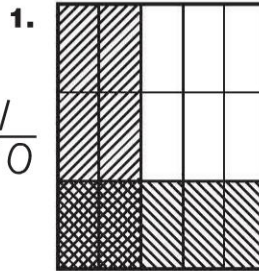


Write a number model for each area model.

Example:



$$\frac{1}{4} * \frac{2}{5} = \frac{2}{20}, \text{ or } \frac{1}{10}$$



Reminder: $\frac{a}{b} * \frac{c}{d} = \frac{a * c}{b * d}$

Multiply.

4. $\frac{3}{7} * \frac{2}{10} =$ _____

5. $\frac{5}{6} * \frac{2}{3} =$ _____

6. $\frac{1}{2} * \frac{1}{4} =$ _____

7. $\frac{4}{5} * \frac{3}{5} =$ _____

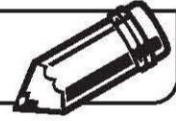
8. $\frac{2}{3} * \frac{3}{8} =$ _____

9. $\frac{1}{7} * \frac{5}{9} =$ _____

10. Matt is making cookies for the school fund-raiser. The recipe calls for $\frac{2}{3}$ cup of chocolate chips. He decides to triple the recipe. How many cups of chocolate chips does he need? _____ cups

11. The total number of goals scored by both teams in the field-hockey game was 15. Julie's team scored $\frac{3}{5}$ of the goals. Julie scored $\frac{1}{3}$ of her team's goals. How many goals did Julie's team score? _____ goals

How many goals did Julie score? _____ goals

LESSON
8•6
Fraction Problems


1. Ailene is baking corn bread. She will cover $\frac{3}{4}$ of the cornbread with cheese. Then she plans to give $\frac{2}{3}$ of the cornbread with cheese to her friend Alex.
 - a. Use the rectangle to show an area model for the problem.
 - b. Write an open number model for the problem. Choose a letter to stand for the portion that will be given to Alex. _____
 - c. Ailene will give _____ of the cornbread to Alex.

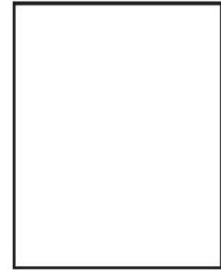
2. A recipe for granola bars calls for $\frac{1}{2}$ cup almonds. Cy is making $\frac{3}{4}$ of the recipe.
 - a. Write an open number model to show how many ounces of almonds Cy will use. _____
 - b. Cy will use _____ cup of almonds.

3. An ant weighs $\frac{1}{10}$ the weight of a crumb that it is carrying. Suppose the crumb weighs $\frac{3}{100}$ gram.
 - a. Write an open number model to show the weight of the ant in grams.

 - b. The ant weighs _____ gram.

4. Walker plans to hike a trail that is $\frac{8}{10}$ of a mile long. So far, he has walked $\frac{1}{4}$ that distance.
 - a. Write an open number model for the problem. _____
 - b. So far, Walker has walked _____ mi.

5. In Mrs. Ortiz's class, $\frac{9}{22}$ of the students are boys. Of the boys, $\frac{1}{9}$ are left-handed.
 - a. Write an open number model to show how to find what fraction of the class are left-handed boys. _____
 - b. _____ of the class are left-handed boys.



STUDY LINK
8•7
Multiplying Fractions and Whole Numbers


Use the fraction multiplication algorithm to calculate the following products.



1. $\frac{5}{3} * 9 =$ _____

2. $\frac{3}{8} * 12 =$ _____

3. $\frac{1}{8} * 5 =$ _____

4. $20 * \frac{3}{4} =$ _____

5. $\frac{5}{6} * 14 =$ _____

6. $27 * \frac{2}{9} =$ _____

7. Use the given rule to complete the table.

Rule
$\Delta = \square * 4$

in (\square)	out (Δ)
$\frac{2}{3}$	
$\frac{4}{5}$	
$\frac{8}{9}$	
$\frac{5}{4}$	
$\frac{7}{3}$	

8. What is the rule for the table below?

Rule

in (\square)	out (Δ)
2	$\frac{1}{2}$
3	$\frac{3}{4}$
$\frac{5}{6}$	$\frac{5}{24}$
$\frac{2}{3}$	$\frac{1}{6}$

9. Make and complete your own “What’s My Rule?” table on the back of this page.

STUDY LINK
8•8
Multiplying Fractions and Mixed Numbers


1. Multiply.

a. $5\frac{3}{4} * \frac{2}{6} =$ _____

b. $\frac{5}{8} * \frac{2}{5} =$ _____

c. $4\frac{1}{4} * \frac{5}{6} =$ _____

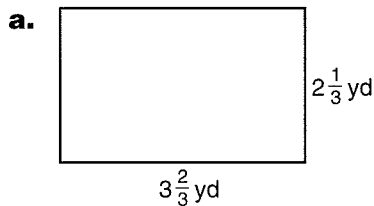
d. $2\frac{1}{3} * 3\frac{1}{8} =$ _____

e. $3\frac{1}{12} * 1\frac{3}{5} =$ _____

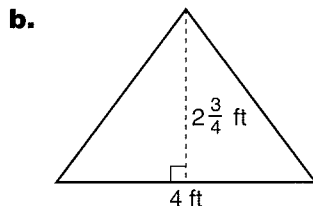
f. $2\frac{4}{5} * 3\frac{2}{8} =$ _____

2. Find the area of each figure below.

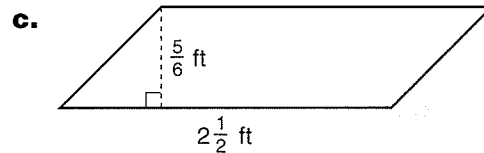
Area of a Rectangle $A = b * h$	Area of a Triangle $A = \frac{1}{2} * b * h$	Area of a Parallelogram $A = b * h$
------------------------------------	---	--



Area = _____ yd²



Area = _____ ft²



Area = _____ ft²

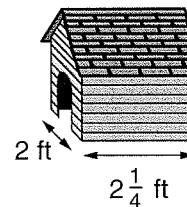
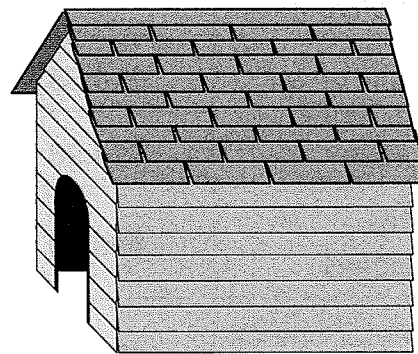
3. The dimensions of a large doghouse are $2\frac{1}{2}$ times the dimensions of a small doghouse.

a. If the width of the small doghouse is 2 feet, what is the width of the large doghouse?

_____ feet

b. If the length of the small doghouse is $2\frac{1}{4}$ feet, what is the length of the large doghouse?

_____ feet



STUDY LINK
8•9

Fractions, Decimals, and Percents



1. Complete the table so each number is shown as a fraction, decimal, and percent.



Fraction	Decimal	Percent
		45%
	0.3	
$\frac{2}{10}$		
	0.15	

2. Use your percent sense to estimate the discount for each item. Then calculate the discount for each item. (If necessary, round to the nearest cent.)

Item	List Price	Percent of Discount	Estimated Discount	Calculated Discount
Saguaro cactus with arms	\$400.00	25%		
Life-size wax figure of yourself	\$10,000.00	16%		
Manhole cover	\$78.35	10%		
Live scorpion	\$14.98	5%		
10,000 honeybees	\$29.00	30%		
Dinner for one on the Eiffel Tower	\$88.00	6%		
Magician's box for sawing a person in half	\$4,500.00	18%		
Fire hydrant	\$1,100.00	35%		

Source: *Everything Has Its Price*

STUDY LINK
8•10

Unit Fractions



Finding the worth of the unit fraction will help you solve each problem below.

1. If $\frac{4}{5}$ of a number is 16, what is $\frac{1}{5}$ of the number? _____

What is the number? _____

2. Our football team won $\frac{3}{4}$ of the games that it played. It won 12 games. How many games did it play? _____

(unit)

3. When a balloon had traveled 800 miles, it had completed $\frac{2}{3}$ of its journey. What was the total length of its trip? _____

(unit)

4. Grandpa baked cookies. Twenty cookies were oatmeal raisin. The oatmeal raisin cookies represent $\frac{5}{8}$ of all the cookies. How many cookies did Grandpa bake? _____

(unit)

5. Tiana jogged $\frac{6}{8}$ of the way to school in 12 minutes. If she continues at the same speed, how long will her entire jog to school take? _____

(unit)

6. After 35 minutes, Hayden had completed $\frac{7}{10}$ of his math test. If he has a total of 55 minutes to complete the test, do you think he will finish in time? _____

Explain: _____

7. Complete the table using the given rule. 8. Find the rule. Then complete the table.

Rule
out = 60% of in

in	out
100	
60	
	42
110	
	72
35	

Rule
out = _____ of in

in	out
24	9
72	27
56	21
80	30
	15
32	

STUDY LINK
8•11

Fraction Review



Write three equivalent fractions for each fraction.

1. $\frac{7}{8}$ _____

2. $\frac{3}{4}$ _____

3. $\frac{6}{12}$ _____

4. $\frac{2}{3}$ _____



Circle the fraction that is closer to $\frac{1}{2}$.

5. $\frac{3}{8}$ or $\frac{4}{5}$

6. $\frac{4}{7}$ or $\frac{5}{9}$

7. $\frac{7}{8}$ or $\frac{7}{9}$

8. $\frac{4}{10}$ or $\frac{7}{12}$

9. Explain how you found your answer for Problem 8.

Solve. Write your answers in simplest form.

10. _____ = $\frac{5}{6} + \frac{3}{4}$

11. $\frac{7}{9} - \frac{1}{6} =$ _____

12. $8 - \frac{2}{3} =$ _____

13. $\frac{7}{8} - \frac{1}{6} =$ _____

14. $\frac{3}{4}$ of $\frac{2}{5}$ is _____.

15. $4 * \frac{5}{6} =$ _____

Practice

16. $64,072 - 15,978 =$ _____

17. $2,297 \div 45 \rightarrow$ _____

18. $1,674 - 1,204 =$ _____

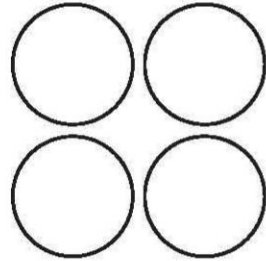
19. $326 + 684 + 934 =$ _____

STUDY LINK
8•12

Mixed-Number Review

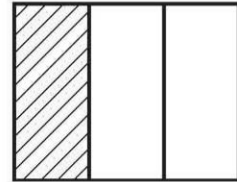


1. a. Four pizzas will each be cut into eighths. Show how they can be cut to find how many slices there will be in all.



b. The drawing shows that $4 \div \frac{1}{8} =$ _____, so there will be _____ slices in all.

2. a. Two families equally share $\frac{1}{3}$ of a garden. Show how they can divide their portion of the garden.



b. The drawing shows that $\frac{1}{3} \div 2 =$ _____, so each family gets _____ of the total garden.

Common Denominator Division

Step 1 Rename the numbers using a common denominator.

Step 2 Divide the numerators, and divide the denominators.

Solve. Show your work.

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

4. $\frac{4}{7} \div \frac{3}{5} =$ _____

5. $4\frac{1}{8} \div \frac{3}{4} =$ _____

6. $6\frac{2}{3} \div \frac{7}{9} =$ _____

Practice

7. $4\frac{1}{4} = 3\frac{\square}{4}$ _____

8. $\frac{\square}{5} = 3\frac{7}{5}$ _____

9. $1\frac{3}{5} + 2\frac{1}{5} =$ _____

10. $3\frac{3}{8} - 1\frac{5}{8} =$ _____

11. $7\frac{4}{9} - 5\frac{8}{9} =$ _____

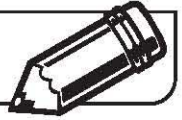
12. $3\frac{2}{7} + 1\frac{4}{5} =$ _____

13. $5\frac{2}{3} + 2\frac{3}{4} =$ _____

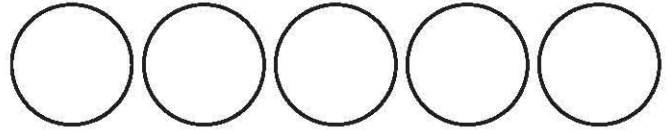
14. $4 - 1\frac{3}{4} =$ _____

15. $3 * 3\frac{3}{4} =$ _____

16. $4\frac{2}{3} * \frac{6}{7} =$ _____

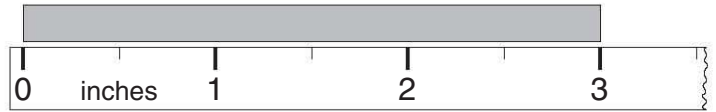
LESSON
8•12
Number Stories: Division with Fractions


1. Five pies will each be sliced into fourths. Ira would like to find out how many slices there will be in all.



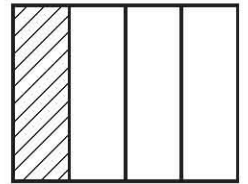
- a. Show how the pies will be cut.
- b. The drawings show that $5 \div \frac{1}{4} =$ _____, so there will be _____ slices in all.

2. Jake has a 3-inch strip of metal. He would like to find out how many $\frac{1}{2}$ -inch strips he can cut.



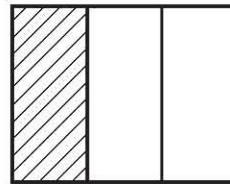
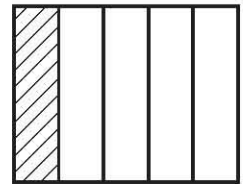
Jake can cut _____ strips. So, $3 \div \frac{1}{2} =$ _____.

3. Two students equally share $\frac{1}{4}$ of a granola bar. They would like to know how much of the bar each will get.



- a. Show how the piece of granola bar will be cut.
- b. The drawing shows that $\frac{1}{4} \div 2 =$ _____, so each student will get _____ of a granola bar.

4. a. Drawing A can be used to find $\frac{1}{3} \div 5$.
 Drawing B can be used to find $\frac{1}{3}$ of $\frac{1}{5}$,
 or $\frac{1}{3} * \frac{1}{5}$. Use the drawings to show
 that $\frac{1}{3} \div 5 = \frac{1}{3} * \frac{1}{5}$.


A

B

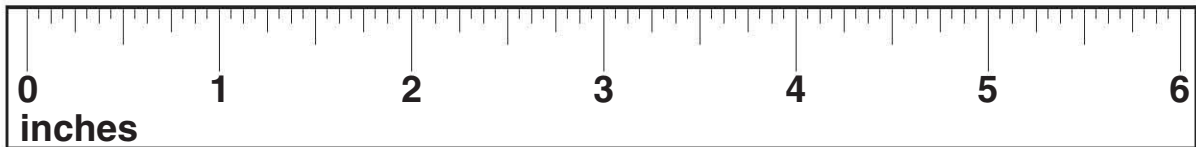
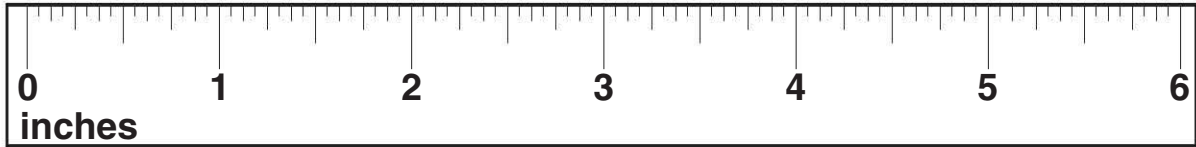
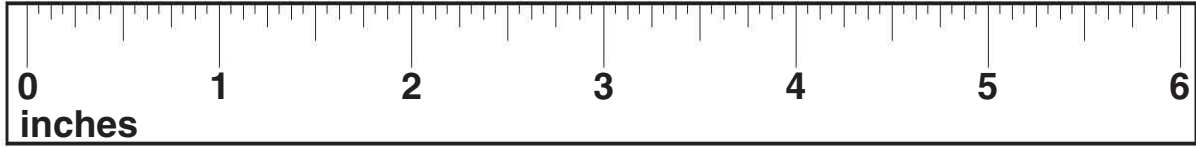
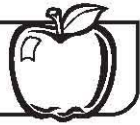
- b. Complete.

$$\frac{1}{3} * \frac{1}{5} = \underline{\hspace{2cm}}$$

$$\frac{1}{3} \div 5 = \underline{\hspace{2cm}}$$

$$\frac{1}{3} \div 5 = \frac{1}{3} * \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$$

Rulers



LESSON
8•13**Self Assessment**Progress
Check 8

Think about each skill listed below. Assess your own progress by checking the most appropriate box.

Skills	I can do this on my own and explain how to do it.	I can do this on my own.	I can do this if I get help or look at an example.
1. Convert among fractions, decimals, and percents.			
2. Find common denominators.			
3. Order and compare fractions.			
4. Use an algorithm to subtract mixed numbers with like denominators.			
5. Use an algorithm to add mixed numbers.			
6. Convert between fractions and mixed or whole numbers.			
7. Find a percent of a number.			
8. Use an algorithm to multiply fractions and mixed numbers.			



Coordinates, Area, Volume, and Capacity

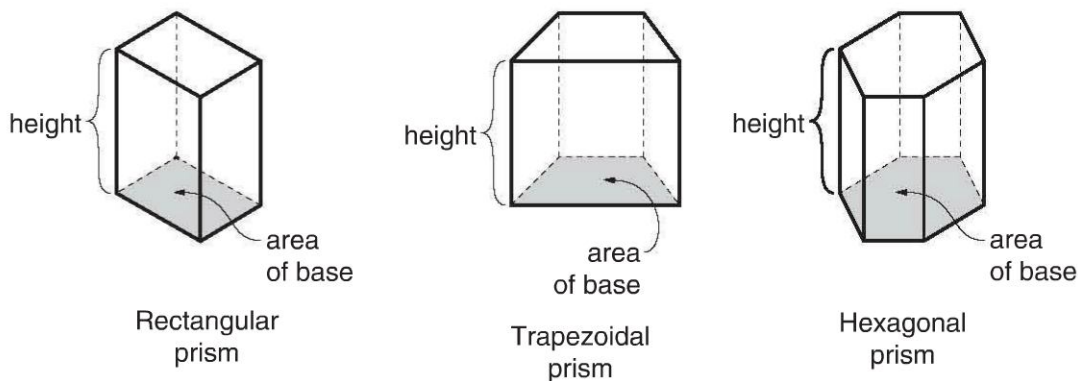
In the beginning of this unit, your child will practice naming and locating ordered number pairs on a coordinate grid. Whole numbers, fractions, and negative numbers will be used as coordinates. Your child will play the game *Hidden Treasure*, which provides additional practice with coordinates. You might want to challenge your child to a round.

In previous grades, your child studied the perimeters (distances around) and the areas (amounts of surface) of geometric figures. *Fourth Grade Everyday Mathematics* developed and applied formulas for the areas of rectangles, parallelograms, and triangles. In this unit, your child will review these formulas and explore new area topics, including the rectangle method for finding areas of regular and irregular shapes.

Students will also examine how mathematical transformations change the area, perimeter, and angle measurements of a figure. These transformations resemble changes and motions in the physical world. In some transformations, figures are enlarged in one or two dimensions; in other transformations, figures are translated (slid) or reflected (flipped over).

In the Earth's Water Surface exploration, students locate places on Earth with latitude and longitude. Then they use latitude and longitude in a sampling experiment that enables them to estimate, without measuring, the percent of Earth's surface that is covered by water. In the School's Land Area exploration, students use actual measurements and scale drawings to estimate their school's land area.

The unit concludes with a look at volume (the amount of space an object takes up) and capacity (the amount of material a container can hold). Students develop a formula for the volume of a prism (volume = area of the base * the height). They observe the metric equivalents 1 liter = 1,000 milliliters = 1,000 cubic centimeters, and they practice making conversions between U.S. customary measures (1 gallon = 4 quarts, and so on).



Please keep this Family Letter for reference as your child works through Unit 9.

Vocabulary

Important terms in Unit 9:

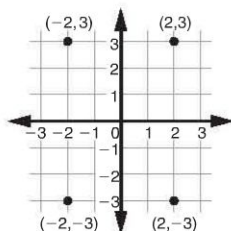
area The amount of surface inside a 2-dimensional figure. Area is measured in square units, such as square inches (in^2) and square centimeters (cm^2).

axis of a coordinate grid Either of the two number lines that intersect to form a coordinate grid.

capacity The amount of space occupied by a 3-dimensional shape. Same as *volume*. The amount a container can hold. Capacity is often measured in units such as *quarts*, *gallons*, *cups*, or *liters*.

coordinate A number used to locate a point on a number line, or one of two numbers used to locate a point on a coordinate grid.

coordinate grid A reference frame for locating points in a plane using ordered number pairs, or coordinates.



Rectangular coordinate grid

formula A general rule for finding the value of something. A formula is usually an equation with quantities represented by letter *variables*. For example, the formula for the area of a rectangle may be written as $A = \ell * w$, where A represents the area of the rectangle, ℓ represents the length, and w represents the width.

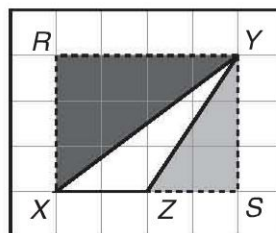
latitude A measure, in degrees, of the distance of a place north or south of the equator.

longitude A measure, in degrees, of how far east or west of the prime meridian a place is.

ordered number pair Two numbers that are used to locate a point on a *coordinate grid*. The first number gives the position along the horizontal axis; the second number gives the position along the vertical axis. Ordered number pairs are usually written inside parentheses: $(2, 3)$.

perpendicular Two lines or two planes that intersect at right angles. Line segments or rays that lie on perpendicular lines are perpendicular to each other. The symbol \perp means *is perpendicular to*.

rectangle method A method for finding area in which one or more rectangles are drawn around a figure or parts of a figure.



To find the area of triangle XYZ , first draw rectangle $XRYZ$ through its vertices. Then subtract the areas of the two shaded triangles from the area of rectangle $XRYZ$.

transformation Something done to a geometric figure that produces a new figure. Common transformations are translations (slides), reflections (flips), and rotations (turns).

volume The amount of space occupied by a 3-dimensional shape. Same as *capacity*. The amount a container can hold. Volume is usually measured in cubic units, such as cubic centimeters (cm^3), cubic inches (in^3), or cubic feet (ft^3).

Do-Anytime Activities

To work with your child on concepts taught in this unit, try these interesting and rewarding activities:

1. Find an atlas or map that uses letter-number pairs to locate places. For example, an atlas might say that Chattanooga, Tennessee, is located at D-9. Use the letter-number pairs to locate places you have visited or would like to visit.
2. Estimate the area of a room in your home. Use a tape measure or ruler to measure the room's length and width, and multiply to find the area. Make a simple sketch of the room, including the length, the width, and the area. If you can, find the area of other rooms or of your entire home.

Building Skills through Games

In Unit 9, your child will develop his or her understanding of coordinates and coordinate grids by playing the following games. For detailed instructions, see the *Student Reference Book*.

Frac-Tac-Toe See *Student Reference Book*, pages 309–311. Two players use a set of number cards 0–10 (4 of each), a gameboard, counters, and a calculator to play one of many versions. Students practice converting between fractions, decimals, and percents.

Hidden Treasure See *Student Reference Book*, page 319. This game for 2 players provides practice using coordinates and coordinate grids. It also offers the opportunity for players to develop good search strategies. Each player will need a pencil and two 1-quadrant playing grids with axes labeled from 0 to 10.

Polygon Capture See *Student Reference Book*, page 328. This game involves two to four players. Materials include polygon pieces and property cards. Players strengthen skills with identifying attributes of polygons. Players may also use 4-quadrant grids with axes labeled from –7 to 7. Practice is extended to coordinates and grids that include negative numbers.

STUDY LINK
9•1

Plotting Points



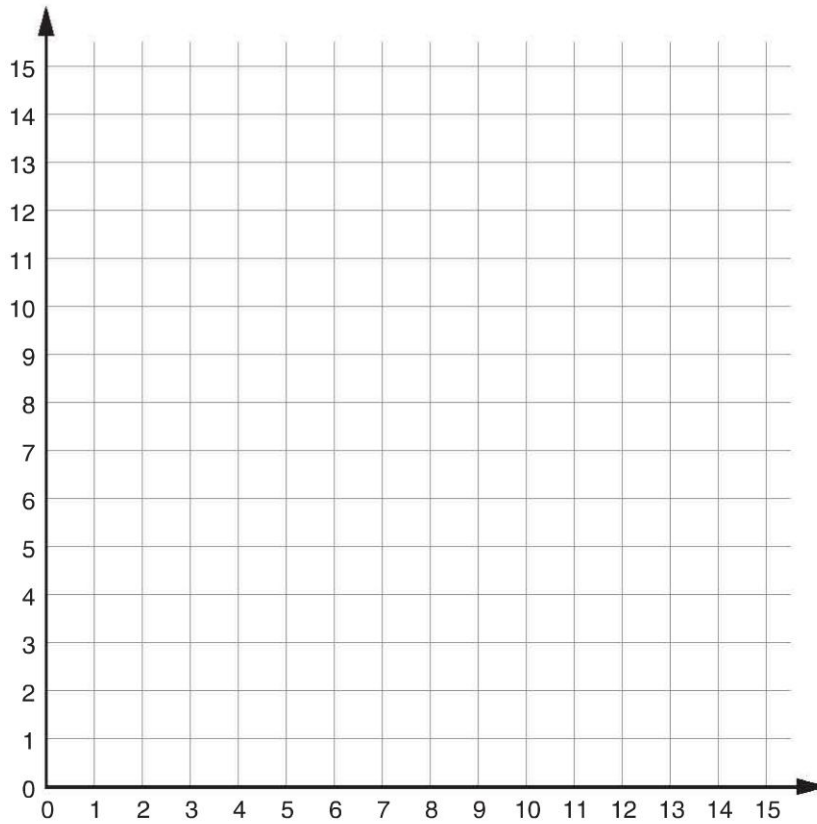
1. Plot the following points on the grid below. After you plot each point, draw a line segment to connect it to the last point you plotted.

Reminder: Use your straightedge!

(3,6); (11,11); (15,11); (15,7); (7,2); (3,2); (3,6); (7,6)

Draw a line segment connecting (7,6) and (7,2).

Draw a line segment connecting (7,6) and (15,11).



2. What 3-dimensional shape could this drawing represent? _____

3. a. What ordered pair would name the missing vertex to represent a prism? _____

b. Draw the missing vertex, and then add dashed lines for the missing edges.

Practice

4. $3,745 + 8,761 + 791 =$ _____

5. $3.745 + 87.61 + 781 =$ _____

6. $4\frac{3}{8} + 5\frac{7}{8} =$ _____

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

STUDY LINK
9•2

Plotting Figures on a Coordinate Grid



1. Plot three points, and make a triangle on the grid below. Label the points as *A*, *B*, and *C*. List the coordinates of the points you've drawn.

A: (____, ____) *B*: (____, ____) *C*: (____, ____)

2. Circle the name of the kind of triangle you drew.

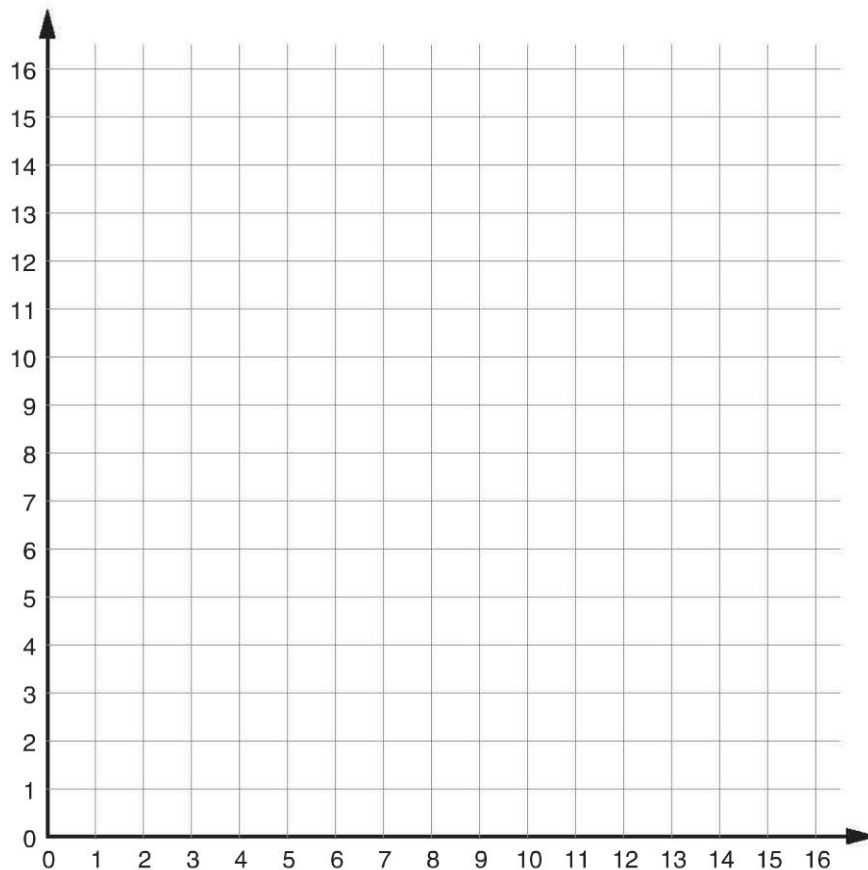
scalene equilateral isosceles

3. Plot four points, and make a parallelogram on the grid below. Label the points as *M*, *N*, *O*, and *P*. List the coordinates of the points you've drawn.

M: (____, ____) *N*: (____, ____) *O*: (____, ____) *P*: (____, ____)

4. Circle another name for the parallelogram you've drawn.

quadrangle rhombus rectangle square



STUDY LINK
9•3

Reflections on a Coordinate Grid

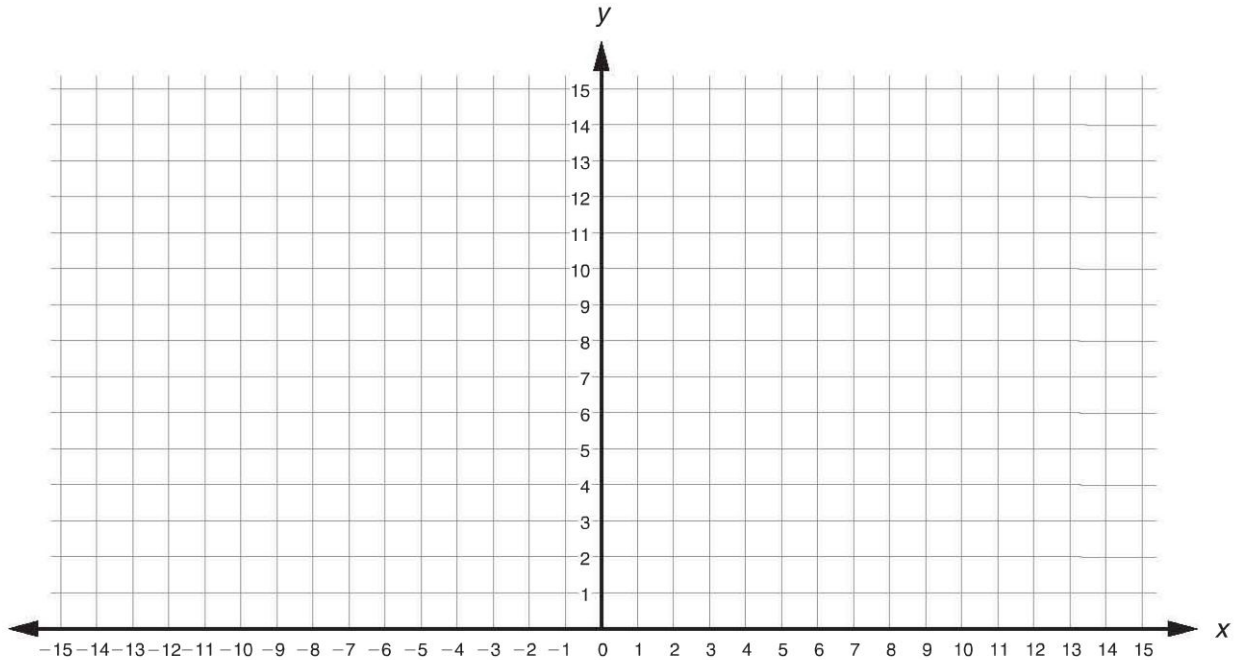


1. Plot the points listed below. Use a straightedge to connect the points in the same order that you plot them.

(6,0); (6,2); (5,3); (3,3); (3,6); (6,7); (7,10); (9,11); (11,11);
 (13,10); (13,3); (11,2); (11,0)

2. Which number (the first number or the second number) in the pair do you need to change to the opposite in order to draw the reflection of this design on the other side of the y -axis?

3. Draw the reflection described above. Plot the points and connect them.


Practice

Multiply.

4. $752 * 35 =$ _____

5. $75.2 * 0.35 =$ _____

6. $\frac{7}{8} * \frac{2}{3} =$ _____

7. $2\frac{1}{2} * \frac{3}{4} =$ _____

STUDY LINK
9•4

More Area Problems

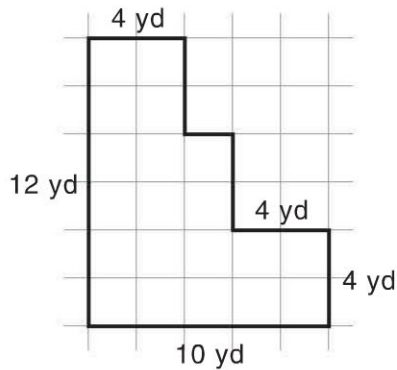


1. Rashid can paint 2 square feet of fence in 10 minutes. Fill in the missing parts to tell how long it will take him to paint a fence that is 6 feet high by 25 feet long. Rashid will be able to paint _____ of fence in _____ (hours/minutes)
- (area)

2. Regina wants to cover one wall of her room with wallpaper. The wall is 9 feet high and 15 feet wide. There is a doorway in the wall that is 3 feet wide and 7 feet tall. How many square feet of wallpaper will she need to buy?
- _____

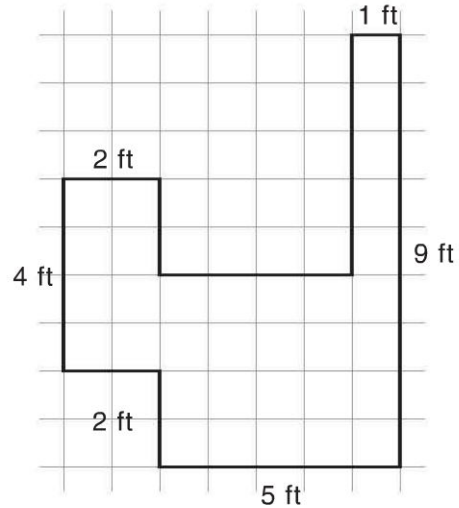
Calculate the areas for the figures below.

3.



Area = _____ yd^2

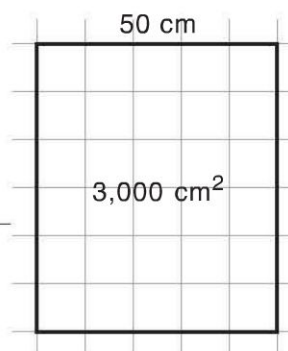
4.



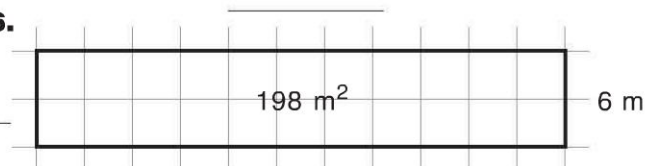
Area = _____ ft^2

Fill in the missing lengths for the figures below.

5.



6.



LESSON
9•4
Area: Tiling and Using a Formula


For each rectangle below, cut out a rectangle from the centimeter grid paper (*Math Masters*, page 436) that has the same dimensions. Follow the directions for each problem.

1. The length of the base of the rectangle is 6 cm and the height is $2\frac{1}{2}$ cm.

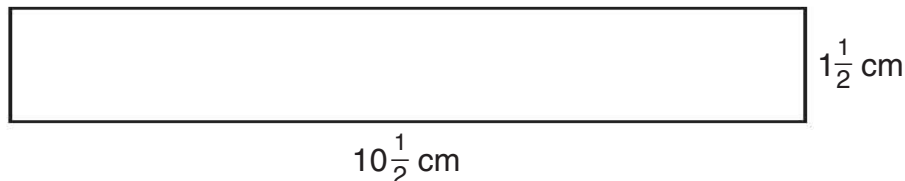


- a. Tape the centimeter grid over the rectangle, and then use the counting method to find the area of the rectangle. _____ cm^2
- b. Use the formula to write an open number model that can be used to find the area. _____
- c. Area = _____ cm^2

2. The length of the base of the rectangle below is $12\frac{1}{2}$ cm and the height is $2\frac{1}{2}$ cm.



- a. Tape the centimeter grid over the rectangle, and then use the counting method to find the area of the rectangle. _____ cm^2
- b. Use the formula to find the area. _____ cm^2
3. a. Use the formula to find the area of the rectangle below. _____ cm^2
- b. Tape the centimeter grid over the rectangle, and then use the counting method to find the area of the rectangle. _____ cm^2



- c. Explain why the formula and the counting method produce the same area.

STUDY LINK
9•5

The Rectangle Method



Use the rectangle method to find the area of each figure below.

	<p>Example:</p> $5 * 3 = 15$ $\frac{1}{2} \text{ of } 15 = 7.5$ <p>Area = <u>7.5</u> cm²</p>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">1 cm²</div>
<p>1. Area = _____ cm²</p>	<p>2. Area = _____ cm²</p>	
<p>3. Area = _____ cm²</p>	<p>4. Area = _____ cm²</p>	
<p>5. Area = _____ cm²</p>	<p>6. Area = _____ cm²</p>	

STUDY LINK
9•6

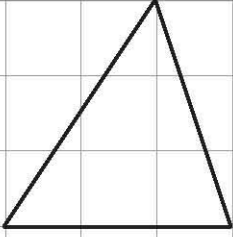
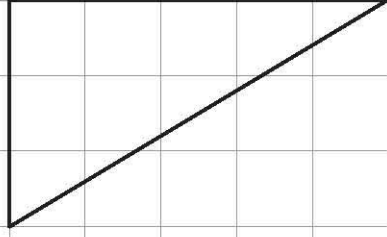
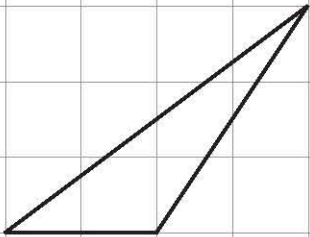
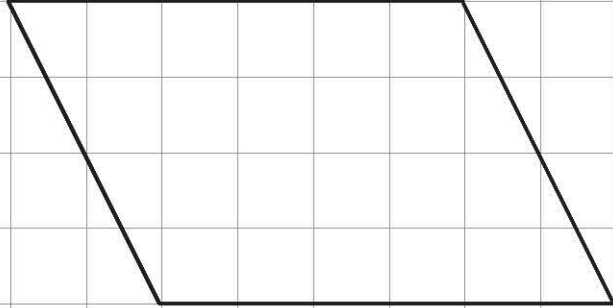
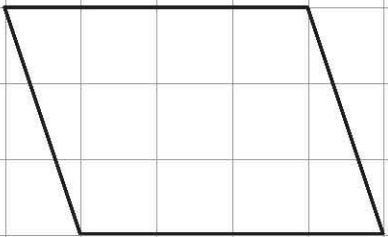
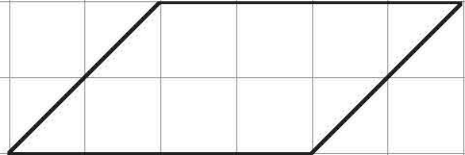
Area Formulas



For each figure below, label the base and the height, find the area, and record the number model you use to find the area.

$$\text{Area of a parallelogram: } A = b * h$$

$$\text{Area of a triangle: } A = \frac{1}{2} * b * h$$

	
1. Area: _____ (unit) Number model: _____	<div style="text-align: right; font-size: small;">1 cm²</div> 2. Area: _____ (unit) Number model: _____
	
3. Area: _____ (unit) Number model: _____	4. Area: _____ (unit) Number model: _____
	
5. Area: _____ (unit) Number model: _____	6. Area: _____ (unit) Number model: _____

STUDY LINK
9•7

An Area Review



Circle the most appropriate unit to use for measuring the area of each object.



1. The area of a football field

cm ²	ft ²	yd ²	in ²
-----------------	-----------------	-----------------	-----------------

2. The area of your hand

cm ²	ft ²	yd ²	in ²
-----------------	-----------------	-----------------	-----------------

3. The area of a postage stamp

cm ²	ft ²	yd ²	in ²
-----------------	-----------------	-----------------	-----------------

4. Area of a triangular kite

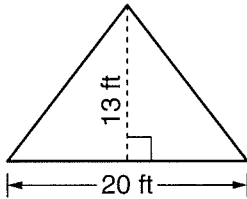
cm ²	ft ²	yd ²	in ²
-----------------	-----------------	-----------------	-----------------

5. Area of a parallelogram-shaped sign on the highway

cm ²	ft ²	yd ²	in ²
-----------------	-----------------	-----------------	-----------------

Use a formula to find the area of each figure. Write the appropriate number sentence and the area.

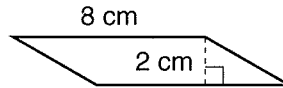
6.



Number sentence: _____

Area: _____ (unit)

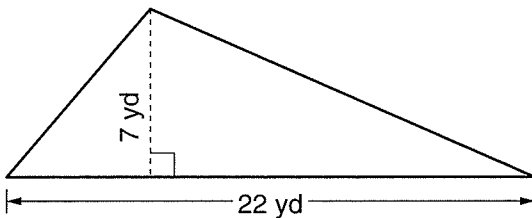
7.



Number sentence: _____

Area: _____ (unit)

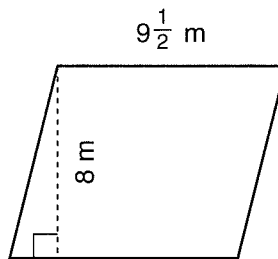
8.



Number sentence: _____

Area: _____ (unit)

9.



Number sentence: _____

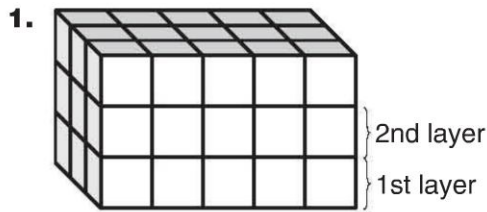
Area: _____ (unit)

STUDY LINK
9•8

Volumes of Cube Structures



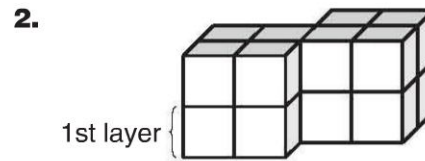
The structures below are made up of centimeter cubes.



Area of base = _____ cm^2

Volume of first layer = _____ cm^3

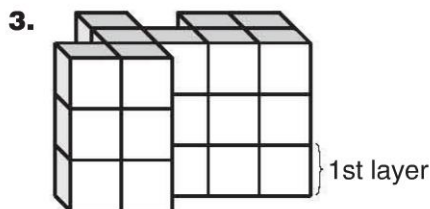
Volume of entire
cube structure = _____ cm^3



Area of base = _____ cm^2

Volume of first layer = _____ cm^3

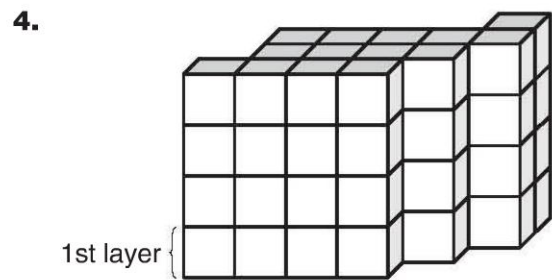
Volume of entire
cube structure = _____ cm^3



Area of base = _____ cm^2

Volume of first layer = _____ cm^3

Volume of entire
cube structure = _____ cm^3



Area of base = _____ cm^2

Volume of first layer = _____ cm^3

Volume of entire
cube structure = _____ cm^3

Practice

5. $\frac{3}{5} * \frac{1}{8} =$ _____

6. $3,840 / 4 =$ _____

7. $960 * 4 =$ _____

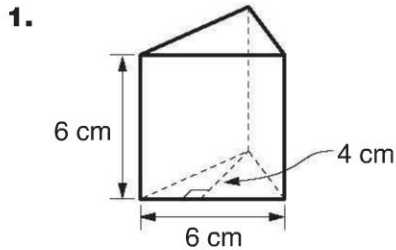
8. $\frac{4}{5} * \frac{5}{6} =$ _____

STUDY LINK
9•9

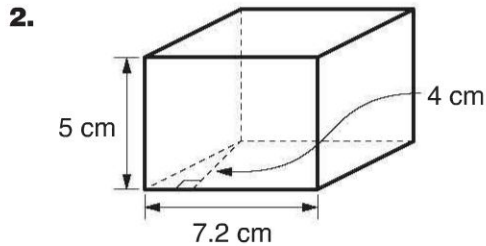
Volumes of Prisms



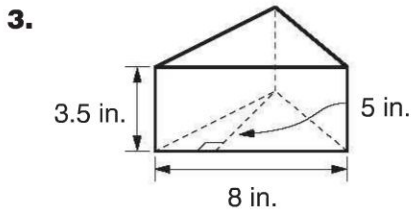
The volume V of any prism can be found with the formula $V = B * h$, where B is the area of the base of the prism, and h is the height of the prism from that base.



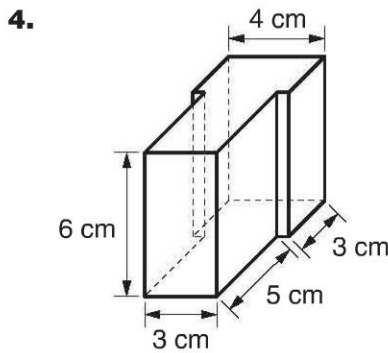
Volume = _____ cm^3



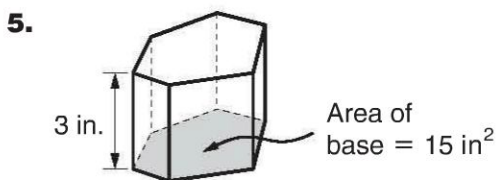
Volume = _____ cm^3



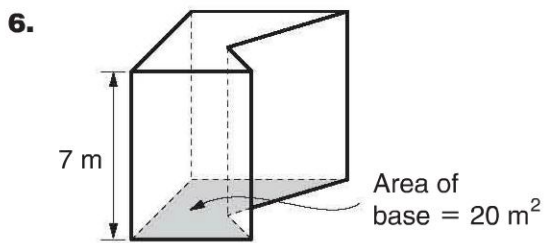
Volume = _____ in^3



Volume = _____ cm^3



Volume = _____ in^3



Volume = _____ m^3

Practice

Solve each equation.

7. $36 * r = 144$ _____

8. $3,577 - t = 3,822$ _____

9. $3,577 - m = 3,417$ _____

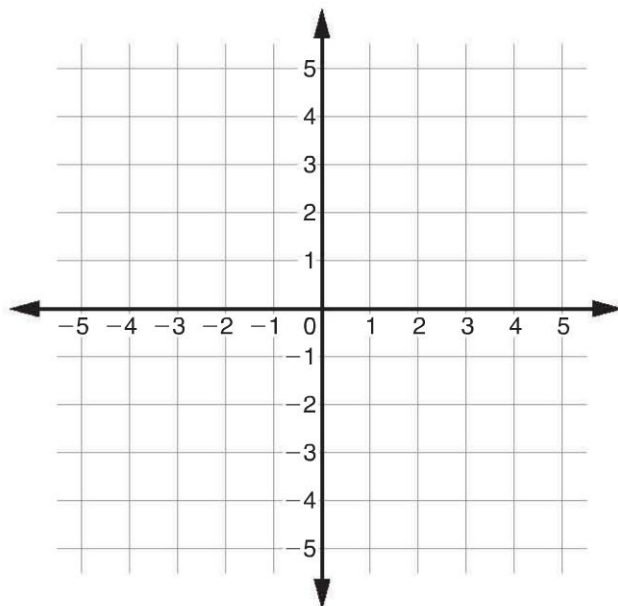
10. $d * 68 = 340$ _____

STUDY LINK
9•10

Unit 9 Review



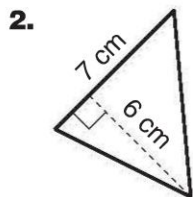
1. Plot 6 points on the grid below and connect them to form a hexagon.
List the coordinates of the points you plotted.



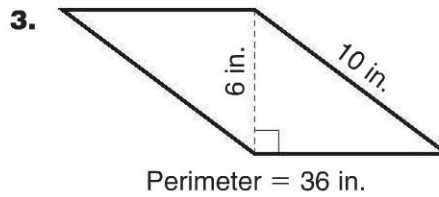
- (_____ , _____)
- (_____ , _____)
- (_____ , _____)
- (_____ , _____)
- (_____ , _____)
- (_____ , _____)

Find the area of the figures shown below.
Write the number model you used to find the area.

Area of a rectangle: $A = b * h$
 Area of a parallelogram: $A = b * h$
 Area of a triangle: $A = \frac{1}{2} * b * h$



Number model: _____
 Area: _____ (unit)



Number model: _____
 Area: _____ (unit)

4. On the back of this page, explain how you solved Problem 3.

LESSON
9•11**Self Assessment**Progress
Check 9

Think about each skill listed below. Assess your own progress by checking the most appropriate box.

Skills	I can do this on my own and explain how to do it.	I can do this on my own.	I can do this if I get help or look at an example.
1. Identify and plot ordered pairs on a one-quadrant and four-quadrant coordinate grid.			
2. Understand the concept of area of a figure.			
3. Use a formula to find the area of rectangles, triangles, and parallelograms.			
4. Identify the base and height of triangles and parallelograms.			
5. Understand the concept of volume of a figure.			
6. Use a formula to find the volume of prisms.			



Exponents and Negative Numbers

In Unit 7, your child will learn to write exponential and scientific notation for naming very large and very small numbers. These topics become increasingly important later on when your child begins algebra. If you have enjoyed playing math games in the past, you might want to play *Exponent Ball* during these lessons.

Your child will also review how parentheses make expressions unambiguous and will learn rules that determine the order for performing operations in a mathematical expression.

Finally, your child will learn to work with positive and negative numbers, using a variety of tools. For example, your child will use number lines and red and black “counters” to model addition and subtraction problems.

The counter activities are especially helpful. Students use counters to represent an account balance. The red counters ($-\$1$) represent a debit, and the black counters ($+\$1$) represent a credit. If there are more red counters than black ones, the account is “in the red,” that is, the balance is negative. On the other hand, if there are more black counters than red ones, the account is “in the black,” that is, the balance is positive. By adding or subtracting red and black counters from an account, your child can model addition and subtraction of positive and negative numbers. To assist your child, you might want to explain how a checking or savings account works. Students will practice their new skills in the *Credits/Debits Game*.



Vocabulary

Important terms in Unit 7:

account balance An amount of money that you have or that you owe.

exponential notation A way to show repeated multiplication by the same factor. For example, 2^3 is exponential notation for $2 * 2 * 2$.

expression A mathematical phrase made up of numbers, variables, operation symbols, and/or grouping symbols. An expression does not contain symbols such as $=$, $>$, and $<$.

in the black Having a positive balance; having more money than is owed.

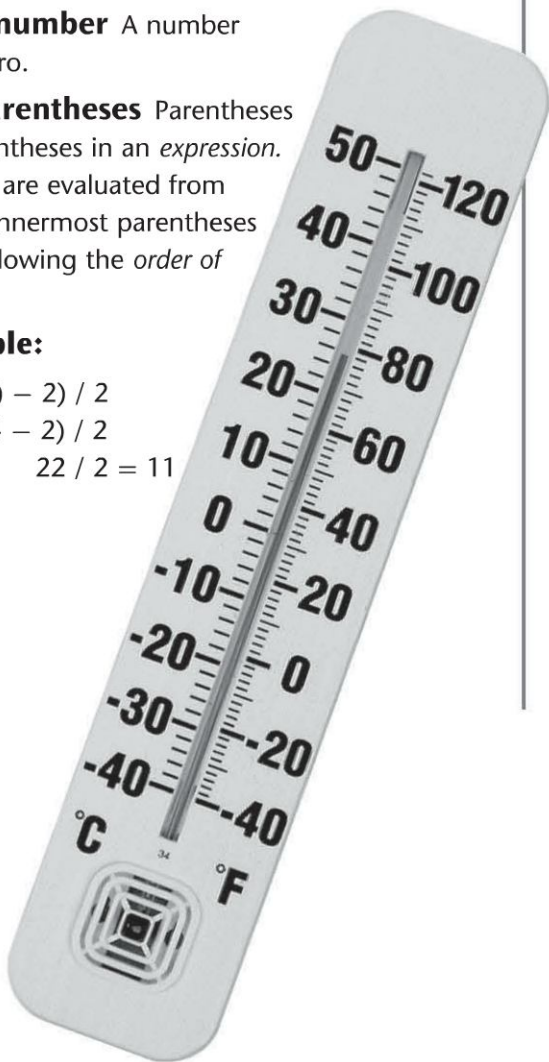
in the red Having a negative balance; owing more money than is available.

negative number A number less than zero.

nested parentheses Parentheses within parentheses in an *expression*. Expressions are evaluated from within the innermost parentheses outward following the *order of operations*.

Example:

$$\begin{aligned} & ((6 * 4) - 2) / 2 \\ & (24 - 2) / 2 \\ & 22 / 2 = 11 \end{aligned}$$



number-and-word notation A way of writing a large number using a combination of numbers and words. For example, *27 billion* is number-and-word notation for 27,000,000,000.

opposite of a number A number that is the same distance from 0 on the number line as a given number but on the opposite side of 0. For example, the opposite of +3 is -3; the opposite of -5 is +5.

order of operations Rules that tell the order in which operations in an *expression* should be carried out. The order of operations is:

1. Do operations inside grouping symbols first. (Use rules 2–4 inside the grouping symbols.)
2. Calculate all the expressions with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

parentheses () Grouping symbols used to indicate which operations in an expression should be done first.

scientific notation A system for writing numbers in which a number is written as the product of a power of 10 and a number that is at least 1 and less than 10. Scientific notation allows you to write big and small numbers with only a few symbols. For example, $4 * 10^{12}$ is scientific notation for 4,000,000,000,000.

standard notation Our most common way of representing whole numbers, integers, and decimals. Standard notation is base-ten, place-value numeration. For example, standard notation for three hundred fifty-six is 356.

Do-Anytime Activities

To work with your child on the concepts taught in this unit and in previous units, try these interesting and rewarding activities:

1. Have your child pick out a stock from the stock-market pages of a newspaper. Encourage your child to watch the stock over a period of time and to report the change in stock prices daily, using positive and negative numbers.
2. Using the same stock in Activity 1, have your child write the high and low of that stock for each day. After your child has watched the stock over a period of time, have him or her find. . .
 - ◆ the *maximum* value observed.
 - ◆ the *minimum* value observed.
 - ◆ the *range* in values.
 - ◆ the *mode*, if there is one.
 - ◆ the *median* value observed.
3. Review tessellations with your child. Encourage your child to name the regular tessellations and to draw and name the 8 semiregular tessellations. Challenge your child to create Escher-type translation tessellations. You might want to go to the library first and show your child examples of Escher's work.
4. Practice finding perimeters of objects and circumferences of circular objects around your home.

Building Skills through Games

In Unit 7, your child will practice operations and computation skills by playing the following games. For detailed instructions, see the *Student Reference Book*.

Credits/Debits Game See *Student Reference Book*, page 301. Two players use a complete deck of number cards, cash and debt cards, and a record sheet to tally a balance. This game helps students add and subtract signed numbers.

Exponent Ball See *Student Reference Book*, page 305. This game involves two players and requires a gameboard, 1 six-sided die, a penny or counter, and a calculator. This game develops skills dealing with forming and comparing exponential values.

Name That Number See *Student Reference Book*, page 325. This is a game for two or three players using the Everything Math Deck or a complete deck of number cards. Playing *Name That Number* helps students review operations with whole numbers.

Scientific-Notation Toss See *Student Reference Book*, page 329. Two players will need 2 six-sided dice to play this game. This game develops skill in converting numbers from scientific notation to standard notation.

STUDY LINK
7·1

Exponents



In exponential notation, the **exponent** tells how many times the **base** is used as a factor. For example, $6^4 = 6 * 6 * 6 * 6 = 1,296$. The base is 6, and the exponent is 4. The product is written as 1,296 in standard notation.

1. Complete the table.

Exponential Notation	Base	Exponent	Repeated Factors	Standard Notation
9^3	9	3	$9 * 9 * 9$	729
	4	5		
			$7 * 7 * 7 * 7$	
			$10 * 10 * 10 * 10 * 10 * 10$	
				262,144

Describe the mistake. Then find the correct solution.

2. $6^3 = 6 + 3 = 9$

Mistake: _____

Correct solution: _____

3. $2^9 = 9 + 9 = 18$

Mistake: _____

Correct solution: _____

4. $4^7 = 4 * 7 = 28$

Mistake: _____

Correct solution: _____

Practice

5. $351.82 + n = 366.52$

$n =$ _____

6. $100 - r = 99.52$

$r =$ _____

7. $\frac{4}{7} + u = \frac{19}{7}$

$u =$ _____



STUDY LINK
7•2

Guides for Powers of 10



There are prefixes that name powers of 10. You know some of them from the metric system. For example, *kilo-* in kilometer (1,000 meters). It's helpful to memorize the prefixes for every third power of 10 through one trillion.



Memorize the table below. Have a friend quiz you. Then cover the table, and try to complete the statements below.

Standard Notation	Number-and-Word Notation	Exponential Notation	Prefix
1,000	1 thousand	10^3	kilo-
1,000,000	1 million	10^6	mega-
1,000,000,000	1 billion	10^9	giga-
1,000,000,000,000	1 trillion	10^{12}	tera-

- More than 10^9 , or one _____, people live in China.
- One thousand, or 10^{\square} , feet is a little less than $\frac{1}{5}$ of a mile.
- Astronomers estimate that there are more than 10^{12} , or one _____, stars in the universe.
- More than one million, or 10^{\square} , copies of *The New York Times* are sold every day.
- A kiloton equals one _____, or 10^{\square} , metric tons.
- A megaton equals one _____, or 10^{\square} , metric tons.

Practice

Find the prime factorization of each number, and write it using exponents.

7. $48 =$ _____ 8. $60 =$ _____

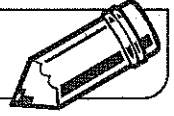
Write each number in expanded notation.

9. $3,264 =$ _____

10. $675,511 =$ _____

LESSON
7·2

Powers of 10



Find the patterns and complete the table below. Do not use your *Student Reference Book*.

1,000,000	100,000	10,000			1
				one hundred	one
		$10 * 10 * 10$			$10 * \frac{1}{10}$
					10^0
					10^1

- Describe at least one pattern you used to complete the table.

- Describe what happens to the decimal point in the standard notation as you move one column to the right in the table.

- Describe what happens to the value of the digit 1 when you move one column to the left.

- Describe what happens to the value of the digit 1 when you move one column to the right.

- Describe a pattern in the number of zeros used in the standard notation that you used to complete the table.

STUDY LINK
7-3

Interpreting Scientific Notation



Scientific notation is a short way to represent large and small numbers. In scientific notation, a number is written as the product of two factors. One factor is a whole number or a decimal. The other factor is a power of 10.

Scientific notation: $4 * 10^4$

Meaning: Multiply 10^4 (10,000) by 4.

$$4 * 10^4 = 4 * 10,000 = 40,000$$

Number-and-word notation: 40 thousand

Scientific notation: $6 * 10^6$

Meaning: Multiply 10^6 (1,000,000) by 6.

$$6 * 10^6 = 6 * 1,000,000 = 6,000,000$$

Number-and-word notation: 6 million

Guides for Powers of 10

10^3	one thousand
10^6	one million
10^9	one billion
10^{12}	one trillion

Complete the following statements.

1. The area of Alaska is about $6 * 10^5$, or _____ thousand, square miles.

The area of the lower 48 states is about $3 * 10^6$, or _____ million, square miles.

2. There are about $6 * 10^9$, or _____ billion, people in the world.
3. It is estimated that about $5 * 10^8$, or _____, people speak English as their first or second language.
4. In Bengal, India, and Bangladesh there are about $2.6 * 10^8$, or _____, people who speak Bengali.
5. At least 1 person in each of $1 * 10^7$ households, or _____, watches the most popular TV shows.

Source: *The World Almanac and Book of Facts, 2000*

Practice

6. $5 * (3^2 + 4^2) =$ _____

7. $3 * (9 + 16) =$ _____

8. $2 * (9 + h) = 20$ _____

9. $g = (7^2 - 2^2)$ _____



STUDY LINK
7•4

Using Parentheses



Make each sentence true by inserting parentheses.

1. $2 = 3 * 2 - 4 / 1$ 2. $3 = 4 + 3 - 1 / 2$ 3. $4 = 3 - 1 + 4 / 2$

4. Write seven names for 8. Use only numbers less than 10, and use at least three different operations in each name. Use parentheses. Follow the directions in Problem 7 to fill in the last two rows.

8

Make each sentence true by inserting parentheses.

Reminder: When you have a pair of parentheses inside another pair, the parentheses are called **nested parentheses**.

Example: $8 = ((5 * 6) + 2) / 4$

5. $1 = 4 + 1 - 3 / 2$ 6. $7 = 4 * 3 / 2 + 1$

7. Add two names to your name-collection box in Problem 4. Use nested parentheses.

Practice

Find the number that each variable represents.

8. $2\frac{5}{12} = (1\frac{1}{12} + a)$ _____ 9. $(1\frac{1}{2} + p) * 2^2 = 12$ _____

10. $6\frac{5}{8} + d = 7\frac{15}{8}$ _____ 11. $6.4 - y = 6\frac{2}{5}$ _____

STUDY LINK
7•5

Order of Operations



Rules for Order of Operations

- ① Do operations inside **parentheses**.
- ② Calculate all expressions with **exponents**.
- ③ **Multiply** and **divide** in order, from left to right.
- ④ **Add** and **Subtract** in order, from left to right.

Solve.

1. $4 + 5 * 6 =$ _____

2. $(2 + 3)^2 =$ _____

3. $12 * 2 + 8 \div 2 =$ _____

4. $115 - 10^2 + 3 * 5 =$ _____

5. $6 * (3 + 2^2) \div 2 =$ _____

6. $7 + 9 * 7 \div 3 =$ _____

Write true or false for each number sentence. Follow the rules for order of operations.

7. $3 + 4 * 5 = 35$ _____

8. $(3 + 4) * 5 = 35$ _____

9. $0 = 3 * 4 - 12$ _____

10. $0 = (3 * 4) - 12$ _____

11. $36 = 12 - 3 * 4$ _____

12. $36 = (12 - 3) * 4$ _____

13. $8 \div 2 + 6 = 1$ _____

14. $8 \div (2 + 6) = 1$ _____

Practice

Find the number that each variable represents.

15. $354 * 26 = z$ _____

16. $907 * 86 = r$ _____

17. $3.000 - 1.75 = s$ _____

18. $0.006 + 3.2 + 0.75 + 4 = h$ _____

STUDY LINK
7•6

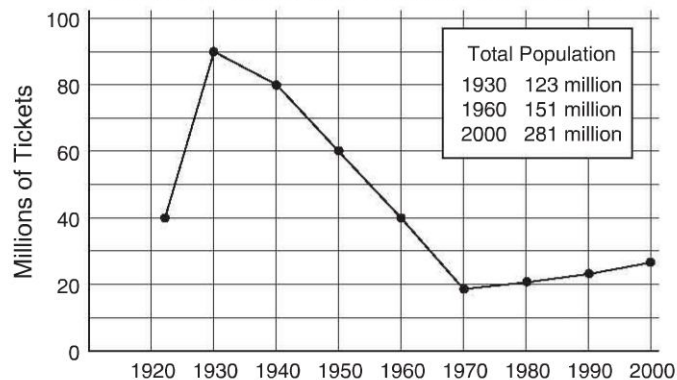
Making Line Graphs



Bar graphs, circle graphs, and line graphs display information in a way that makes it easy to show comparisons, but line graphs can also show trends.

- Use the information in the line graph to write two true statements about movie ticket sales.

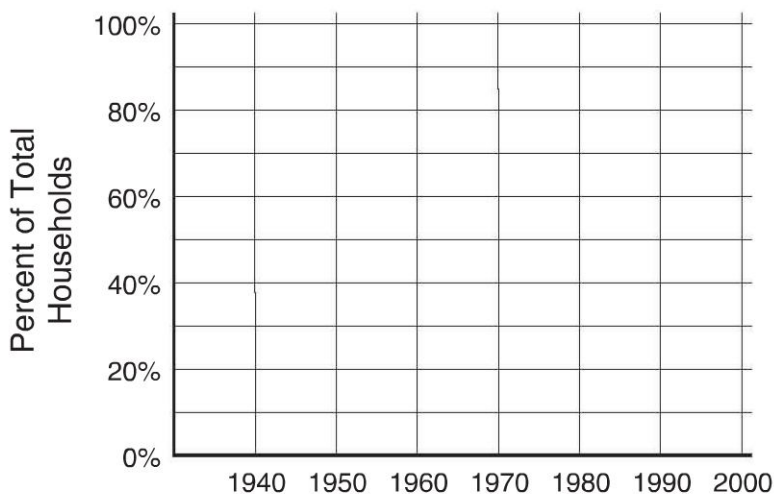
Average Number of Movie Tickets Sold per Week (in Millions), 1922–2000



- The table data lists the estimated percent of households with television sets from 1940 to 2000. Plot the data on the line graph below.

Estimated Percent of Households with Television Sets, 1940–2000							
Year	1940	1950	1960	1970	1980	1990	2000
Percentage	0%	12%	88%	96%	98%	98%	98%

Estimated Percent of Households with Television Sets, 1940–2000



- Compare the information in the line graphs from Problems 1 and 2. What relationships do you see?

STUDY LINK
7·7

Greater Than or Less Than?



Name a number between each pair of numbers.

1. 2 and 3 _____

2. 1.5 and 2 _____

3. -5 and -6 _____

4. -9.5 and -10 _____

Order each set of numbers from *least* to *greatest*.

5. $5\frac{1}{4}$, 3.8, -1.2, -1, $5\frac{3}{8}$ _____

6. -6, $-4\frac{1}{2}$, -0.5, -7, 0 _____

True or false? Write T for true and F for false.

7. $-6 > 5$ _____

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

9. $-2.5 > -3.5$ _____

10. -4 is less than 0 _____

Write one true and one false number sentence. In each sentence, use at least one negative number and one of the $>$, $<$, or $=$ symbols. Label each sentence T or F.

11. _____

12. _____

Practice

Find the number that each variable represents.

13. $92.47 + f = 105$ _____

14. $32 + 15 + 25 + 8 + s = 10^2$ _____

15. $4\frac{3}{12} + n = 5$ _____

16. $4\frac{3}{12} - r = 3\frac{6}{12}$ _____

STUDY LINK
7•8

Positive and Negative Numbers



Write $<$ or $>$.

1. -7 _____ 6

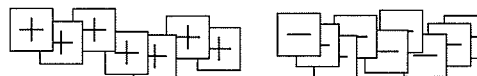
2. 0.01 _____ -32

3. 8.5 _____ -10^3

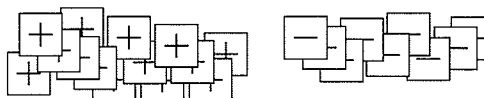
4. $-\frac{3}{4}$ _____ -1.6

Find the account balance. \oplus = \$1 cash. \ominus = \$1 debt.

5. Balance = \$ _____



6. Balance = \$ _____



Solve these addition problems.

7. $-15 + 6 =$ _____

8. $17 + (-5) =$ _____

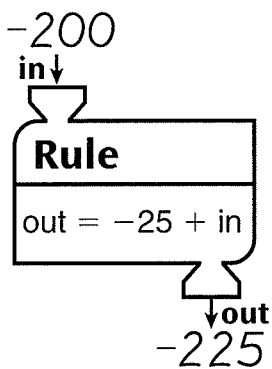
9. $-56 + (-32) =$ _____

10. $90 + (-20) =$ _____

11. $18 + (-15) =$ _____

12. $-987 + 987 =$ _____

13. Use the rule to complete the table.



in	out
25	
50	
-25	
-100	
100	
0	

Practice

Find the number that each variable represents.

14. $3\frac{2}{3} = \frac{j}{3}$ _____

15. $7\frac{9}{3} = \frac{a}{3}$ _____

16. $\frac{19}{25} * \frac{y}{y} = \frac{57}{75}$ _____

17. $\frac{75}{100} \div \frac{p}{p} = \frac{15}{20}$ _____

STUDY LINK
7•9

Addition and Subtraction Problems



Solve each problem. Be careful. Some problems involve addition, and some involve subtraction.

Reminder:

To subtract a number, you can add the opposite of that number.



1. $-25 + (-16) = \underline{\hspace{2cm}}$

2. $0 - (-43) = \underline{\hspace{2cm}}$

3. $-4 - (-4) = \underline{\hspace{2cm}}$

4. $-4 - 4 = \underline{\hspace{2cm}}$

5. $29 - (-11) = \underline{\hspace{2cm}}$

6. $9 - (-11) = \underline{\hspace{2cm}}$

7. $-100 + 15 = \underline{\hspace{2cm}}$

8. $10 - 10.5 = \underline{\hspace{2cm}}$

9. $4\frac{1}{2} + (-2\frac{1}{2}) = \underline{\hspace{2cm}}$

10. $10 - \underline{\hspace{2cm}} = 20$

11. For each temperature change in the table, two number models are shown in the Temperature after Change column. Only one of the number models is correct. Cross out the incorrect number model. Then complete the correct number model.

Temperature before Change	Temperature Change	Temperature after Change	
40°	up 7°	$40 + 7 = \underline{\hspace{2cm}}$	$40 + (-7) = \underline{\hspace{2cm}}$
10°	down 8°	$10 - (-8) = \underline{\hspace{2cm}}$	$10 - 8 = \underline{\hspace{2cm}}$
-15° (15° below zero)	up 10°	$-15 + 10 = \underline{\hspace{2cm}}$	$15 + 10 = \underline{\hspace{2cm}}$
-20° (20° below zero)	down 10°	$-20 - 10 = \underline{\hspace{2cm}}$	$20 - (-10) = \underline{\hspace{2cm}}$

Practice

Find the number that each variable represents.

12. $684 * 96 = u \underline{\hspace{2cm}}$

13. $69 \div e = 23 \underline{\hspace{2cm}}$

14. $32.486 - 1.645 = w \underline{\hspace{2cm}}$

15. $9.45 - m = 3.99 \underline{\hspace{2cm}}$

High-Number Toss: Decimal Version Record Sheet



Circle the winning number for each round. Fill in the Score column each time you have the winning number.

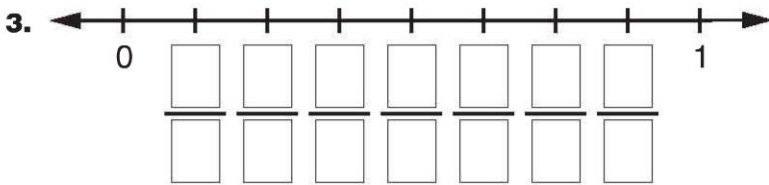
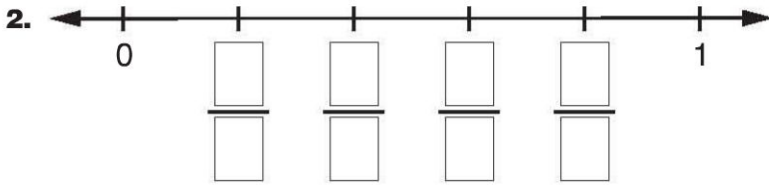
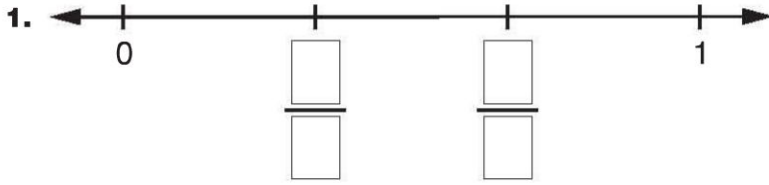


Player 1 _____ (Name) Player 2 _____ (Name)

Round	Player 1	<, >, =	Player 2	Score
Sample	0. <u>6</u> <u>5</u> <u>4</u>	<	0. <u>7</u> <u>5</u> <u>3</u>	$\begin{array}{r} 0.753 \\ - 0.654 \\ \hline 0.099 \end{array}$
1	0. _____		0. _____	
2	0. _____		0. _____	
3	0. _____		0. _____	
4	0. _____		0. _____	
5	0. _____		0. _____	
Total Score				

LESSON
7•10
Identifying Fractions on a Number Line


Label each number line with the correct fractions.



4. Draw and label the following points on this number line. The first one is done for you.

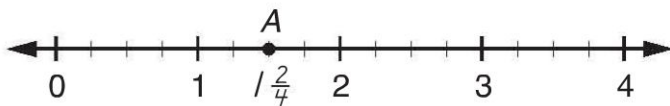
$A: 1\frac{2}{4}$

$B: \frac{1}{4}$

$C: \frac{4}{4}$

$D: \frac{8}{4}$

$E: 2\frac{3}{4}$



5. Jay, Kay, and Mae are in a 3-mile walk-a-thon. So far, Jay has walked $\frac{3}{4}$ mi, Kay has walked $1\frac{1}{2}$ mi, and Mae has walked $\frac{5}{2}$ mi. Draw and label points on the number line below to show their approximate locations.



STUDY LINK
7•10

Scouting for Insects



Some insects are harmful to farmers' crops. The insects listed in this table are harmful to alfalfa crops. Farmers scout their crops and randomly collect sample plants. They regularly observe the plants and gather data to determine if the insect population is growing or remaining stable.

The table shows the result of one farmer's insect scouting.

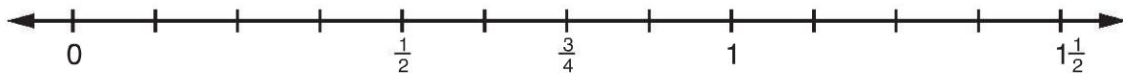
Type of Insect	Average Length of Insect (in.)	Number of Insects
Alfalfa Weevil Larvae	$\frac{3}{8}$	4
Fall Armyworm	$1\frac{1}{4}$	1
Meadow Spittlebug	$\frac{1}{4}$	3
Pea Aphid	$\frac{1}{8}$	6
Potato Leafhopper	$\frac{1}{8}$	6

Plot and label the lengths of the insects from the scouting sample on the line plot below. Use the line plot to find the following data landmarks:

- Minimum insect length _____ in.
- Maximum insect length _____ in.
- Range of insect lengths _____ in.
- Median insect length _____ in.
- Mean insect length _____ in.

Insect Lengths

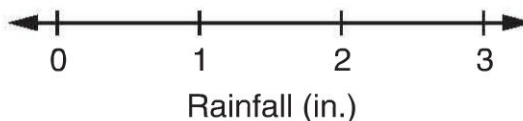
Number
of
Insects



Average Length (in.)

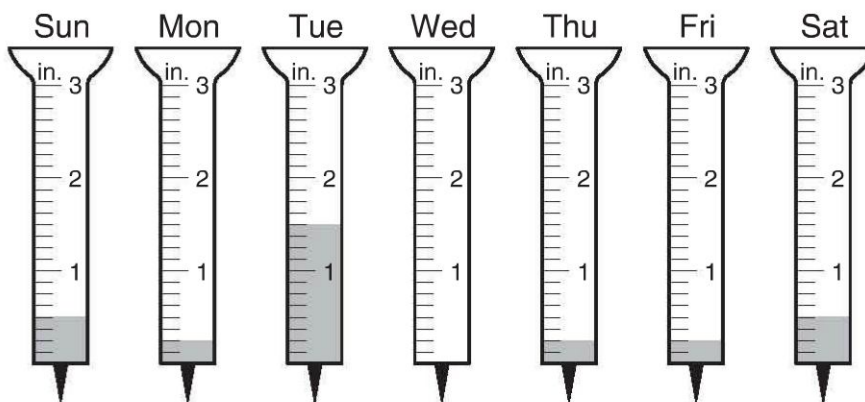
LESSON
7•10

Plotting Rain Gauge Data



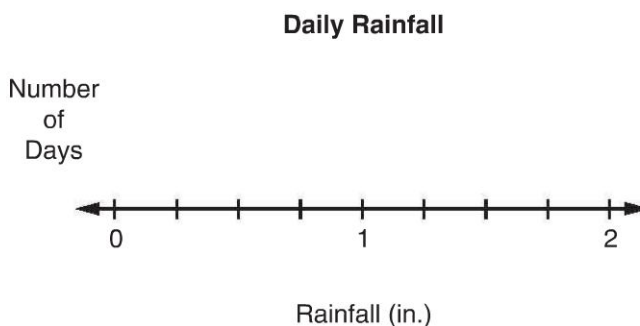
Example: Read the rain gauge pictured above and place an X on the line plot to show how much rain has been collected.

1. Read each rain gauge to find out how much rain fell each day. Write the amount of rain on the line below the gauge.



_____ in. _____ in. _____ in. _____ in. _____ in. _____ in. _____ in.

2. Use the number line to make a line plot recording daily rainfall for 1 week. Label the tick marks on the number line. Place an X to represent each rain amount.



3. Analyze the rain gauge data to answer the questions below.
 - a. What is the mode amount of rain that fell each day? _____ in.
 - b. What is the range of the rainfall during the week? _____ in.

STUDY LINK
7•11**Unit 7 Review**

1. Circle the number sentences that are true.

$25 + (-6) < -32$

$4^2 < 2^4$

$15 * 15 * 15 < 15^3$

$21 * 21 = 21^3$

$-5 - (-58) = 53$

$25 > 5^2 - (-2)$

Write each number as a power of 10.

2. 1,000,000 _____

3. 10,000 _____

4. 1 hundred-thousand _____

5. 1 billion _____

Match the number written in number-and-word notation with its standard notation.
Fill in the oval next to the correct answer.

6. 3 million

300,000

30,000,000

3,000,000

30,000

7. 20 thousand

200,000

20,000

2,000,000

20,000,000

8. 640 thousand

6,400,000

64,000,000

640,000,000

640,000

9. 2.6 million

26,000,000

2,060,000

20,600,000

2,600,000

Write the following numbers in expanded notation.

10. 8,759 _____

11. 87.59 _____

STUDY LINK
7•11
Unit 7 Review *continued*


Write each number in scientific notation.

12. 8 million _____

13. 7 billion _____

14. 3 thousand _____

15. 17 billion _____

16. Louise bought three 6-pack containers of yogurt. She ate 5 individual containers of yogurt in one week. How many containers did she have left?

Number model: _____ Answer: _____

17. The water in Leroy's and Jerod's fish tank had evaporated so it was about $\frac{5}{8}$ inch below the level it should be. They added water and the water level went up about $\frac{3}{4}$ inch. Did the water level end up above or below where it should be?

How much above or below?

Number model: _____ Answer: _____

Find the number that each variable represents.

18. $2.4 + 62.8 + 3.752 = f$ _____

19. $86.54 + b = 87$ _____

20. $33\frac{1}{3}\% + p = 100\%$ _____

21. $6,284 \div 4 = a$ _____

22. $8,463 \div 8 = v$ _____

23. $963 \div 7 = k$ _____

LESSON
7•12**Self Assessment**Progress
Check 7

Think about each skill listed below. Assess your own progress by checking the most appropriate box.

Skills	I can do this on my own and explain how to do it.	I can do this on my own.	I can do this if I get help or look at an example.
1. Read and understand numbers written in scientific notation.			
2. Understand and use powers of 10.			
3. Understand and use exponential notation.			
4. Order and compare positive and negative numbers.			
5. Tell whether a number sentence is true or false.			
6. Understand and use parentheses in number sentences.			
7. Add and subtract positive and negative numbers.			
8. Understand and use order of operations.			

