

Holt Mathematics

Know-It Notebook™



HOLT, RINEHART AND WINSTON

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USING THE *KNOW-IT NOTEBOOK*™

This *Know-It Notebook* will help you take notes, organize your thinking, and study for quizzes and tests. There are *Know-It Notes*™ pages for every lesson in your textbook. These notes will help you identify important mathematical information that you will need later. Then at the end of every chapter, a fun *Foldnotes* activity will help you remember key terms.

Know-It Notes

Lesson Objectives

A good note-taking practice is to know the objective the content covers.

Vocabulary

Another good note-taking practice is to keep a list of the new vocabulary.

- Use the page references or the glossary in your textbook to find each definition.
- Write each definition on the lines provided.

Additional Examples

Your textbook includes examples for each math concept taught. Additional examples in the *Know-It Notebook* help you take notes so you remember how to solve different types of problems.

- Take notes as your teacher discusses each example.
- Write notes in the blank boxes to help you remember key concepts.
- Write final answers in the shaded boxes.

Try This

Complete the Try This problems that follow some lessons. Use these to make sure you understand the math concepts covered in the lesson.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any problem that you answered incorrectly.

LESSON 1-1 Comparing and Ordering Whole Numbers

Lesson Objectives
Compare and order whole numbers using place value or a number line.

	Place Value		
	Billions	Millions	Thousands
	6	2	3
	8	3	6
			3
			4
			5
			3

Additional Examples

Example 1
Belize's 2000 population was 249,183 people. Iceland's 2000 population was 276,365 people. Which country had more people?

Belize 2 4 9, 1 8 3
Iceland 2 7 6, 3 6 5

Start at the **left** and compare digits in the same place value position. Look for the **first** place where the values are different.

40 thousand is **less** than 70 thousand.

249,183 is **less** than 276,365.

Iceland had more people.

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LESSON 1-1 CONTINUED

Example 2
Order the numbers from least to greatest.
675, 1,044, 497

Graph the numbers on a number line:

The number **675** is between 600 and 700.
The number **1,044** is between 1,000 and 1,100.
The number **497** is between 400 and 500.

The numbers are ordered when you read the number line from **left** to **right**.

The numbers in order from least to greatest are **497**, **675**, and **1,044**.

Try This

1. In 2000, the population of San Diego, California was 1,223,400 people. In 2000, the population of Dallas, Texas was 1,188,580 people. Which city had more people?

San Diego

2. Order the numbers from least to greatest.
732, 923, 502

502, 732, 923

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Chapter Review

Complete Chapter Review problems that follow each chapter. This is a good review before you take the chapter test.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any problem that you answered incorrectly.

Big Ideas

The Big Ideas have you summarize the important chapter concepts in your own words. You must think about and understand ideas to put them in your own words. This will also help you remember them.

- Write each answer in the space provided.
- Check your answers with your teacher or another student.
- Ask your teacher to help you understand any question that you answered incorrectly.

CHAPTER 1 Chapter Review Know It! *Now*

1-1 Comparing and Ordering Whole Numbers

Compare. Write $<$, $>$, or $=$.

1. 17,086,749 17,210,345 2. 512,007,956 509,997,136

3. The Empire State Building, built in 1960, is 15,000 inches high. The Sears Tower, built in 1983, is 17,400 inches high. Which building is taller?

Order the numbers from least to greatest.

4. 1,271; 1,089; 1,912 5. 6,366; 6,636; 3,636 6. 11,901; 13,102; 11,688

1-2 Estimate with Whole Numbers

Estimate each sum or difference by rounding to the place value indicated.

7. $57,024 + 21,879$; ten thousands 8. $14,507 - 9,613$; thousands

9. Anthony's fifth-grade class took a bus to the art museum. The museum was 76 miles away. The bus traveled an average of 40 mi/h. About how long did it take Anthony's class to get to the museum?

1-3 Exponents

Write each expression in exponential form.

10. $6 \times 6 \times 6 \times 6$ 11. $10 \times 10 \times 10 \times 10 \times 10$

Find each value.

12. 4^3 13. 5^2 14. 2^6 15. 7^3

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CHAPTER 1 Big Ideas Know It! *Now*

Answer these questions to summarize the important concepts from Chapter 1 in your own words.

1. Explain the rules when rounding numbers.
2. Explain how to evaluate 8^4 .
3. List the steps when evaluating an expression with more than one operation.
4. How can you use mental math to find the product of 7 and 53?
5. Explain how to find the rule in a numerical pattern.

For more review of Chapter 1:

- Complete the Chapter 1 Study Guide and Review on pages 42–44 of your textbook.
- Complete the Ready to Go On quizzes on pages 18 and 38 of your textbook.

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NOTE TAKING STRATEGIES

Taking good notes is very important in many of your classes and will be even more important when you take college classes. This notebook was designed to help you get started. Here are some other steps that can help you take good notes.

Getting Ready

1. Use a loose-leaf notebook. You can add pages to this where and when you want to. It will help keep you organized.

During the Lecture

2. If you are taking notes during a lecture, write the big ideas. Use abbreviations to save time. Do not worry about spelling or writing every word. Use headings to show changes in the topics discussed. Use numbering or bullets to organize supporting ideas under each topic heading. Leave space before each new heading so that you can fill in more information later.

After the Lecture

3. As soon as possible after the lecture, read through your notes and add any information that will help you understand them when you review later. You should also summarize the information into key words or key phrases. This will help your comprehension and will help you process the information. These key words and key phrases will be your memory cues when you are reviewing for or taking a test. At this time you may also want to write questions to help clarify the meaning of the ideas and facts.
4. Read your notes out loud. As you do this, state the ideas in your own words and do as much as you can by memory. This will help you remember and will also help with your thinking process. This activity will help you understand the information.
5. Reflect upon the information you have learned. Ask yourself how new information relates to information you already know. Ask how this relates to your personal experience. Ask how you can apply this information and why it is important.

Before the Test

6. Review your notes. Don't wait until the night before the test to review. Do frequent reviews. Don't just read through your notes. Put the information in your notes into your own words. If you do this you will be able to connect the new material with material you already know, and you will be better prepared for tests. You will have less test anxiety and better recall.
7. Summarize your notes. This should be in your own words and should only include the main points you need to remember. This will help you internalize the information.

Comparing and Ordering

Whole Numbers



Lesson Objectives

Compare and order whole numbers using place value or a number line

Place Value

Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		6 , 8	2	3 , 6	3	4 , 5	5	3			
Billions			Millions			Thousands			Ones		

Additional Examples

Example 1

Belize's 2000 population was 249,183 people. Iceland's 2000 population was 276,365 people. Which country had more people?

Belize 2 4 9 , 1 8 3

Iceland 2 7 6 , 3 6 5

Start at the and compare digits in the same place value position. Look for the place where the values are different.

40 thousand is than 70 thousand.

249,183 is than 276,365.

had more people.

Example 2

Order the numbers from least to greatest.

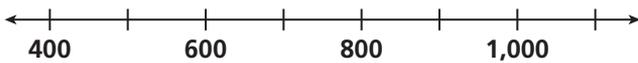
675; 1,044; 497

Graph the numbers on a number line:

The number is between 600 and 700.

The number is between 1,000 and 1,100.

The number is between 400 and 500.



The numbers are ordered when you read the number line from to .

The numbers in order from least to greatest are , , and .

Try This

1. In 2000, the population of San Diego, California was 1,223,400 people. In 2000, the population of Dallas, Texas was 1,188,580 people. Which city had more people?

2. Order the numbers from least to greatest.

732, 923, 502

Lesson Objectives

Estimate with whole numbers

Vocabulary

compatible numbers (p. 10) _____

underestimate (p. 10) _____

overestimate (p. 10) _____

Additional Examples**Example 1****Estimate the sum or difference by rounding to the place value indicated.****A.** $12,345 + 62,167$; ten thousands

$$\begin{array}{r} 10,000 \\ + 60,000 \\ \hline 70,000 \end{array}$$

Round 12,345 .Round 62,167 .The sum is about .**B.** $4,983 - 2,447$; thousands

$$\begin{array}{r} 5,000 \\ - 2,000 \\ \hline 3,000 \end{array}$$

Round 4,983 .Round 2,447 .The difference is about .

Example 2

Chelsea is planning the annual softball banquet for the 8 teams in the region. Each team has 18 members. Estimate how many plates she will need to buy if all the members attend.

$$8 \times 18 \longrightarrow 8 \times 20$$

$$8 \times 20 = 160$$

the number of team members.

The actual number of team members is than 160.

If Chelsea buys plates, she will have enough for each person.

Example 3

Mr. Dehmel will drive 243 miles to the fair at 65 mi/h. About how long will his trip take?

$$243 \div 65 \longrightarrow 240 \div 60$$

$$240 \div 60 = 4$$

240 and 60 are numbers. Underestimate the speed.

Because he underestimated the speed, the actual time will be

hours.

Try This

1. Estimate the sum by rounding to the place value indicated.

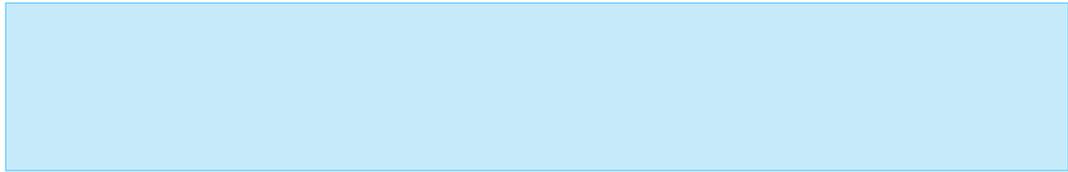
$$13,235 + 41,139; \text{ ten thousands}$$



2. Quinton will hike 14 miles each of the next 9 days. Estimate the number of miles Quinton will hike.



3. Mrs. Blair will drive 103 miles to the airport at 55 mi/h. About how long will her trip take?



Lesson Objectives

Represent numbers by using exponents

Vocabulary

exponent (p. 14) _____

base (p. 14) _____

exponential form (p. 14) _____

Additional Examples**Example 1**

Write each expression in exponential form.

A. $5 \times 5 \times 5 \times 5$

5 is a factor 4 times.

B. $3 \times 3 \times 3 \times 3 \times 3$

is a factor times.

Example 2

Find each value.

A. 2^6

$$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = \text{_____}$$

B. 4^5

$$4^5 = \text{_____} = \text{_____}$$

Example 3

PROBLEM SOLVING APPLICATION

A phone tree is used to contact families at Paul's school. The secretary calls 4 families. Then each family calls 4 other families, and so on. How many families will be notified during the fourth round of calls?

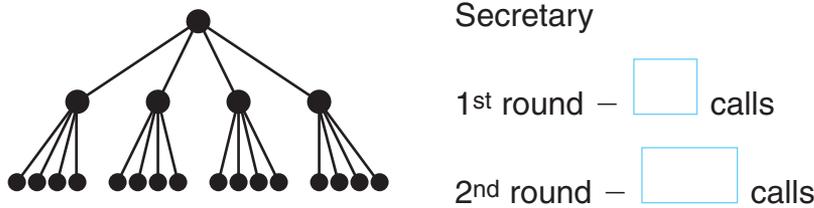
1. Understand the Problem

The answer will be the number of families called in the 4th round. List the important information:

- The secretary calls families.
- Each family calls families.

2. Make a Plan

You can draw a diagram to see how many calls are in each round.



3. Solve

Notice that in each round, the number of calls is a power of 4.

1st round: 4 calls = 4 = 4¹

2nd round: 16 calls = = 4²

So during the fourth round, there will be 4⁴ calls.

4⁴ = =

During the 4th round of calls, families will be notified.

4. Look Back

Drawing a diagram helps you see how to use exponents to solve the problem.

Try This

1. Write the expression in exponential form.

$$6 \times 6 \times 6 \times 6 \times 6 \times 6 = \square$$

2. Find the value.

$$3^4 = \square$$

3. Problem Solving Application

A phone tree is used to contact families at Emily's work. The secretary calls 3 employees. Then each employee calls 3 other employees, and so on. How many employees will be notified during the fourth round of calls?

1. Understand the Problem

The answer will be the number of employees called in the fourth round.

List the important information:

- The secretary calls employees.
- Each employee calls employees.

2. Make a Plan

3. Solve

4. Look Back

Drawing a diagram helps you see how to use exponents to solve the problem.

Lesson Objectives

Use the order of operations

Vocabulary

numerical expression (p. 22) _____

evaluate (p. 22) _____

order of operations (p. 22) _____

Additional Examples**Example 1****Evaluate each expression.**

A. $15 - 10 \div 2$

$15 - \square$

\square

There are no parentheses or exponents.

Divide.

Subtract.

B. $9 + (21 \div 7) \times 5$

$9 + \square \times 5$

$9 + \square$

\square

Perform operations within \square .

\square .

Add.

Example 2

Evaluate each expression.

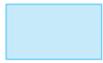
A. $2^4 + 6 \times 4$

+ 6×4

Find the value of numbers with .

$16 +$

.



Add.

B. $24 \div (9 - 6) \times 3^2 - 10$

$24 \div$ $\times 3^2 - 10$

Perform operations within .

$24 \div 3 \times$ $- 10$

Find the value of numbers with .

$\times 9 - 10$

.

$- 10$

.



Subtract.

Example 3

Mr. Kellett bought 6 used CDs for \$4 each and 5 used CDs for \$3 each. Evaluate the following expression to find the amount Mr. Kellett spent on CDs.

$$6 \times 4 + 5 \times 3$$

+

Mr. Kellett spent on CDs.

Try This

1. Evaluate the expression.

$$2 \times (3 + 6) + 4$$

2. Evaluate $16 + 5^2 \times 3$.

3. Ms. Nivia bought 4 new CDs for \$8 each and 6 used CDs for \$4 each. Evaluate the following expression to find the amount Ms. Nivia spent on CDs.

$$4 \times 8 + 6 \times 4$$

Lesson Objectives

Use number properties to compute mentally

Vocabulary

Commutative Property (p. 26) _____

Associative Property (p. 26) _____

Distributive Property (p. 27) _____

Additional Examples**Example 1**

A. Evaluate $17 + 5 + 3 + 15$.

$$17 + 5 + 3 + 15$$

Look for sums that are multiples of .

$$17 + 3 + 5 + 15$$

Use the Property.

$$(17 + 3) + (5 + 15)$$

Use the Property to

$$\boxed{} + \boxed{}$$

make groups of

$$\boxed{}$$

numbers. Use math to add.

B. Evaluate $4 \times 13 \times 5$.

$4 \times 13 \times 5$ Look for products that are multiples of .

$13 \times 4 \times 5$ Use the Property.

$13 \times (4 \times 5)$ Use the Property to

$13 \times$ group numbers.

Use math to multiply.

Example 2

Use the Distributive Property to find each product.

A. 6×35

$6 \times 35 = 6 \times (30 + 5)$ “Break apart” 35 into + .

$= (6 \times 30) + (6 \times 5)$ Use the Property.

$=$ + Use math to multiply.

$=$ Use math to .

B. 9×87

$9 \times 87 = 9 \times (\text{} + \text{)}$ “Break apart” 87 into + .

$= (9 \times \text{)} + (9 \times \text{)}$ Use the Property.

$=$ + Use math to multiply.

$=$ Use math to .

Try This

1. Evaluate $12 + 5 + 8 + 5$. 2. Evaluate 6×43 .

Lesson Objectives

Choose an appropriate method of computation and justify a choice

Additional Examples**Example 1**

A. Evaluate the expression and state the method of computation you used.

$$4 + 3 + 2 + 10 + 8 + 2 + 5 + 1$$

There are probably too many numbers to add , but the

numbers are small. You can use paper and pencil.

B. $4,562 - 397$

397 is close to a multiple of .

You can use mental math.

$(4,562 + 3) - (397 + 3)$ Think: Add 3 to 397 to make .

- Add 3 to to compensate.

Try This

1. Find the difference: $3,442 - 298$.

Lesson Objectives

Find, recognize, describe, and extend patterns in sequences

Vocabulary

sequence (p. 33) _____

term (p. 33) _____

arithmetic sequence (p. 33) _____

Additional Examples**Example 1**

Identify a pattern in each sequence and then find the missing terms.

A. 48, 42, 36, 30, , , , ...

A pattern is to subtract from each term to get the next term.

$$30 - 6 = \text{} \quad 24 - 6 = \text{} \quad 18 - 6 = \text{}$$

So , , and will be the next three terms.

B.

Position	1	2	3	4	5	6
Value of Term	9	22	35	48	61	74

A pattern is to add to each term.

$$48 + 13 = \text{} \quad 61 + 13 = \text{}$$

So and will be the next terms.

Example 2

Identify a pattern in each sequence. Name the missing terms.

A. 24, 34, 31, 41, 38, 48, , , , ...

One pattern is to add to one term and subtract from the next.

$48 - 3 =$ $45 + 10 =$ $55 - 3 =$

So , , and will be the next three terms.

B.

Position	1	2	3	4	5	6	7
Value of Term	1	4	2	8	<input type="text"/>	16	<input type="text"/>

A pattern is to one term by and divide the next term by .

$8 \div 2 =$ $16 \div 2 =$

So and are the missing terms.

Try This

1. Identify a pattern in the sequence. Name the next three terms.

12, 23, 34, , , , ...

2. Identify a pattern in the sequence. Name the missing terms.

8, 2, 16, 4, 32, , 64, 16, , ...

1-1 Comparing and Ordering Whole Numbers

Compare. Write $<$, $>$, or $=$.

1. 17,086,749 \square 17,210,345 \square

2. 512,007,956 \square 509,997,136 \square

3. The Empire State Building, built in 1960, is 15,000 inches high. The Sears Tower, built in 1983, is 17,400 inches high. Which building is taller?

Order the numbers from least to greatest.

4. 1,271; 1,089; 1,912

5. 6,366; 6,636; 3,636

6. 11,901; 13,102; 11,688

1-2 Estimate with Whole Numbers

Estimate each sum or difference by rounding to the place value indicated.

7. $57,024 + 21,879$; ten thousands

8. $14,507 - 9,613$; thousands

9. Anthony's fifth-grade class took a bus to the art museum. The museum was 76 miles away. The bus traveled an average of 40 mi/h. About how long did it take Anthony's class to get to the museum?

1-3 Exponents

Write each expression in exponential form.

10. $6 \times 6 \times 6 \times 6$ \square

11. $10 \times 10 \times 10 \times 10 \times 10 \times 10$ \square

Find each value.

12. 4^3 \square

13. 5^2 \square

14. 2^6 \square

15. 7^3 \square

1-4 Order of Operations

Evaluate each expression.

16. $6 \times 6 \div (4 + 5)$ 17. $4^2 - 18 \div 3 + 7$ 18. $21 - (3 + 2^3)$

19. Mrs. Berg buys 2 gallons of milk for \$2, a dozen eggs for \$3, and 3 bags of sugar for \$4. Find the total amount Mrs. Berg spends. **1-5 Mental Math**

Use mental math to find each sum or product.

20. $23 + 12 + 7 + 18$ 21. $2 \times 13 \times 5$

Use the Distributive Property to find each product.

22. 2×56 23. 8×36

24. The temperature on Monday was 63°F . The temperature was predicted to drop 4°F on Tuesday, rise 7°F on Wednesday, rise 2°F on Thursday, and drop 5°F on Friday. What was the predicted temperature on Friday? **1-6 Choose the Method of Computation**

Choose a solution method and solve. Explain your choice.

25. Jamie receives \$7.25 a week as allowance. How much does she receive in four weeks? 26. A factory produces 238 baseballs per minute. How many baseballs are produced in 360 minutes? **1-7 Patterns and Sequences**

Use the pattern below to write the first five terms of the sequence.

27. Start with 7, add 2.

28. Start with 3, multiply by 5.

Answer these question to summarize the important concepts from Chapter 1 in your own words.

1. Explain the rules when rounding numbers.

2. Explain how to evaluate 8^4 .

3. List the steps when evaluating an expression with more than one operation.

4. How can you use mental math to find the product of 7 and 53?

5. Explain how to find the rule in a numerical pattern.

For more review of Chapter 1:

- Complete the Chapter 1 Study Guide and Review on pages 42–44 of your textbook.
- Complete the Ready to Go On quizzes on pages 18 and 38 of your textbook.

Lesson Objectives

Identify and evaluate expressions

Vocabulary

variable (p. 54) _____

constant (p. 54) _____

algebraic expression (p. 54) _____

Additional Examples**Example 1**

Evaluate each expression to find the missing values in the table.

A.

y	$5 \times y$
16	80
27	<input type="text"/>
35	<input type="text"/>

Substitute for y in $5 \times y$.

$$y = 16; 5 \times 16 = 80$$

$$y = 27; 5 \times 27 = \boxed{}$$

$$y = \boxed{}; 5 \times \boxed{} = \boxed{}$$

The missing values are and .**B.**

z	$z \div 5 + 4$
20	8
45	<input type="text"/>
60	<input type="text"/>

Substitute for z in $z \div 5 + 4$.

$$z = 20; 20 \div 5 + 4 = 8$$

$$z = 45; \boxed{} \div 5 + 4 = \boxed{}$$

$$z = \boxed{}; \boxed{} \div 5 + 4 = \boxed{}$$

The missing values are and .

Example 2

A rectangle is 4 units wide. How many square units does the rectangle cover if it is 3, 4, 5, or 6 units long?

l	w	$l \times w$
3	4	12
4	4	
5	4	
6	4	

Make a to help you find the number of square units for each length.

$3 \times 4 = 12$ square units

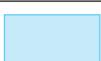
$4 \times 4 =$ square units

$5 \times 4 =$ square units

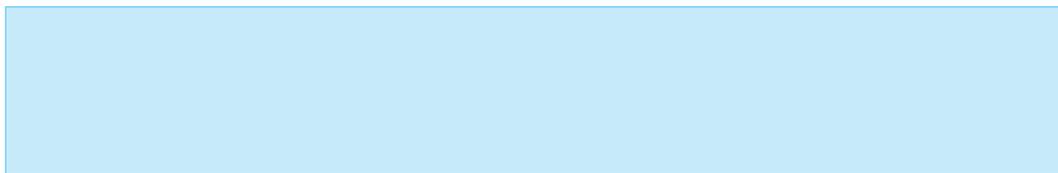
$6 \times 4 =$ square units

Try This

1. Complete the table.

z	$8 \times z + 2$
7	58
9	
11	

2. A rectangle is 7 units wide. How many square units does the rectangle cover if it is 8, 9, 10, or 11 units long?



Lesson Objectives

Translate between words and math

Additional Examples**Example 1**

- A. Lake Superior is the largest lake in North America. Let a stand for the area in square miles of Lake Superior. Lake Erie has an area of 9,910 square miles. Write an expression to show how much larger Lake Superior is than Lake Erie.**

To find how much larger, subtract the area of Lake Erie from the area of Lake Superior.

$$a - \boxed{}$$

Lake Superior is $\boxed{}$ square miles larger than Lake Erie.

- B. Let p represent the number of colored pencils in a box. If there are 26 boxes on the shelf, write an algebraic expression to represent the total number of pencils on the shelf.**

To put together 26 equal groups of p , multiply $\boxed{}$ times p .

$$\boxed{} p$$

There are $\boxed{}$ pencils on the shelf.

Example 2

Write each phrase as a numerical or algebraic expression.

- A. 987 minus 12**

$$987 \boxed{} 12$$

- B. x times 45**

$$45 \boxed{} x \text{ or } \boxed{}$$

Example 3

Write two phrases for each expression.

A. $\frac{16}{b}$

- 16 b
- the of 16 and b

B. $(75)(32)$

- 75 32
- the of 75 and 32

Try This

1. The Nile River is the world's longest river. Let n stand for the length in miles of the Nile. The Paraná River is 3,030 miles long. Write an expression to show how much longer the Nile is than the Paraná.

2. Write the phrase as a numerical or algebraic expression.

42 more than 79

3. Write two phrases for the expression.

$18 - r$

Lesson Objectives

Write expressions for tables and sequences

Example 1

Write an expression for the missing value in the table.

Spike's Age	Rusty's Age
2	6
3	7
4	8
a	<input type="text"/>

Rusty's age is Spike's age plus .

$$2 + 4 = \text{$$

$$3 + 4 = \text{$$

$$4 + 4 = \text{$$

$$\text{$$

Example 2

Write an expression for the sequence in the table.

Position	1	2	3	4	n
Value	7	10	13	16	<input type="text"/>

Look for a relationship between the and the of the terms in the sequence. Use guess and check.

Guess $7n$

Check by substituting 2.

$$\text{} \cdot 2 \text{ does not equal } 10.$$

Guess $3n + 2$.

Check by substituting 2.

$$\text{} \cdot 2 + \text{} \text{ does not equal } 10.$$

Guess $3n + 4$.

Check by substituting 2.

$$\text{} \cdot 2 + \text{} = \text{$$

The expression works for the entire sequence.

$$3 \cdot 1 + 4 = \text{, } 3 \cdot 2 + 4 = \text{, } 3 \cdot 3 + 4 = \text{, } 3 \cdot 4 + 4 = \text{$$

Example 3

A triangle has a base of 6 inches. The table shows the area of the triangle for different heights. Write an expression that can be used to find the area of the triangle when its height is h inches.

Base (in.)	Height (in.)	Area (in ²)
6	1	3
6	2	6
6	4	12
6	h	<input type="text"/>

$$6 \times 1 = 6, 6 \div 2 = 3$$

$$6 \times 2 = \text{[]}, 12 \div 2 = \text{[]}$$

$$6 \times 4 = \text{[]}, 24 \div 2 = \text{[]}$$

$$6 \times h = \text{[]}, 6h \div 2 = 3h$$

Try This

1. Write an expression for the missing value in the table.

Trucks	2	3	4	t
Tires	12	18	24	<input type="text"/>

2. Write an expression for the sequence in the table.

Position	1	2	3	4	n
Value	7	9	11	13	<input type="text"/>

3. A triangle has a base of 10 inches. The table shows the area of the triangle for different heights. Write an expression that can be used to find the area of the triangle when its height is h inches.

Height (in.)	1	2	4	h
Area (in ²)	5	10	20	<input type="text"/>

Lesson Objectives

Determine whether a number is a solution of an equation

Vocabulary

equation (p. 70) _____

solution (p. 70) _____

Additional Examples**Example 1**

Determine whether the given value of each variable is a solution.

A. $b - 447 = 1,203$ for $b = 1,650$

$$b - 447 = 1,203$$

$$1,650 - 447 \stackrel{?}{=} 1,203 \quad \boxed{} \quad 1,650 \text{ for } b.$$

$$1,203 \stackrel{?}{=} 1,203 \quad \boxed{}.$$

Because $\boxed{} = \boxed{}$,

1,650 is a solution to $b - 447 = 1,203$.

B. $27x = 1,485$ for $x = 54$

$$27x = 1,485$$

$$27 \cdot 54 \stackrel{?}{=} 1,485 \quad \boxed{} \quad 54 \text{ for } x.$$

$$1,458 \stackrel{?}{=} 1,485 \quad \boxed{}.$$

Because $\boxed{} \neq \boxed{}$,

54 is not a solution to $27x = 1,485$.

Example 2

Paulo says that the park is 19 yards long. Jamie says that the park is 664 inches long. Determine if these two measurements are equal.

$$36 \cdot y = i$$

$$36 \cdot y = 664$$

$$36 \cdot 19 \stackrel{?}{=} 664 \quad \text{Substitute } \boxed{} \text{ for } y.$$

$$684 \stackrel{?}{=} 664 \quad \boxed{}.$$

Because $\boxed{} \neq \boxed{}$, 19 yards is not equal to 664 inches.

Try This

1. Determine whether the given value of the variable is a solution.

$$u + 56 = 139 \text{ for } u = 73$$

2. Anna says that the table is 7 feet long. John says that the table is 84 inches long. Determine if these two measurements are equal.



Lesson Objectives

Solve whole-number addition equations

Additional Examples

Example 1

Solve each equation. Check your answers.

A. $x + 87 = 152$

$$x + 87 = 152$$

$$\begin{array}{r} - 87 \\ - 87 \end{array}$$

$$x = \boxed{}$$

87 is added to x .

87 from both sides to
undo the .

Check $x + 87 = 152$

$$65 + 87 \stackrel{?}{=} 152$$

$$152 \stackrel{?}{=} 152 \checkmark$$

Substitute for x in the equation.

is the solution.

B. $72 = 18 + y$

$$72 = 18 + y$$

$$\begin{array}{r} - 18 \\ - 18 \end{array}$$

$$\boxed{} = y$$

18 is added to y .

18 from both sides to
undo the .

Check $72 = 18 + y$

$$72 \stackrel{?}{=} 18 + 54$$

$$72 \stackrel{?}{=} 72 \checkmark$$

Substitute for y in the equation.

is the solution.

Example 2

Johnstown, Cooperstown, and Springfield are located in that order in a straight line along a highway. It is 12 miles from Johnstown to Cooperstown and 95 miles from Johnstown to Springfield. Find the distance d between Cooperstown and Springfield.

distance between Johnstown and Springfield	=	distance between Johnstown and Cooperstown	+	distance between Cooperstown and Springfield
95	=	12	+	d

$95 = 12 + d$ 12 is added to d .

$\begin{array}{r} 95 \\ - 12 \\ \hline \end{array} = \begin{array}{r} 12 + d \\ - 12 \\ \hline \end{array}$ 12 from both sides to undo
the .

= d

It is miles from Cooperstown to Springfield.

Try This

1. Solve the equation. Check your answer.

$u + 43 = 78$

2. Patterson, Jacobsville, and East Valley are located in that order in a straight line along a highway. It is 17 miles from Patterson to Jacobsville and 35 miles from Patterson to East Valley. Find the distance d between Jacobsville and East Valley.



Lesson Objectives

Solve whole-number subtraction equations

Additional Examples

Example 1

Solve each equation. Check your answers.

A. $y - 23 = 39$

$$y - 23 = 39$$

23 is subtracted from y .

$$\begin{array}{r} + 23 \\ + 23 \end{array}$$

23 to both sides to undo the

$$y = \boxed{}$$

Check $y - 23 = 39$

$$62 - 23 \stackrel{?}{=} 39$$

Substitute for y in the equation.

$$39 \stackrel{?}{=} 39 \checkmark$$

is the solution.

B. $78 = s - 15$

$$78 = s - 15$$

15 is subtracted from s .

$$\begin{array}{r} + 15 \\ + 15 \end{array}$$

15 to both sides to undo the

$$\boxed{} = s$$

Check $78 = s - 15$

$$78 \stackrel{?}{=} 93 - 15$$

Substitute for s in the equation.

$$78 \stackrel{?}{=} 78 \checkmark$$

is the solution.

Solve the equation. Check your answer.

C. $z - 3 = 12$

$$z - 3 = 12$$

3 is subtracted from z .

$$\begin{array}{r} + 3 \\ + 3 \end{array}$$

3 to both sides to undo the
.

$$z = \text{$$

Check $z - 3 = 12$

$$15 - 3 \stackrel{?}{=} 12$$

Substitute for z in the equation.

$$12 \stackrel{?}{=} 12 \checkmark$$

is the solution.

Try This

1. Solve the equation. Check your answer.

$$57 = c - 13$$

2. Solve the equation. Check your answer.

$$g - 62 = 14$$



Lesson Objectives

Solve whole-number multiplication equations

Additional Examples

Example 1

Solve each equation. Check your answers.

A. $5p = 75$

$$5p = 75$$

p is multiplied by 5.

$$\frac{5p}{5} = \frac{75}{5}$$

both sides by 5 to undo the

.

$$p = \text{$$

Check $5p = 75$

$$5(15) \stackrel{?}{=} 75$$

Substitute for p in the equation.

$$75 \stackrel{?}{=} 75 \checkmark$$

is the solution.

B. $16 = 8r$

$$16 = 8r$$

r is multiplied by 8.

$$\frac{16}{8} = \frac{8r}{8}$$

both sides by 8 to undo the

.

$$\text{} = r$$

Check $16 = 8r$

$$16 \stackrel{?}{=} 8(2)$$

Substitute for r in the equation.

$$16 \stackrel{?}{=} 16 \checkmark$$

is the solution.

Example 2

PROBLEM SOLVING APPLICATION

The area of a rectangle is 56 square inches. Its length is 8 inches. What is its width?

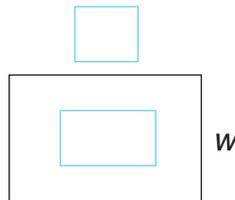
1. Understand the Problem

The answer will be the of the rectangle in inches.

List the important information:

- The area of the rectangle is square inches.
- The length of the rectangle is inches.

Draw a diagram to represent this information.



2. Make a Plan

You can write and solve an equation using the formula for area. To find the area of a rectangle, multiply its length by its width.

$$A = lw$$

$$56 = 8w$$

3. Solve

$56 = 8w$ w is multiplied by 8.

$\frac{56}{8} = \frac{8w}{8}$ both sides by 8 to undo the

= w

So the width of the rectangle is inches.

4. Look Back

Arrange 56 identical squares in a rectangle. The length is 8, so line up the squares in rows of 8. You can make 7 rows of 8, so the width of the rectangle is 7.

Try This**1. Solve the equation. Check your answer.**

$$8a = 72$$


2. Solve the equation. Check your answer.

$$18 = 3w$$


3. Problem Solving Application

The area of a rectangle is 48 square inches. Its width is 6 inches. What is its length?

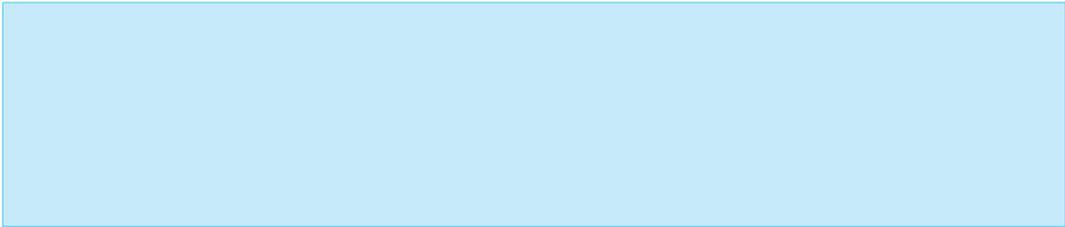
1. Understand the Problem

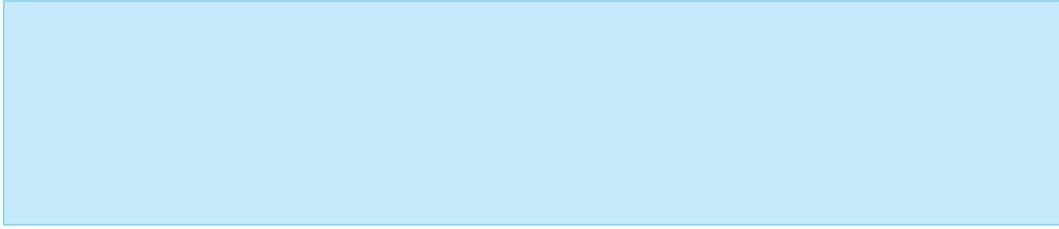
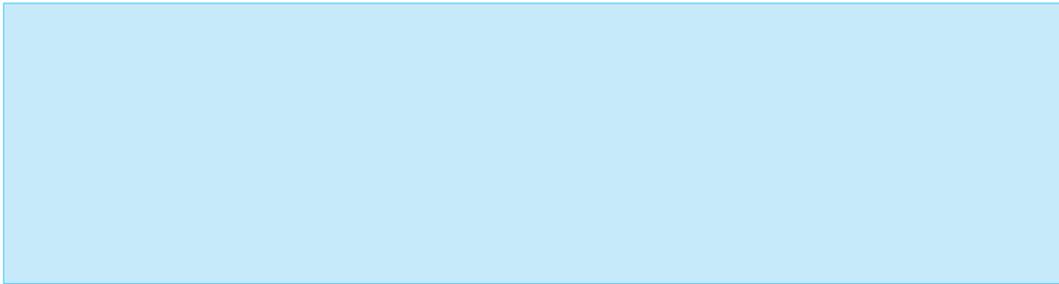
The answer will be the of the rectangle in inches.

List the important information:

- The area of the rectangle is square inches.
- The width of the rectangle is inches.

Draw a diagram to represent this information.



2. Make a Plan**3. Solve****4. Look Back**

Arrange 48 identical squares in a rectangle. The width is 6, so line up the squares in columns of 6. You can make columns of 6, so the length of the rectangle is .



Lesson Objectives

Solve whole-number division equations

Additional Examples

Example 1

Solve each equation. Check your answers.

A. $\frac{x}{7} = 5$

$$\frac{x}{7} = 5$$

x is divided by 7.

$$7 \cdot \frac{x}{7} = 7 \cdot 5$$

both sides by 7 to undo the

.

$$x = \text{$$

Check $\frac{x}{7} = 5$

$$\frac{35}{7} \stackrel{?}{=} 5$$

Substitute for x in the equation.

$$5 \stackrel{?}{=} 5 \checkmark$$

is the solution.

B. $13 = \frac{p}{6}$

$$13 = \frac{p}{6}$$

p is divided by 6.

$$6 \cdot 13 = 6 \cdot \frac{p}{6}$$

both sides by 6 to undo the

.

$$\text{} = p$$

Check $13 = \frac{p}{6}$

$$13 \stackrel{?}{=} \frac{78}{6}$$

Substitute for p in the equation.

$$13 \stackrel{?}{=} 13 \checkmark$$

is the solution.

Example 2

At Elk Meadows Park an aspen tree is one-third the height of a pine tree.

$$\text{height of aspen} = \frac{\text{height of pine}}{3}$$

The aspen tree is 14 feet tall. How tall is the pine tree?

Let h represent the height of the pine tree.

$$14 = \frac{h}{3}$$

Substitute 14 for height of aspen. h is divided by 3.

$$3 \cdot 14 = 3 \cdot \frac{h}{3}$$

both sides by 3 to undo the

$$\text{ } = h$$

The pine tree is feet tall.

Try This

1. Solve the equation. Check your answer.

$$72 = \frac{p}{4}$$

2. Jamie weighs one-half as much as her father.

$$\text{Jamie's weight} = \frac{\text{father's weight}}{2}$$

Jamie weighs 95 pounds. How many pounds does her father weigh?



2-1 Variables and Expressions

Evaluate each expression to find the missing values in the tables.

1.

m	$32 + m$
18	50
28	? <input type="text"/>
38	? <input type="text"/>

2.

n	$4 \times n + 15$
4	31
5	? <input type="text"/>
6	? <input type="text"/>

3. Laura's journal can fit 60 words on a page. How many words does Laura have if she fills 3, 4, 5, or 6 pages?

2-2 Translating Between Words and Math

Write each phrase as a numerical or algebraic expression.

4. 218 less than 345

5. the product of 5 and k

6. the sum of b and 98

Write two phrases for each expression.

7. $563 + 72$

8. $y \div 13$

9. $18p$

10. Let z represent the number of hours for which Kendall must do homework every night he has school. Write an expression for the number of hours for which Kendall must do homework in a week in which he had school Monday through Friday.

11. Let m represent the number of miles Skyler jogs every week. Write an expression for the number of miles Skyler jogs per day.

2-3 Translating Between Tables and Expressions

Write an expression for the missing value in the table.

12.

Bicycles	1	2	3	n
Wheels	2	4	6	?

Write an expression for the sequence in the table.

13.

Position	1	2	3	4	5	n
Value of Term	14	15	16	17	18	?

2-4 Equations and Their Solutions

Determine whether the given value of each variable is a solution.

14. $46 + t = 63$ for $t = 27$ 15. $7u = 42$ for $u = 6$ 16. $d - 26 = 12$ for $d = 38$

17. Ty bought 7 pens and should get \$2.25 back in change. The cashier gave him 10 quarters. Determine if Ty was given the correct amount of change. Explain.

2-5 Solving Addition Equations

Solve each equation. Check your answers.

18. $h + 34 = 87$ 19. $79 = 61 + v$ 20. $46 = d + 12$

21. A high school library has fiction and non-fiction books. There are 2,730 fiction books. The library has 7,680 books altogether. Write and solve an equation to find the number of non-fiction books in the high school library.

22. The drama club sold 596 tickets to the play. There were 387 people at the play on Friday. How many people were at the play on Saturday? Write and solve an equation to find the number of people at the play on Saturday.

2-6 Subtraction Equations

Solve each equation. Check your answers.

23. $r - 17 = 7$

24. $180 = 220 - k$

25. $74 - l = 59$

26. A football field is 100 yards long. A football team is on their own 34-yard line. Write and solve an equation to find the number of yards the team must go to score a touchdown.

2-7 Multiplication Equations

Solve each equation. Check your answers.

27. $7j = 28$

28. $125 = 5f$

29. $77 = 7w$

30. Corban bought 4 CDs for \$60. Each CD cost the same amount. Write and solve an equation to find the amount Corban spent per CD.

2-8 Division Equations

Solve each equation. Check your answers.

31. $10 = \frac{t}{6}$

32. $\frac{x}{5} = 8$

33. $6 = \frac{p}{8}$

34. Franz baked four dozen cookies for a bake sale. Each dozen cookies required three cups of chocolate chips. Write and solve an equation to find out how many cups of chocolate chips Franz bought.

Answer these question to summarize the important concepts from Chapter 2 in your own words.

1. Explain what it means to evaluate an expression with values of a variable.

2. When translating from words to math, there are key words that represent each operation. List two key words that represent addition. List two keys words for subtraction. List two key words for multiplication. List two key words for division.

3. What does it mean to be a solution of an equation?

4. Explain how to solve a whole-number equation.

For more review of Chapter 2:

- Complete the Chapter 2 Study Guide and Review on pages 94–96 of your textbook.
- Complete the Ready to Go On quizzes on pages 68 and 88 of your textbook.

Lesson Objectives

Write, compare, and order decimals using place value and number lines

Additional Examples

Example 1

Write each decimal in standard form, expanded form, and words.

A. 1.07

Expanded form: $1 +$

Word form: one and seven

B. $0.03 + 0.006 + 0.0009$

Standard form:

Word form: three hundred sixty-nine

Example 2

The star Wolf 359 has an apparent magnitude of 13.5. Suppose another star has an apparent magnitude of 13.05. Which star has the smaller magnitude?

13.50 Line up the decimal points.

13.05 Start from the and compare the digits.

Look for the place where the digits are different.

0 is less than 5.

$<$

The star that has an apparent magnitude of has the smaller magnitude.

Example 3

Order the decimals from least to greatest.

16.67, 16.6, 16.07

16.67 < Compare two of the numbers at a time.
 16.60 < Write 16.6 as "16.60."

16.67 < Start at the and compare
 16.07 < the digits.

16.60 < Look for the place where
 16.07 < the digits are different.

Graph the numbers on a number line.



The numbers are ordered when you read the number line from left to right.

The numbers in order from least to greatest are , ,
 and .

Try This

1. Write the decimal in standard form and expanded form.

eleven and two hundredths

2. Tina reported on a star for her science project that has a magnitude of 11.3. Maven reported on another star that has a magnitude of 11.03. Which star has the smaller magnitude?

Lesson Objectives

Estimate decimal sums, differences, products, and quotients

Vocabulary

clustering (p. 112) _____

front-end estimation (p. 113) _____

Additional Examples**Example 1**

Nancy wants to cycle, ice skate, and water ski for 30 minutes each. About how many calories will she burn in all? (Cycling = 165.5 calories, ice skating = 177.5 calories, and water skiing = 171.5 calories.)

$$165.5 \rightarrow 170$$

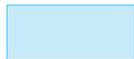
The addends around 170.

$$177.5 \rightarrow 170$$

To estimate the total number of calories,

$$+ 171.5 \rightarrow + 170$$

each addend to 170. Add.



Nancy burns about calories.

Example 2

Estimate by rounding to the indicated place value.

A. $7.13 + 4.68$; ones

$$7.13 + 4.68$$

Round to the nearest number.

$$\boxed{} + \boxed{} = \boxed{}$$

The sum is about .

B. $9.705 - 0.2683$; tenths

$$9.705 \quad 9.7$$

Round to the .

$$\begin{array}{r} 9.705 \\ - 0.2683 \\ \hline \end{array}$$

Align the .

$$\begin{array}{r} \\ - 0.3 \\ \hline \end{array}$$

Subtract.

Example 3

Estimate each product or quotient.

A. 33.83×1.98

$$35 \times 2 = \boxed{} \quad \boxed{} \text{ and } \boxed{} \text{ are compatible.}$$

So 33.83×1.98 is about .

B. $72.77 \div 26.14$

$$75 \div 25 = \boxed{} \quad \boxed{} \text{ and } \boxed{} \text{ are compatible.}$$

So $72.77 \div 26.14$ is about .

Example 4

Estimate a range for the sum.

$$7.86 + 36.97 + 5.40$$

$7.86 \rightarrow 7$	Add the <input type="text"/> numbers only.
$36.97 \rightarrow 36$	The whole-number values of the decimals are
$+ 5.40 \rightarrow + 5$	<input type="text"/> than the actual numbers, so the answer
at least <input type="text"/>	is an <input type="text"/> .

The exact answer of $7.86 + 36.97 + 5.40$ is or greater.

You can estimate a range for the sum by adjusting the decimal part of the numbers. Round the decimals to 0, 0.5, or 1.

$0.86 \rightarrow 1.00$	Add the <input type="text"/> part of the numbers.
$0.97 \rightarrow 1.00$	
$+ 0.40 \rightarrow + 0.50$	Add the whole-number estimate and the
<input type="text"/>	<input type="text"/> estimate.

$48.00 + 2.5 =$

The adjusted decimals are greater than the actual decimal, so 50.50 is an .

The estimated range for the sum is from to .

Try This

- Abner wants to run, roller-skate, and snow ski for 60 minutes each. About how many calories will he burn in all? (Running = 185.5 calories, roller-skating = 189.5 calories, and snow skiing = 191.5 calories.)

Lesson Objectives

Add and subtract decimals

Additional Examples**Example 1**

Carly Patterson's Preliminary Scores	
Event	Points
Floor exercise	9.7
Balance beam	9.7
Vault	9.3
Uneven bars	9.45

A. What was Carly Patterson's total for the events other than the floor exercise?

Find the sum of 9.7, 9.3, and 9.45.

$$9.7 + 9.3 + 9.45$$

Estimate by rounding to the nearest whole number.

$$\begin{array}{r} \downarrow \quad \downarrow \quad \downarrow \\ 10 + 9 + 9 = \boxed{} \end{array} \quad \text{The total is about } \boxed{} \text{ points.}$$

$$\begin{array}{r} 9.70 \\ 9.30 \\ + 9.45 \\ \hline \end{array}$$

Align the $\boxed{}$ points.Use $\boxed{}$ as placeholders.

Add. Then place the decimal point.

Since $\boxed{}$ is close to the estimate of 28, the answer is reasonable. Carly Patterson's total for the events other than the floor exercise was $\boxed{}$.

B. How many more points did Carly need on the vault to have a perfect score?

Find the difference between 10 and .

$$\begin{array}{r} 10.0 \\ - 9.3 \\ \hline \end{array}$$

Align the points.
Use as placeholders.
Subtract. Then place the decimal point.

Carly needed another points to have a perfect score.

Example 2

Find each sum or difference.

A. $1.8 + 0.2$

$1.8 + 0.2 = \text{}$

Think: $0.8 + 0.2 = \text{}$.

B. $4 - 0.7$

$4 - 0.7 = \text{}$

Think: What number added to is 1?
 $0.7 + \text{} = 1$
So $1 - 0.7 = \text{}$.

Example 3

Evaluate $6.73 - x$ for each value of x .

A. $x = 3.8$

$6.73 - x$

$6.73 - \text{}$

6.73

$- 3.80$

$\text{}$

Substitute for x .

Align the decimal points.

Use a as a placeholder.

Subtract. Place the decimal point.

B. $x = 2.9765$

$$6.73 - x$$

$$6.73 - \boxed{}$$

$$6.7300$$

$$\underline{- 2.9765}$$

Substitute $\boxed{}$ for x .

Align the decimal points.

Use $\boxed{}$ as placeholders.

Subtract. Place the decimal point.

Try This

1. What was Carly Patterson's total for the events other than the vault exercise?

2. Find the difference.

$$6 - 0.3$$

3. Evaluate $7.58 - x$ for the value of x .

$$x = 3.8$$



Lesson Objectives

Write large numbers in scientific notation

Vocabulary

scientific notation (p. 124) _____

Additional Examples

Example 1

Find each product.

A. $5,892 \times 1,000$

There are zeros in 1,000.

$5,892,000$

To multiply, move the decimal point places to the .

=

Write placeholder zeros.

B. $47.75 \times 10,000$

There are zeros in 10,000.

47.7500

To multiply, move the decimal point places to the .

=

Write placeholder zeros.

Example 2

Write 6,000,000 in scientific notation.

$6,000,000$

Move the decimal point places .

The power of 10 is .

$6,000,000 =$

Example 3

Write 6.2174×10^3 in standard form.

6.2174×10^3 The power of 10 is .

6.2174 Move the decimal point places .

$6.2174 \times 10^3 =$

Example 4

Write the distance to the sun, 93,000,000 miles, in scientific notation.

93,000,000 Move the decimal point to form a number greater than and less than .

93,000,000 Multiply that number by a power of .

 The power of 10 is , because the decimal point is moved places left.

The distance to the sun is miles.

Try This

1. Find the product.

$52.91 \times 10,000$

2. Write 8,000,000 in scientific notation.

3. Write 9.77×10^5 in standard form.

Lesson Objectives

Multiply decimals by whole numbers and by decimals

Additional Examples**Example 1**

Something that weighs 1 lb on Earth weighs 0.17 lb on the Moon. How much would a 4 lb dumbbell weigh on the Moon?

$$4 \times 0.17$$

$$\begin{array}{r} 0.17 \\ 0.17 \\ 0.17 \\ + 0.17 \\ \hline \end{array}$$



You can think of multiplication by a whole number as repeated .

You can also multiply as you would with whole numbers. Place the decimal point by adding the number of decimal places in the numbers multiplied.

$$0.17$$

$$\times 4$$



decimal places



+ decimal places



decimal places

A 4 lb dumbbell on Earth weighs lb on the Moon.

Example 2

Find each product.

A. 0.3×0.4

$$\begin{array}{r} 0.3 \\ \times 0.4 \\ \hline \end{array}$$

Multiply. Then place the decimal point.

$$\begin{array}{r} \square \text{ decimal place} \\ + \square \text{ decimal place} \\ \hline \square \text{ decimal places} \end{array}$$

Find each product.

B. 0.07×0.8

$$0.07 \times 1 = \square$$

Estimate the product. \square is close to 1.

Multiply. Then place the decimal point.

$$\begin{array}{r} 0.07 \\ \times 0.8 \\ \hline \end{array}$$

$$\begin{array}{r} \square \text{ decimal places} \\ + \square \text{ decimal place} \\ \hline \square \text{ decimal places; use a placeholder zero} \end{array}$$

\square is close to the estimate of \square .

The answer is reasonable.

C. 1.34×2.5

$$1 \times 3 = 3$$

Estimate the product. Round each factor to the nearest \square number.

Multiply. Then place the decimal point.

$$\begin{array}{r} 1.34 \\ \times 2.5 \\ \hline 670 \\ 2680 \\ \hline \end{array}$$

$$\begin{array}{r} \square \text{ decimal places} \\ + \square \text{ decimal place} \\ \hline \square \text{ decimal places} \end{array}$$

\square is close to the estimate of \square .

The answer is reasonable.

Example 3

Evaluate $5x$ for each value of x .

A. $x = 3.062$

$5x = 5(\text{ })$ Substitute $\text{ }(\text{ })$ for x .

3.062 $\times 5$ <hr style="border: 0; border-top: 1px solid black; margin: 2px 0;"/> <div style="background-color: #e0f0ff; height: 20px; width: 100%;"></div>	<table style="border-collapse: collapse;"> <tr> <td style="text-align: center; width: 20px;">$\text{ }(\text{ })$</td> <td style="padding-left: 10px;">decimal places</td> </tr> <tr> <td style="text-align: center;">$+$</td> <td style="padding-left: 10px;">$\text{ }(\text{ })$ decimal places</td> </tr> <tr> <td style="text-align: center;"><hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/></td> <td style="padding-left: 10px;">$\text{ }(\text{ })$ decimal places</td> </tr> </table>	$\text{ }(\text{ })$	decimal places	$+$	$\text{ }(\text{ })$ decimal places	<hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/>	$\text{ }(\text{ })$ decimal places
$\text{ }(\text{ })$	decimal places						
$+$	$\text{ }(\text{ })$ decimal places						
<hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/>	$\text{ }(\text{ })$ decimal places						

B. $x = 4.79$

$5x = 5(\text{ })$ Substitute $\text{ }(\text{ })$ for x .

4.79 $\times 5$ <hr style="border: 0; border-top: 1px solid black; margin: 2px 0;"/> <div style="background-color: #e0f0ff; height: 20px; width: 100%;"></div>	<table style="border-collapse: collapse;"> <tr> <td style="text-align: center; width: 20px;">$\text{ }(\text{ })$</td> <td style="padding-left: 10px;">decimal places</td> </tr> <tr> <td style="text-align: center;">$+$</td> <td style="padding-left: 10px;">$\text{ }(\text{ })$ decimal places</td> </tr> <tr> <td style="text-align: center;"><hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/></td> <td style="padding-left: 10px;">$\text{ }(\text{ })$ decimal places</td> </tr> </table>	$\text{ }(\text{ })$	decimal places	$+$	$\text{ }(\text{ })$ decimal places	<hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/>	$\text{ }(\text{ })$ decimal places
$\text{ }(\text{ })$	decimal places						
$+$	$\text{ }(\text{ })$ decimal places						
<hr style="border: 0; border-top: 1px solid black; width: 20px; margin: 2px 0;"/>	$\text{ }(\text{ })$ decimal places						

Try This

1. Something that weighs 1 lb on Earth weighs 0.17 lb on the Moon. How much would a 7 lb dumbbell weigh on the Moon?

2. Find the product.

3.80×3.3

3. Evaluate $5x$ for the value of x .

$x = 6.22$

Lesson Objectives

Divide decimals by whole numbers

Additional Examples

Example 1

Find each quotient.

A. $0.84 \div 3$

$$\begin{array}{r} \boxed{} \\ 3 \overline{)0.84} \\ \underline{-6} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$

Place a decimal point in the directly above the decimal point in the . Divide as you would with numbers.

B. $3.56 \div 4$

$$\begin{array}{r} \boxed{} \\ 4 \overline{)3.56} \\ \underline{-32} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

Place a decimal point in the directly above the decimal point in the . Divide as you would with .

Example 2

Evaluate $0.936 \div x$ for each given value of x .

A. $x = 9$

$0.936 \div x$

$0.936 \div \boxed{}$

Substitute for x .

$$\begin{array}{r} \boxed{} \\ 9 \overline{)0.936} \\ \underline{-9} \\ 3 \\ \underline{-0} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

Sometimes you need to use a as a placeholder.

$9 > 3$, so place a zero in the quotient and divide 9 into 36.

Evaluate $0.936 \div x$ for each given value of x .

B. $x = 18$

$$0.936 \div x$$

$$0.936 \div \boxed{}$$

Substitute $\boxed{}$ for x .

$$\begin{array}{r} \boxed{} \\ 18 \overline{)0.936} \\ \underline{-0} \\ 93 \\ \underline{-90} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

Sometimes you need to use a $\boxed{}$ as a placeholder.

$18 > 9$, so place a zero in the quotient and divide 18 into 93.

Example 3

Jodi and three of her friends are making a tile design. The materials cost \$10.12. If they share the cost equally, how much should each person pay?

\$10.12 should be divided into four equal groups.

Divide \$10.12 by $\boxed{}$.

$$\begin{array}{r} \boxed{} \\ 4 \overline{)10.12} \\ \underline{-8} \\ 21 \\ \underline{-20} \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

Place a $\boxed{}$ in the quotient directly above the decimal point in the dividend.

Divide as you would with whole numbers.

Each person should pay $\boxed{}$.

Try This

1. Find the quotient.

$$2.96 \div 4$$



Lesson Objectives

Divide whole numbers and decimals by decimals

Additional Examples

Example 1

Find each quotient.

A. $5.2 \div 1.3$

$$1.3 \overline{)5.2}$$

Multiply the divisor and dividend by the same power of ten.

$$\begin{array}{r} \square \\ \hline \end{array}$$

There is \square decimal place in the divisor.

$$\begin{array}{r} 13 \overline{)52} \\ - 52 \\ \hline 0 \end{array}$$

Multiply by 10^1 , or \square .

Think: $1.3 \times 10 = \square$ $5.2 \times 10 = \square$

Divide.

B. $61.3 \div 0.36$

$$0.36 \overline{)61.30}$$

Make the divisor a \square by multiplying

$$\square$$

the divisor and dividend by \square , or \square .

$$\begin{array}{r} 36 \overline{)6130.00} \\ - 36 \downarrow \\ \hline 253 \\ - 252 \downarrow \\ \hline 100 \\ - 72 \downarrow \\ \hline 280 \\ - 252 \downarrow \\ \hline 28 \end{array}$$

Place the \square in the quotient.

Divide.

When there is a remainder, place a \square after the decimal point in the dividend and continue to divide.

$$61.3 \div 0.36 = \square$$

Try This**1. Find the quotient.**

$$51.2 \div 0.24$$

2. Problem Solving Application

After driving 191.1 miles, the Changs used 10.5 gallons of gas. On average, how many miles did they drive per gallon of gas?

1. Understand the Problem

The answer will be the average number of miles per gallon.

List the important information:

They drove miles. They used gallons of gas.

2. Make a Plan

Solve a simpler problem by replacing the decimals in the problem with whole numbers.

If they drove 10 miles using 2 gallons of gas, they averaged 5 miles per gallon. You need to divide by to solve the problem.

3. Solve**4. Look Back**

Use compatible numbers to estimate the quotient.

$$191.1 \div 10.5 \longrightarrow 190 \div 10 = 19$$

The answer is reasonable since 18.2 is close to the estimate of 19.

Lesson Objectives

Solve problems by interpreting the quotient

Additional Examples**Example 1**

Suppose Mark wants to make bags of slime. If each bag of slime requires 0.15 kg of corn starch and he has 1.23 kg, how many bags of slime can he make?

The question asks how many whole bags of slime can be made when the corn starch is divided into groups of 0.15 kg.

$$1.23 \div 0.15 = \boxed{}$$

Think: The quotient shows that there is not enough to make $\boxed{}$ bags of slime that are 0.15 kg each. There is only enough for $\boxed{}$ bags. The decimal part of the quotient will not be used in the answer.

Mark can make $\boxed{}$ bags of slime.

Example 2

There are 237 students in the seventh grade. If Mr. Jones buys rolls of film with 36 exposures each, how many rolls will he need to take every student's picture?

The question asks how many rolls are needed to take a picture of every one of the students.

$$237 \div 36 = \boxed{}$$

Think: $\boxed{}$ rolls of film will not be enough to take every student's picture.

Mr. Jones will need to buy another roll of film. The quotient must be rounded up to the next highest $\boxed{}$ number.

Mr. Jones will need $\boxed{}$ rolls of film.

Example 3

Gary has 42.25 meters of rope. If he cuts it into 13 equal pieces, how long is each piece?

The question asks exactly how long each section will be when the rope is cut into 13 equal pieces.

$$42.25 \div 13 = \boxed{}$$

Think: The question asks for an exact answer; so do not estimate. Use the entire quotient.

Each piece will be meters long.

Try This

1. Suppose Antonio wants to make bags of slime. If each bag of slime requires 0.15 kg of corn starch and he has 1.44 kg, how many bags of slime can he make?

2. There are 342 students in the seventh grade. If Ms. Tia buys rolls of film with 24 exposures each, how many rolls will she need to take every student's picture?

3. Ethan has 64.20 meters of rope. If he cuts it into 15 equal pieces, how long is each piece?



Lesson Objectives

Solve equations involving decimals

Additional Examples

Example 1

Solve each equation. Check your answer.

A. $k - 6.2 = 9.5$

$$k - 6.2 = 9.5$$

6.2 is subtracted from k .

$$\begin{array}{r} + 6.2 \\ + 6.2 \end{array}$$

Add to both sides to undo the

$$k = \text{[]}$$

Check $k - 6.2 = 9.5$

$$15.7 - 6.2 \stackrel{?}{=} 9.5$$

Substitute for k in the equation.

$$9.5 \stackrel{?}{=} 9.5 \checkmark$$

is the solution.

B. $6k = 7.2$

$$6k = 7.2$$

k is multiplied by 6.

$$\frac{6k}{6} = \frac{7.2}{6}$$

Divide both sides by to undo the

$$k = \text{[]}$$

Check $6k = 7.2$

$$6(1.2) \stackrel{?}{=} 7.2$$

Substitute for k in the equation.

$$7.2 \stackrel{?}{=} 7.2 \checkmark$$

is the solution.

Solve the equation. Check your answer.

C. $\frac{m}{7} = 0.6$

$$\frac{m}{7} = 0.6$$

m is divided by 7.

$$\frac{m}{7} \cdot 7 = 0.6 \cdot 7$$

Multiply both sides by to undo the

.

$$m = \text{$$

Check $\frac{m}{7} = 0.6$

$$\frac{4.2}{7} \stackrel{?}{=} 0.6$$

Substitute for m in the equation.

$$0.6 \stackrel{?}{=} 0.6 \checkmark$$

is the solution.

Example 2

A. The area of Emily's floor is 33.75 m^2 . If its length is 4.5 meters, what is its width?

$$\text{area} = \text{length} \cdot \text{width}$$

$$\text{} = \text{} \cdot w$$

Write the equation for the problem.

$$33.75 = 4.5w$$

Let w be the of the room.

$$\frac{33.75}{4.5} = \frac{4.5w}{4.5}$$

w is multiplied by .

$$\text{} = w$$

Divide both sides by to undo the multiplication.

The width of the floor is meters.

B. If carpet costs \$23 per m², what is the total cost to carpet the floor?

total cost = area • cost of carpet per square meter

$$C = \boxed{} \cdot 23$$

Let $\boxed{}$ be the $\boxed{}$.

Write the equation for the problem.

$$C = \boxed{}$$

Multiply.

The total cost of carpeting the floor is $\boxed{}$.

Try This

1. Solve the equation. Check your answer.

$$\frac{w}{9} = 0.3$$

2. The area of Yvonne's bedroom is 181.25 ft². If its length is 12.5 feet, what is its width?

**3-1 Representing, Comparing, and Ordering Decimals**

Write each number in words.

1. 7.09

2. 125.856

Order the numbers from greatest to least.

3. 24.428, 24.4285, 23.4389

4. 2.04, 2.004, 2.404, 2.4

3-2 Estimating Decimals

Estimate each by rounding to the indicated place value.

5. $8.497 - 1.346$; tenths

6. $14.8557 + 11.7391$; hundredths

Estimate each product or quotient.

7. 7.83×2.692

8. $18.237 \div 5.914$

9. $28.652 \div 4.836$

10. Ruthie bought 3 packages of ground beef, weighing 1.8 pounds, 2.2 pounds and 3.6 pounds. The beef costs \$3.59 per pound. Estimate the total cost.

3-3 Adding and Subtracting Decimals

11. Kristy bought a birthday card for \$2.95, a book for \$12.29, and wrapping paper for \$1.15. She paid with a \$20 bill. How much change should she get back?

Add or subtract.

12. $3.73 + 7.29$

13. $12.628 - 7.563$

14. $32.876 + 14.69$

3-4 Scientific Notation

Write each number in standard form.

15. 4.592×10^5

16. 2.47×10^3

17. 9.40×10^2

18. Mumbai, India is the most populated city in the world with a population of 11,914,398. Round the population to the nearest hundred thousand. Then write that number in scientific notation.

3-5 Multiplying Decimals

Find each product.

19.
$$\begin{array}{r} 0.07 \\ \times 0.8 \\ \hline \end{array}$$

20.
$$\begin{array}{r} 0.42 \\ \times 0.09 \\ \hline \end{array}$$

21. 0.007×0.06

22. 3.0×0.0009

Evaluate.

23. $5t - 12 + t$ for $t = 4.6$

24. $6^3 + 8p + p$ for $p = 0.39$

25. A piece of ribbon 3.2 inches in length is needed to make a small bow. How much ribbon is needed to make three small bows?

3-6 Dividing Decimals by Whole NumbersEvaluate $x \div 6$ for each given value of x .

26. $x = 35.19$

27. $x = 6.312$

28. $x = 0.354$

29. $x = 0.846$

Find the value of each expression.

30. $(0.035 + 0.27) \div 5$

31. $(8.5 - 4.175) \div 5$

32. $(15.78 - 9.3) \div 8$

33. Four friends went to dinner. The bill was \$63.60. They split the bill evenly. How much did each friend pay?

3-7 Dividing by Decimals

Divide.

34. $14.4 \div 0.6$

35. $45.612 \div 1.4$

36. $0.9132 \div 0.06$

Evaluate.

37. $0.66 \div c$ for $c = 0.04$

38. $y \div 3.28$ for $y = 22.468$

39. Ryan and his family drove 447.3 miles using 14.2 gallons of gasoline. On average, how many miles did they drive per gallon of gas?

3-8 Interpret the Quotient

40. Marisa needs 105 thank-you cards for her graduation party guests. The cards come in packages of 12. How many packages will she need to buy?

41. There are 907 g in a box of pancake mix. Each serving size is 60 g. How many servings are in one box?

42. Cady's dog, Blitz, eats 2.75 cups of dog food each day. There are 88 cups of dog food in a bag. How many days will the bag of dog food last?

3-9 Solving Decimal Equations

Solve each equation. Check your answer.

43. $3.2 = \frac{m}{7}$

44. $7.4f = 44.4$

45. $z - 53.56 = 11.093$

46. Jeremy read his book at a rate of 13.4 pages per hour. At this rate, how many pages will he read in 8 hours?



Answer these questions to summarize the important concepts from Chapter 3 in your own words.

1. Explain how to compare two decimals.

2. List methods used to estimate the answer to decimal computation problems.

3. List the steps when adding or subtracting decimals.

4. What determines the power of 10, when a number is written in scientific notation?

5. List the steps when dividing by decimals.

For more review of Chapter 3:

- Complete the Chapter 3 Study Guide and Review on pages 152–154.
- Complete the Ready to Go On quizzes on pages 122 and 148.

Lesson Objectives

Use divisibility rules

Vocabulary

divisible (p. 164) _____

composite number (p. 165) _____

prime number (p. 165) _____

Additional Examples**Example 1****A. Tell whether 462 is divisible by 2, 3, 4, and 5.**

2	The last digit, 2, is <input type="text"/> .	Divisible
3	The sum of the digits is $4 + 6 + 2 = 12$. 12 is divisible by <input type="text"/> .	Divisible
4	The last two digits form the number 62. 62 is not divisible by <input type="text"/> .	Not divisible
5	The last digit is 2.	Not divisible

So 462 is divisible by and .

B. Tell whether 540 is divisible by 6, 9, and 10.

6	The number is divisible by both <input type="text"/> and <input type="text"/> .	Divisible
9	The sum of the digits is $5 + 4 + 0 = 9$. 9 is divisible by <input type="text"/> .	Divisible
10	The last digit is <input type="text"/> .	Divisible

So 540 is divisible by , , and .

Example 2

Tell whether each number is prime or composite.

- A. 23 divisible by
- B. 48 divisible by
- C. 31 divisible by
- D. 18 divisible by

Try This

1. Tell whether 114 is divisible by 2, 3, 4, and 5.

2. Tell whether the number is prime or composite.

27

Lesson Objectives

Write prime factorizations of composite numbers

Vocabulary

factor (p. 169) _____

prime factorization (p. 169) _____

Additional Examples**Example 1**

List all of the factors of the number.

A. 16

Begin listing factors in pairs.

$$16 = 1 \cdot 16 \quad 1 \text{ is a factor.}$$

$$16 = 2 \cdot 8 \quad 2 \text{ is a factor.}$$

3 is not a factor.

$$16 = 4 \cdot 4 \quad 4 \text{ is a factor.}$$

5 is not a factor.

6 is not a factor.

7 is not a factor.

$$16 = 8 \cdot 2 \quad 8 \text{ and } 2 \text{ have already been listed, so stop here.}$$

The factors of 16 are .

B. 19

$$19 = \square \cdot \square$$

Begin listing factors in pairs.

19 is not divisible by any other whole numbers.

The factors of 19 are .

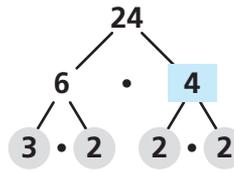
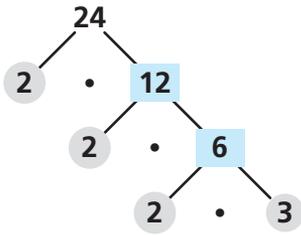
Example 2

Write the prime factorization of each number.

A. 24

Method 1: Use a factor tree.

Choose any two factors of 24 to begin. Keep finding factors until each branch ends at a prime factor.



24 =

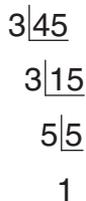
24 =

The prime factorization of 24 is , or .

B. 45

Method 2: Use a ladder diagram.

Choose a prime factor of 45 to begin. Keep dividing by prime factors until the quotient is 1.



45 =

45 =

The prime factorization of 45 is or .

Try This

1. List all factors of the number.

12

Lesson Objectives

Find the greatest common factor (GCF) of a set of numbers

Vocabulary

greatest common factor (GCF) (p. 173) _____

Additional Examples**Example 1**

Find the GCF of each set of numbers.

A. 28 and 42

Method 1: List the factors.

factors of 28: 1, 2, 4, 7, 14, 28

List all the factors.

factors of 42: 1, 2, 3, 6, 7, 14, 21, 42

Circle the .

The GCF of 28 and 42 is .

B. 18, 30, and 24

Method 2: Use the prime factorization.

$$18 = 2 \cdot 3 \cdot 3$$

Write the

of each number.

$$30 = 2 \cdot 3 \cdot 5$$

$$24 = 2 \cdot 3 \cdot 2 \cdot 2$$

Find the common factors.

$$2 \cdot 3 = 6$$

Find the of the common prime factors.

The GCF of 18, 30, and 24 is .

Example 2

PROBLEM SOLVING APPLICATION

Jenna has 16 red flowers and 24 yellow flowers. She wants to make bouquets with the same number of each color flower in each bouquet. What is the greatest number of bouquets she can make?

1. Understand the Problem

The answer will be the greatest number of bouquets 16 red flowers and 24 yellow flowers can form so that each bouquet has the same number of red flowers, and each bouquet has the same number of yellow flowers.

2. Make a Plan

You can make an organized list of the possible bouquets.

3. Solve

Red	Yellow	Bouquets
2	3	<p>16 red, 24 yellow: Every flower is in a bouquet ✓</p>

The greatest number of bouquets Jenna can make is .

4. Look Back

To form the largest number of bouquets, find the GCF of 16 and 24.

factors of 16: 1, 2, 4, 8, 16

factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

The GCF of 16 and 24 is .

Try This**1. Find the GCF of the set of numbers.**

40, 16, and 24

2. Problem Solving Application

Peter has 18 oranges and 27 pears. He wants to make fruit baskets with the same number of each fruit in each basket. What is the greatest number of fruit baskets he can make?

1. Understand the Problem

The answer will be the greatest number of fruit baskets 18 oranges and 27 pears can form so that each basket has the same number of oranges, and each basket has the same number of pears.

2. Make a Plan

You can make an organized list of the possible fruit baskets.

3. Solve**4. Look Back**

To form the largest number of baskets, find the of 18 and 27.

factors of 18:

factors of 27:

The GCF of 18 and 27 is .

Lesson Objectives

Convert between decimals and fractions

Vocabulary

mixed number (p. 181) _____

terminating decimal (p. 182) _____

repeating decimal (p. 182) _____

Additional Examples**Example 1**

Write each decimal as a fraction or mixed number.

A. 0.67

0.67

Identify the place value of the digit farthest to the right. _____

The 7 is in the _____ place, so use
_____ as the denominator.**B.** 5.9

5.9

Identify the place value of the digit farthest to the right. _____

Write the whole number, _____.

The 9 is in the _____ place, so use _____ as the
denominator.

Example 2

Write each fraction or mixed number as a decimal.

A. $\frac{3}{20}$

$$\begin{array}{r} \boxed{} \\ 20 \overline{) 3.00} \\ \underline{- 20} \\ 100 \\ \underline{- 100} \\ 0 \end{array}$$

Divide $\boxed{}$ by $\boxed{}$.

Add zeros after the decimal point.

The remainder is 0.

$$\frac{3}{20} = \boxed{}$$

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

$$\begin{array}{r} 0.333 \\ 3 \overline{) 1.000} \\ \underline{- 9} \\ 10 \\ \underline{- 9} \\ 10 \\ \underline{- 9} \\ 1 \end{array}$$

Divide $\boxed{}$ by $\boxed{}$.

Add zeros after the decimal point.

The $\boxed{}$ repeats in the quotient.

$$6\frac{1}{3} = \boxed{} = \boxed{}$$

Example 3

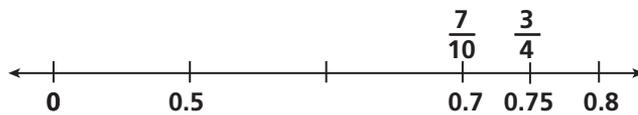
Order the fractions and decimal from least to greatest.

$$\frac{3}{4}, 0.8, \frac{7}{10}$$

First, rewrite the fractions as .

$$\frac{3}{4} = \text{} \qquad \frac{7}{10} = \text{}$$

Order the three decimals.



The numbers in order from least to greatest are .

Try This

1. Write the decimal as a mixed number.

$$4.8$$

2. Write the fraction as a decimal.

$$\frac{5}{20}$$

3. Order the fractions and decimal from least to greatest.

$$\frac{1}{2}, 0.35, \frac{1}{4}$$

Lesson Objectives

Write equivalent fractions and mixed numbers

Vocabulary

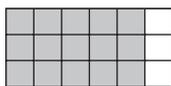
equivalent fractions (p. 186) _____

simplest form (p. 187) _____

Additional Examples**Example 1**Find two equivalent fractions for $\frac{10}{12}$.

$$\frac{10}{12}$$

=



$$\frac{\quad}{\quad}$$

=



$$\frac{\quad}{\quad}$$

So $\frac{10}{12}$, $\frac{\quad}{\quad}$, and $\frac{\quad}{\quad}$ are all equivalent fractions.**Example 2**

Find the missing number that makes the fractions equivalent.

$$A. \frac{3}{5} = \frac{\quad}{20}$$

In the denominator, $\frac{\quad}{\quad}$ is multiplied by $\frac{\quad}{\quad}$ to get 20.

$$\frac{3 \cdot 4}{5 \cdot 4} = \frac{\quad}{\quad}$$

Multiply the numerator, $\frac{\quad}{\quad}$, by the same number, $\frac{\quad}{\quad}$.So $\frac{3}{5}$ is equivalent to $\frac{\quad}{\quad}$.

Find the missing number that makes the fractions equivalent.

B. $\frac{4}{5} = \frac{80}{\square}$

In the numerator, \square is multiplied by \square to get 80.

$\frac{4 \cdot 20}{5 \cdot 20} = \square$

Multiply the denominator, \square , by the same number, \square .

So $\frac{4}{5}$ is equivalent to \square .

Example 3

Write each fraction in simplest form.

A. $\frac{20}{48}$

The GCF of 20 and 48 is \square , so $\frac{20}{48}$ is not in simplest form.

Method 1: Use the GCF.

$\frac{20 \div 4}{48 \div 4} = \square$ Divide \square and \square by their GCF, \square .

B. $\frac{7}{10}$

The GCF of 7 and 10 is \square , so $\frac{7}{10}$ is already in simplest form.

Try This

1. Find two equivalent fractions for $\frac{4}{6}$.

2. Find the missing number that makes the fractions equivalent.

$\frac{3}{9} = \frac{\square}{27}$

Mixed Numbers and Improper Fractions

Lesson Objectives

Convert between mixed numbers and improper fractions

Vocabulary

improper fraction (p. 192) _____

proper fraction (p. 192) _____

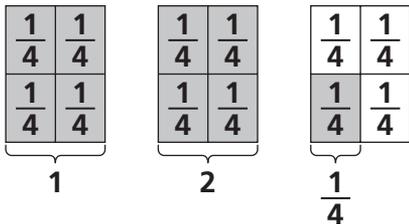
Additional Examples

Example 1

Ella hiked for $\frac{9}{4}$ hours yesterday. Write $\frac{9}{4}$ as a mixed number.

Method 1: Use a model.

Draw squares divided into fourth sections. Shade of the sections.



There are whole squares and fourth square, or squares, shaded.

Method 2: Use division.

$$\begin{array}{r} \text{[shaded box]} \\ 4 \overline{) 9} \\ \underline{- 8} \\ 1 \end{array}$$

Divide the numerator by the denominator.

To form the fraction part of the quotient, use the remainder

as the and the divisor as the

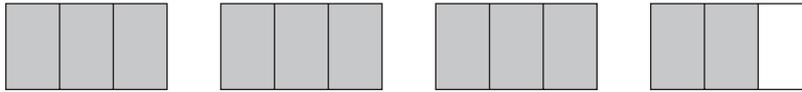
.

Example 2

Write $3\frac{2}{3}$ as an improper fraction.

Method 1: Use a model.

You can draw a diagram to illustrate the whole and fractional parts.



There are thirds or . Count the thirds in the diagram.

Method 2: Use multiplication and addition.

When you are changing a mixed number to an improper fraction, spiral clockwise as shown in the picture. The order of operations will help you remember to multiply before you add.

$$3\frac{2}{3} = \frac{(3 \cdot 3) + 2}{3}$$

$$= \frac{9 + 2}{3}$$

Multiply the number
by the and
add the .

Then add.



Multiply.

Keep the same .

=

Try This

1. Arnold biked for $\frac{7}{4}$ hours yesterday. Write $\frac{7}{4}$ as a mixed number.

2. Write $4\frac{1}{3}$ as an improper fraction.

Lesson Objectives

Use pictures and number lines to compare and order fractions

Vocabulary

like fractions (p. 198) _____

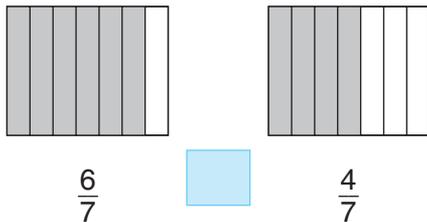
unlike fractions (p. 198) _____

common denominator (p. 199) _____

Additional Examples**Example 1**

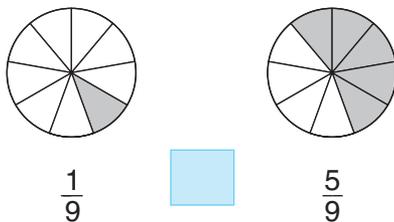
Compare. Write $<$, $>$, or $=$.

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



From the model, $\frac{6}{7}$ $\frac{4}{7}$.

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



From the model, $\frac{1}{9}$ $\frac{5}{9}$.

Example 2

Ray has $\frac{2}{3}$ cup of nuts. He needs $\frac{3}{4}$ cup to make cookies. Does he have enough nuts for the recipe?

Compare $\frac{2}{3}$ and $\frac{3}{4}$.

Find a common denominator by the denominators. $3 \times 4 =$

Find equivalent fractions with as the denominator.

$$\frac{2}{3} = \frac{\square}{12}$$

$$\frac{3}{4} = \frac{\square}{12}$$

$$\frac{2 \cdot 4}{3 \cdot 4} = \frac{\square}{12}$$

$$\frac{3 \cdot 3}{4 \cdot 3} = \frac{\square}{12}$$

$$\frac{2}{3} = \frac{\square}{12}$$

$$\frac{3}{4} = \frac{\square}{12}$$

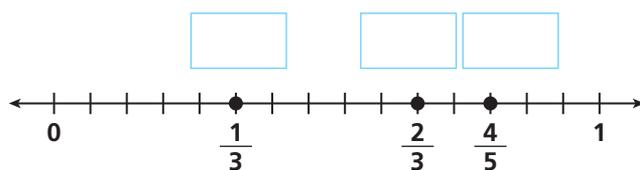
Compare the like fractions. $\frac{8}{12}$ $\frac{9}{12}$, so $\frac{2}{3}$ $\frac{3}{4}$.

Since $\frac{2}{3}$ cup is $\frac{3}{4}$ cup, he have enough.

Example 3

Order $\frac{4}{5}$, $\frac{2}{3}$, and $\frac{1}{3}$ from least to greatest.

$\frac{4 \cdot 3}{5 \cdot 3} =$ $\frac{2 \cdot 5}{3 \cdot 5} =$ $\frac{1 \cdot 5}{3 \cdot 5} =$ Rename with like denominators.



The fractions in order from least to greatest are , , .

Try This

1. Compare. Write $<$, $>$, or $=$.

$$\frac{4}{6} \square \frac{5}{6}$$

2. Trevor has $\frac{1}{3}$ cup of soil. He needs $\frac{1}{4}$ cup to fill a small planter. Does he have enough soil to fill the planter?

3. Order the fractions $\frac{4}{7}$, $\frac{3}{4}$, and $\frac{1}{4}$ from least to greatest.

Adding and Subtracting with Like Denominators



Lesson Objectives

Add and subtract fractions with like denominators

Additional Examples

Example 1

Snow was falling at a rate of $\frac{1}{4}$ inch per hour. How much snow fell after two hours? Write your answer in simplest form.

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

$$\frac{1}{4} + \frac{1}{4} = \square$$

Add the . Keep the same

.

$$= \square$$

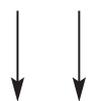
Write your answer in simplest form.

After 2 hours inch of snow fell.

Example 2

Subtract. Write each answer in simplest form.

A. $1 - \frac{3}{5}$



$$\frac{5}{5} - \frac{3}{5} = \square$$

To get a common denominator, rewrite 1 as a fraction with a of .

Subtract the . Keep the same

.

B. $5\frac{5}{12} - 2\frac{1}{12}$

$$5\frac{5}{12} - 2\frac{1}{12}$$

Subtract the . Then subtract the

.

Write your answer in simplest form.

Example 3

Evaluate each expression for $x = \frac{2}{9}$. Write each answer in simplest form.

A. $\frac{5}{9} - x$

$\frac{5}{9} - x$

Write the expression.

$\frac{5}{9} - \frac{2}{9} = \square$

Substitute \square for x and subtract the

$= \square$

Keep the same .

Write your answer in simplest form.

B. $x + 2\frac{4}{9}$

$x + 2\frac{4}{9}$

Write the expression.

$\frac{2}{9} + 2\frac{4}{9} = \square$

Substitute \square for x and add the

Then add the numbers.

$= \square$, or $\frac{8}{3}$

Write your answer in simplest form.

Try This

1. Rain was falling at a rate of $\frac{1}{8}$ inch per hour. How much rain fell after two hours? Write your answer in simplest form.

2. Subtract. Write the answer in simplest form.

$1 - \frac{2}{6}$

Lesson Objectives

Estimate sums and differences of fractions and mixed numbers

Additional Examples

Example 1

Estimate each sum or difference by rounding to 0, $\frac{1}{2}$, or 1.

A. $\frac{6}{7} + \frac{3}{8}$

$$\frac{6}{7} + \frac{3}{8}$$

$$\square + \square = \square$$

Think: $\frac{6}{7}$ rounds to \square and $\frac{3}{8}$ rounds to \square .

$$\frac{6}{7} + \frac{3}{8} \text{ is about } \square.$$

B. $\frac{9}{10} - \frac{7}{8}$

$$\frac{9}{10} - \frac{7}{8}$$

$$\square - \square = 0$$

Think: $\frac{9}{10}$ rounds to \square and $\frac{7}{8}$ rounds to \square .

$$\frac{9}{10} - \frac{7}{8} \text{ is about } \square.$$

Example 2

The table shows the distances Tosha walked.

A. About how far did Tosha walk on Tuesday and Thursday?

$$5\frac{1}{10} + 4\frac{7}{8}$$

$$\square + \square = \square$$

She walked about \square miles on Tuesday and Thursday.

Tosha's Walking Distances	
Day	Distance (mi)
Tuesday	$5\frac{1}{10}$
Thursday	$4\frac{7}{8}$
Saturday	$6\frac{3}{7}$
Sunday	$8\frac{9}{10}$

B. About how much farther did Tosha walk on Sunday than Thursday?

$$8\frac{9}{10} - 4\frac{7}{8}$$

$$\square - \square = \square$$

She walked about miles farther on Sunday than on Thursday.

C. Estimate the total distance Tosha walked on Thursday, Saturday, and Sunday.

$$4\frac{7}{8} + 6\frac{3}{7} + 8\frac{9}{10}$$

$$\square + \square + \square = \square$$

She walked about miles on Thursday, Saturday, and Sunday.

Try This

1. Estimate each sum or difference by rounding to 0, $\frac{1}{2}$, or 1.

$$\frac{5}{6} + \frac{3}{7}$$

2. The table shows the distances Jerry roller skated.

About how far did Jerry skate on Tuesday and Sunday?

Jerry's Roller Skating Distances	
Day	Distance (mi)
Tuesday	$3\frac{1}{5}$
Thursday	$6\frac{3}{7}$
Saturday	$8\frac{1}{7}$
Sunday	$2\frac{6}{7}$



4-1 Divisibility

Copy and complete the table. Write *yes* if the number is divisible by the given number. Write *no* if it is not.

	2	3	4	5	6	9	10
1. 459	no					yes	
2. 370	yes						
3. 1,366		no					
4. 13,950				yes			

Tell whether each statement is true or false. Explain your answer.

5. All even numbers are divisible by 4.

6. All numbers that are divisible by 10 are also divisible by 5.

7. There were 120 students that went a field trip. Kirby put them into small groups of less than 10 students, so that all groups had the same number of students. What were all the possible group sizes Kirby could have made?

4-2 Factors and Prime Factorization

Write each number as a product in two different ways.

8. 26

9. 70

10. 42

11. 96

Find the prime factorization of each number.

12. 88

13. 170

14. 306

15. 324

4-3 Greatest Common Factor

Write the GCF of each set of numbers.

16. 50 and 72 17. 14 and 35 18. 75, 115 and 150
19. 32, 80, and 108 20. 48, 120, and 144 21. $2^2 \cdot 5 \cdot 7^2$ and $2^3 \cdot 3^2 \cdot 5^2$
-

22. Jillian is making centerpieces for her parents' anniversary party. She has 48 tulips, 36 lilies and 12 roses. What is the greatest number of centerpieces she can make if each type of flower is distributed equally among the centerpieces?

4-4 Decimals and Fractions

Order the fractions and decimals from least to greatest.

23. $\frac{3}{8}$, 0.37, $\frac{1}{3}$ 24. $\frac{5}{6}$, 0.91, $\frac{7}{8}$ 25. $\frac{4}{9}$, 0.42, 0.90
-

Write each decimal in expanded form and use a whole number or fraction for each place value.

26. 0.64 27. 52.6 28. 17.31 29. 112.13
-

Write each fraction as a decimal. Tell whether the decimal terminates or repeats.

30. $\frac{3}{20}$ 31. $\frac{5}{18}$ 32. $\frac{11}{9}$ 33. $\frac{3}{15}$
-

Compare. Write $<$, $>$, or $=$.

34. $\frac{2}{9}$ 0.29 35. 0.38 $\frac{3}{8}$ 36. $\frac{4}{5}$ 0.80
-

4-5 Equivalent Fractions

Find missing numbers that make the fractions equivalent.

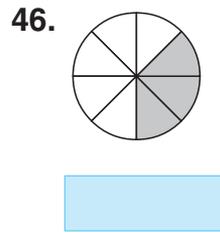
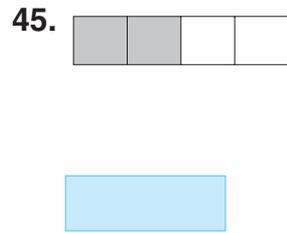
37. $\frac{1}{4} = \frac{6}{\square}$ 38. $\frac{5}{8} = \frac{\square}{40}$ 39. $\frac{3}{18} = \frac{1}{\square}$ 40. $\frac{12}{16} = \frac{3}{\square}$

Find two equivalent fractions for each fraction.

41. $\frac{4}{15}$ 42. $\frac{8}{10}$ 43. $\frac{6}{8}$ 44. $\frac{7}{21}$

\square \square \square \square

Write two equivalent fractions represented by each picture.



4-6 Mixed Numbers and Improper Fractions

Write each mixed number as an improper fraction.

47. $8\frac{3}{7}$ 48. $3\frac{7}{12}$ 49. $12\frac{1}{9}$ 50. $15\frac{2}{3}$

Write each improper fraction as a mixed number or whole number.

51. $\frac{32}{5}$ 52. $\frac{16}{3}$ 53. $\frac{42}{7}$ 54. $\frac{85}{8}$

Replace each shape with a number that will make the equation correct.

55. $\frac{\square}{10} = \frac{53}{\square}$ 56. $\frac{3}{28} = \frac{171}{\square}$ 57. $\frac{1}{16} = \frac{113}{\square}$

Write each improper fraction as a decimal. Then use $<$, $>$, or $=$ to compare.

58. $\frac{14}{9}$ \square 1.4 59. $\frac{64}{5}$ \square 12.80 60. 7.27 \square $\frac{58}{8}$

4-7 Comparing and Ordering FractionsCompare. Write $<$, $>$, or $=$.

61. $\frac{5}{12}$ \square $\frac{6}{10}$

62. $\frac{2}{3}$ \square $\frac{9}{14}$

63. $\frac{4}{11}$ \square $\frac{3}{7}$

64. $\frac{11}{16}$ \square $\frac{7}{19}$

Order the numbers from least to greatest.

65. $3\frac{1}{5}$, 3, $2\frac{7}{8}$, $2\frac{3}{8}$, $3\frac{4}{5}$

66. $6\frac{3}{7}$, 6, $5\frac{4}{7}$, $6\frac{1}{4}$, $5\frac{4}{9}$

4-8 Adding and Subtracting with Like Denominators

Write each sum or difference in simplest form.

67. $\frac{3}{18} + \frac{5}{18}$

68. $3\frac{21}{28} - \frac{7}{28}$

69. $\frac{37}{75} + \frac{21}{75} + \frac{7}{75}$

Evaluate. Write each answer in simplest form.

70. $b + \frac{9}{16}$ for $b = \frac{3}{16}$

71. $k - 4\frac{5}{28}$ for $k = 9\frac{27}{28}$

72. Rick had 5 cups of blueberries. He used $1\frac{3}{4}$ cups to make pancakes and $2\frac{1}{4}$ cups to make smoothies. How many cups of blueberries does Rick have now? **4-9 Estimating Fraction Sums and Differences**Estimate each sum or difference to compare. Write $<$, $>$, or $=$.

73. $3\frac{8}{9} + 4\frac{5}{12}$ \square 8

74. $8\frac{13}{15} - \frac{1}{12}$ \square 9

75. $4\frac{15}{16} + 1\frac{2}{13}$ \square 7

Estimate.

76. $\frac{6}{17} + \frac{2}{13} + \frac{9}{11}$

77. $8\frac{17}{19} - 3\frac{2}{15} - 1\frac{12}{13}$

78. $12\frac{5}{12} + 14\frac{10}{13} + \frac{1}{9}$



Answer these questions to summarize the important concepts from Chapter 4 in your own words.

1. Explain the difference between a prime number and a composite number.

2. List two methods that can be used to find the greatest common factor of a set of numbers.

3. Explain how to write a fraction as a decimal. Explain how to write a decimal as a fraction.

4. Explain how to change a mixed number to an improper fraction and how to change an improper fraction to a mixed number.

For more review of Chapter 4:

- Complete the Chapter 4 Study Guide and Review on pages 216–218 of your textbook.
- Complete the Ready to Go On quizzes on pages 178, 196, and 210 of your textbook.

Lesson Objectives

Find the least common multiple (LCM) of a group of numbers

Vocabulary

least common multiple (LCM) (p. 228) _____

Additional Examples

Example 1

English muffins come in packs of 8, and eggs come in cartons of 12. If there are 24 students, what is the least number of packs and cartons needed so that each student has a muffin sandwich with one egg and there are no muffins left over?

Draw muffins in groups of . Draw eggs in groups of . Stop when you have drawn the same number of each.

There are English muffins and eggs.

So packs of English muffins and cartons of eggs are needed.

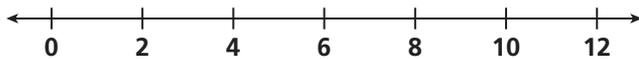
Example 2

Find the least common multiple (LCM).

Method 1: Use a number line.

A. 3 and 4

Use a number line to skip count by and .



The least common multiple (LCM) of 3 and 4 is .

Method 2: Use a list.

B. 4, 5, and 8

List of 4, 5, and 8.

Find the number that is in all the lists.

4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, ...

5: 5, 10, 15, 20, 25, 30, 35, 40, 45, ...

8: 8, 16, 24, 32, 40, 48, ...

LCM:

Method 3: Use prime factorization.

C. 6 and 20

$$6 = 2 \cdot 3$$

Write the prime of each number.

$$20 = 2 \cdot 2 \cdot 5$$

Line up the factors.

$$2 \cdot 3 \cdot 2 \cdot 5$$

$2 \cdot 3 \cdot 2 \cdot 5 =$ To find the LCM, multiply one number from each column.

Find the least common multiple (LCM).

Method 3: Use prime factorization.

D. 15, 6, and 4

$$15 = 3 \cdot 5$$

Write the prime

of each number in exponential form.

$$6 = 2 \cdot 3$$

$$4 = 2^2$$

$$2^2 \cdot 3 \cdot 5$$

To find the LCM, multiply each prime factor once with the greatest exponent used in any of the prime factorizations.

$$2^2 \cdot 3 \cdot 5 = \square$$

Try This

1. Dog cookies come in packages of 6, and bones come in bags of 9. If there are 18 dogs, what is the least number of packages and bags needed so that each dog has a treat box with one bone and one cookie, and there are no bones or cookies left over?

2. Find the least common multiple of 3, 4, and 9.

Lesson Objectives

Add and subtract fractions with unlike denominators

Vocabulary

least common denominator (LCD) (p. 234) _____

Additional Examples

Example 1

Mark made a pizza with pepperoni covering $\frac{1}{4}$ of the pizza and onions covering another $\frac{1}{3}$. What fraction of the pizza is covered by pepperoni or onions?

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

$\frac{1}{4}$	$\frac{1}{3}$
?	

$$\frac{1}{4}$$

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

$$\frac{1}{4} \rightarrow$$

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

Find a denominator for and .

Write fractions with as the common denominator.

Add the . Keep the common denominator.

$\frac{1}{4}$			$\frac{1}{3}$			
$\frac{1}{12}$						

The pepperoni or onions cover of the pizza.

Example 2

Add or subtract. Write each answer in simplest form.

Method 1: Multiplying denominators.

A. $\frac{7}{10} - \frac{3}{8}$

$$\frac{7}{10} - \frac{3}{8}$$

$$\boxed{} - \boxed{}$$

$$\frac{26}{80}$$

$$\boxed{}$$

Multiply the denominators. $\boxed{} \cdot \boxed{} = \boxed{}$

Write $\boxed{}$ fractions.

Subtract.

Write the answer in simplest form.

Method 2: Use the LCD.

B. $\frac{11}{12} - \frac{3}{8}$

$$\frac{11}{12} - \frac{3}{8}$$

$$\boxed{} - \boxed{}$$

$$\boxed{}$$

The LCD is $\boxed{}$.

Write $\boxed{}$ fractions.

Subtract.

Method 3: Use mental math.

C. $\frac{5}{16} + \frac{1}{8}$

$$\frac{5}{16} + \frac{1}{8}$$

$$\frac{5}{16} + \boxed{}$$

$$\boxed{}$$

Think: $\boxed{}$ is a multiple of $\boxed{}$, so the LCD is $\boxed{}$.

Rewrite $\frac{1}{8}$ with a denominator of 16.

Add.

Lesson Objectives

Add and subtract mixed numbers with unlike denominators

Additional Examples

Example 1

Find each sum or difference. Write the answer in simplest form.

A. $3\frac{1}{8} + 1\frac{5}{6}$

$$\begin{array}{r} 3\frac{1}{8} \rightarrow 3\frac{6}{48} \\ + 1\frac{5}{6} \rightarrow + 1\frac{40}{48} \\ \hline \end{array}$$

$$\boxed{} = \boxed{}$$

Multiply the denominators. $8 \cdot 6 = 48$

Write $\boxed{}$ fractions with a denominator of 48.

Add the $\boxed{}$ and then $\boxed{}$ numbers, and simplify.

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

$$\begin{array}{r} 5\frac{2}{3} \rightarrow \boxed{} \\ - 1\frac{1}{4} \rightarrow - \boxed{} \\ \hline \end{array}$$

$$\boxed{}$$

The LCD of the denominators is 12.

Write $\boxed{}$ fractions with a denominator of 12.

Subtract the $\boxed{}$ and then the $\boxed{}$ numbers.

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

$$\begin{array}{r} 2\frac{1}{2} \rightarrow \boxed{} \\ + 4\frac{4}{5} \rightarrow + \boxed{} \\ \hline \end{array}$$

$$\boxed{} = \boxed{}$$

The LCD of the denominators is 10.

Write $\boxed{}$ fractions with a denominator of 10.

Add the $\boxed{}$ and then the $\boxed{}$ numbers. $6\frac{13}{10} = 6 + 1\frac{3}{10}$

Example 2

The length of Jen's kitten's body is $10\frac{1}{4}$ inches. Its tail is $5\frac{1}{8}$ inches long. What is the total length of its body and tail?

Add $10\frac{1}{4} + 5\frac{1}{8}$.

$$10\frac{1}{4} \rightarrow \boxed{}$$

Find a $\boxed{}$ denominator. Write $\boxed{}$ fractions with the LCD, $\boxed{}$, as the denominator.

$$\begin{array}{r} + 5\frac{1}{8} \rightarrow \phantom{+ 5\frac{1}{8}} \\ \hline \phantom{+ 5\frac{1}{8}} \end{array}$$

$$\boxed{}$$

Add the $\boxed{}$ and then $\boxed{}$ numbers.

The total length of the kitten's body and tail is $\boxed{}$ inches.

Try This

1. Find the sum. Write the answer in simplest form.

$$2\frac{7}{8} + 4\frac{2}{3}$$

2. The length of Regina's mouse's body is $2\frac{2}{3}$ inches. Its tail is $2\frac{1}{6}$ inches long. What is the total length of its body and tail?

Lesson Objectives

Regroup mixed numbers to subtract

Additional Examples**Example 1****Subtract. Write each answer in simplest form.**

A. $7\frac{1}{6} - 2\frac{5}{6}$

$7\frac{1}{6} \rightarrow \boxed{}$

$$\begin{array}{r} 7\frac{1}{6} \\ - 2\frac{5}{6} \\ \hline \end{array} \rightarrow \begin{array}{r} \\ - 2\frac{5}{6} \\ \hline \end{array}$$

$\boxed{} = \boxed{}$

Rename $7\frac{1}{6}$ as $6 + \boxed{} = 6 + \boxed{} + \frac{1}{6}$.Subtract the $\boxed{}$ and then the $\boxed{}$ numbers.

Write the answer in simplest form.

B. $8\frac{2}{5} - 6\frac{7}{10}$

$8\frac{4}{10} \rightarrow \boxed{}$

$$\begin{array}{r} 8\frac{4}{10} \\ - 6\frac{7}{10} \\ \hline \end{array} \rightarrow \begin{array}{r} \\ - 6\frac{7}{10} \\ \hline \end{array}$$

$\boxed{}$

 $\boxed{}$ is a multiple of 5, so $\boxed{}$ is a common denominator.Rename $8\frac{4}{10}$ as $7 + \boxed{} =$ $7 + \boxed{} + \frac{4}{10}$.Subtract the $\boxed{}$ and then the $\boxed{}$ numbers.

C. $6 - 3\frac{2}{3}$

$6 \rightarrow \boxed{}$

$$\begin{array}{r} 6 \\ - 3\frac{2}{3} \\ \hline \end{array} \rightarrow \begin{array}{r} \\ - 3\frac{2}{3} \\ \hline \end{array}$$

$\boxed{}$

Write 6 as a $\boxed{}$ number with a denominator of $\boxed{}$.Rename 6 as $5 + \frac{3}{3}$.Subtract the $\boxed{}$ and then the $\boxed{}$ numbers.

Solving Fraction Equations: Addition and Subtraction

Lesson Objectives

Solve equations by adding and subtracting fractions

Additional Examples

Example 1

Solve each equation. Write the solution in simplest form.

A. $x + 5\frac{3}{5} = 14$

$$\begin{array}{r} - 5\frac{3}{5} \\ \hline \end{array} \quad \begin{array}{r} - 5\frac{3}{5} \\ \hline \end{array}$$

Subtract from both sides to undo the

$$\boxed{}$$

$$x = \boxed{} - 5\frac{3}{5}$$

Rename 14 as .

$$x = \boxed{}$$

Subtract.

B. $3\frac{2}{9} = x - 4\frac{1}{3}$

$$\begin{array}{r} + 4\frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} + 4\frac{1}{3} \\ \hline \end{array}$$

Add to both sides to undo the

$$\boxed{}$$

$$3\frac{2}{9} + \boxed{} = x$$

Find a denominator.

$$\boxed{} = x$$

Add.

C. $6\frac{1}{6} = m + \frac{7}{12}$

$$\begin{array}{r} - \frac{7}{12} \\ \hline \end{array} \quad \begin{array}{r} - \frac{7}{12} \\ \hline \end{array}$$

Subtract from both sides to undo the

$$\boxed{}$$

$$6\frac{2}{12} - \frac{7}{12} = m$$

Find a denominator.

$$\boxed{} - \frac{7}{12} = m$$

Rename $6\frac{2}{12}$ as + $\frac{2}{12}$

$$\boxed{} = m$$

Subtract.

Example 2

Linda's dog weighs $85\frac{1}{4}$ pounds. If Linda's dog weighs $17\frac{1}{2}$ pounds less than Ian's dog, how much does Ian's dog weigh?

$$d - 17\frac{1}{2} = 85\frac{1}{4}$$

Let d represent the weight of Ian's dog.

$$+ \boxed{} + \boxed{}$$

Add $\boxed{}$ to both sides to undo the $\boxed{}$.

$$d = \boxed{}$$

Ian's dog weighs $\boxed{}$ pounds.

Try This

1. Solve the equation. Write the solution in simplest form.

$$5\frac{2}{5} = m + \frac{7}{10}$$

2. Jimmy's cat weighs $13\frac{2}{3}$ pounds. If Jimmy's cat weighs $4\frac{1}{6}$ pounds less than Vicki's cat, how much does Vicki's cat weigh?

Lesson Objectives

Multiply fractions by whole numbers

Additional Examples

Example 1

Multiply. Write each answer in simplest form.

A. $7 \cdot \frac{1}{9}$

$$7 \cdot \frac{1}{9} = \frac{7 \cdot 1}{1 \cdot 9}$$

Write 7 as a . Multiply

and .

$$= \text{[]}$$

B. $6 \cdot \frac{1}{8}$

$$6 \cdot \frac{1}{8} = \frac{6 \cdot 1}{1 \cdot 8}$$

Write 6 as a . Multiply

and .

$$= \text{[]}$$

$$= \text{[]}$$

Write your answer in simplest form.

C. $8 \cdot \frac{2}{3}$

$$8 \cdot \frac{2}{3} = \frac{8 \cdot 2}{1 \cdot 3}$$

Write 8 as a . Multiply

and

.

$$= \text{[]}, \text{ or } \text{[]}$$

Example 2

Evaluate $4x$ for each value of x . Write each answer in simplest form.

A. $x = \frac{1}{10}$

$4x$

Write the expression.

$4 \cdot \square$

Substitute \square for x .

$\square \cdot \frac{1}{10} = \square$

Multiply.

$= \square$

Write your answer in simplest form.

B. $x = \frac{3}{8}$

$4x$

Write the expression.

$4 \cdot \square$

Substitute \square for x .

$\square \cdot \frac{3}{8} = \frac{12}{8}$

Multiply.

$= \square$ or \square

Write your answer in simplest form.

Example 3

There are 25 students in the music club. Of those students, $\frac{3}{5}$ are also in the band. How many music club students are in the band?

To find $\frac{3}{5}$ of 25, multiply.

$\frac{3}{5} \cdot 25 = \frac{3}{5} \cdot \square$

$= \frac{\square}{5}$

Divide \square by 5 and write your answer in simplest form.

$= \square$

There are \square music club students in the band.

Try This

1. Multiply. Write the answer in simplest form.

$$9 \cdot \frac{3}{4}$$

2. Evaluate $3x$ for the value of x . Write the answer in simplest form.

$$x = \frac{1}{9}$$

3. There are 50 people on the football team. Of those people, $\frac{1}{5}$ are also on the basketball team. How many people on the football team are also on the basketball team?

Lesson Objectives

Multiply fractions

Additional Examples

Example 1

Multiply. Write each answer in simplest form.

A. $\frac{1}{4} \cdot \frac{2}{5}$

$$\frac{1}{4} \cdot \frac{2}{5} = \frac{1 \cdot 2}{4 \cdot 5}$$

$$= \frac{\quad}{\quad}$$

$$= \frac{\quad}{\quad}$$

Multiply . Multiply

$$\frac{\quad}{\quad}$$

The GCF of 2 and 20 is .

The answer is in simplest form.

B. $\frac{5}{7} \cdot \frac{4}{15}$

$$\frac{\cancel{5}}{7} \cdot \frac{4}{\cancel{15}_3} = \frac{1 \cdot 4}{7 \cdot 3}$$

$$= \frac{1 \cdot 4}{7 \cdot 3}$$

$$= \frac{\quad}{\quad}$$

Use the GCF to simplify the fractions before

. The greatest common

factor of 5 and 15 is .

Multiply . Multiply

$$\frac{\quad}{\quad}$$

The answer is in simplest form.

C. $\frac{4}{9} \cdot \frac{6}{10}$

$$\frac{4}{9} \cdot \frac{6}{10} = \frac{4 \cdot 6}{9 \cdot 10}$$

$$= \frac{\quad}{\quad}$$

$$= \frac{\quad}{\quad}$$

Multiply . Multiply .

The GCF of and is .

The answer is in simplest form.

Example 2

Evaluate the expression $b \cdot \frac{2}{5}$ for each value of b . Write the answer in simplest form.

A. $b = \frac{1}{3}$

$$b \cdot \frac{2}{5}$$

$$\square \cdot \frac{2}{5}$$

Substitute \square for b .

$$\frac{1 \cdot 2}{3 \cdot 5}$$

Multiply.

$$\square$$

The answer is in simplest form.

B. $b = \frac{3}{8}$ $b \cdot \frac{2}{5}$

$$\square \cdot \frac{2}{5}$$

Substitute \square for b .

$$\frac{3}{\cancel{4}^1} \cdot \frac{\cancel{2}^1}{5}$$

Use the \square to simplify.

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

Multiply.

$$\square$$

The answer is in simplest form.

Try This

1. Multiply. Write the answer in simplest form.

$$\frac{3}{7} \cdot \frac{5}{9}$$

2. Evaluate the expression $c \cdot \frac{1}{4}$ for the value of c . Write the answer in simplest form.

$$c = \frac{1}{7}$$

Lesson Objectives

Multiply mixed numbers

Additional Examples

Example 1

Multiply. Write each answer in simplest form.

A. $\frac{1}{4} \cdot 1\frac{1}{3}$

$\frac{1}{4} \cdot \square$

Write $1\frac{1}{3}$ as an improper fraction. $1\frac{1}{3} = \square$

$\frac{1 \cdot 4}{4 \cdot 3}$

Multiply \square . Multiply

\square

\square

\square

Write the answer in simplest form.

B. $3\frac{1}{2} \cdot \frac{4}{5}$

$\square \cdot \frac{4}{5}$

Write $3\frac{1}{2}$ as an improper fraction. $3\frac{1}{2} = \square$

$\frac{7 \cdot 4}{2 \cdot 5}$

Multiply \square . Multiply

\square

\square

Write the answer in simplest form.

$\square = \square$

You can write the answer as a mixed number.

C. $\frac{12}{13} \cdot 2\frac{3}{8}$

$\frac{12}{13} \cdot \square$

Write $2\frac{3}{8}$ as an improper fraction. $2\frac{3}{8} = \square$

$\frac{3 \cancel{12}}{13} \cdot \frac{19}{\cancel{8}_2}$

Use the GCF to simplify before

\square

$\frac{3 \cdot 19}{13 \cdot 2}$

$\square = \square$

You can write the answer as a mixed number.

Example 2

Find each product. Write the answer in simplest form.

A. $1\frac{2}{3} \cdot 2\frac{1}{7}$

\cdot

Write the mixed numbers as improper fractions.

$1\frac{2}{3} =$ $2\frac{1}{7} =$

$\frac{5 \cdot 15}{3 \cdot 7}$

Multiply . Multiply .

=

You can write the improper fraction as a mixed number.

Simplify.

B. $1\frac{3}{8} \cdot 2\frac{2}{5}$

\cdot

Write the mixed numbers as improper fractions.

$1\frac{3}{8} =$ $2\frac{2}{5} =$

$\frac{11}{2} \cdot \frac{12^3}{5}$

Use the GCF to simplify before .

$\frac{11 \cdot 3}{2 \cdot 5}$

Multiply . Multiply .

=

Simplify.

Try This

1. Multiply. Write the answer in simplest form.

$2\frac{2}{3} \cdot \frac{5}{6} =$

2. Find the product. Write the answer in simplest form.

$1\frac{3}{4} \cdot 2\frac{1}{6} =$

Dividing Fractions and Mixed Numbers

Lesson Objectives

Divide fractions and mixed numbers

Vocabulary

reciprocal (p. 270) _____

Additional Examples

Example 1

Find the reciprocal.

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

$\frac{1}{9} \cdot \square = 1$ Think: $\frac{1}{9}$ of what number is 1?

$\frac{1}{9} \cdot \square = 1$ $\frac{1}{9}$ of \square is 1.

The reciprocal of $\frac{1}{9}$ is \square .

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

$\frac{2}{3} \cdot \square = 1$ Think: $\frac{2}{3}$ of what number is 1?

$\frac{2}{3} \cdot \square = 1$ $\frac{2}{3}$ of \square is 1.

The reciprocal of $\frac{2}{3}$ is \square .

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

$\frac{16}{5} \cdot \square = 1$ Write $3\frac{1}{5}$ as $\frac{16}{5}$.

$\frac{16}{5} \cdot \square = \frac{80}{80} = 1$ $\frac{16}{5}$ of \square is 1.

The reciprocal of $\frac{16}{5}$ is \square .

Example 2**Divide. Write each answer in simplest form.**

A. $\frac{8}{7} \div 7$

$$\frac{8}{7} \div 7 = \frac{8}{7} \cdot \square$$

Rewrite as multiplication using the reciprocal of 7,
 \square .

$$= \frac{8 \cdot 1}{7 \cdot 7}$$

Multiply by the reciprocal.

$$= \square$$

The answer is in simplest form.

B. $\frac{5}{6} \div \frac{2}{3}$

$$\frac{5}{6} \div \frac{2}{3} = \frac{5}{6} \cdot \square$$

Rewrite as multiplication using the reciprocal of $\frac{2}{3}$,
 \square .

$$= \frac{5 \cdot \cancel{3}^1}{\cancel{2}^1 \cdot 6 \cdot 2}$$

Simplify before \square .

$$= \square$$

Multiply.

$$= \square$$

You can write the answer as a mixed number.

Try This**1. Find the reciprocal.**

$$4\frac{1}{8}$$

2. Divide. Write the answer in simplest form.

$$\frac{7}{10} \div \frac{1}{5}$$

Lesson Objectives

Solve equations by multiplying and dividing fractions

Additional Examples

Example 1

Solve each equation. Write the answer in simplest form.

A. $\frac{3}{5}j = 25$

$$\frac{3}{5}j \div \boxed{} = 25 \div \boxed{} \quad \boxed{} \text{ both sides of the equation by } \boxed{}.$$

$$\frac{3}{5}j \cdot \frac{5}{3} = 25 \cdot \frac{5}{3} \quad \text{Multiply by } \boxed{}, \text{ the reciprocal of } \boxed{}.$$

$$j = 25 \cdot \frac{5}{3}$$

$$j = \frac{25 \cdot 5}{1 \cdot 3}$$

$$j = \boxed{}, \text{ or } \boxed{}$$

B. $7x = \frac{2}{5}$

$$\frac{7x}{1} \cdot \boxed{} = \frac{2}{5} \cdot \boxed{} \quad \text{Multiply both sides by the } \boxed{} \text{ of 7.}$$

$$x = \frac{2 \cdot 1}{5 \cdot 7}$$

$$x = \boxed{} \quad \text{The answer is in simplest form.}$$

C. $\frac{5y}{8} = 6$

$$\frac{5y}{8} \div \boxed{} = \frac{6}{1} \div \boxed{} \quad \text{Divide both sides by } \boxed{}.$$

$$\frac{5y}{8} \cdot \boxed{} = \frac{6}{1} \cdot \boxed{} \quad \text{Multiply by the reciprocal of } \boxed{}.$$

$$y = \boxed{} \text{ or } \boxed{}$$

Example 2

PROBLEM SOLVING APPLICATION

Dexter makes $\frac{2}{3}$ of a recipe, and he uses 12 cups of powdered milk. How many cups of powdered milk are in the recipe?

1. Understand the Problem

The answer will be the number of cups of powdered milk in the recipe. List the important information:

- He makes of the recipe.
- He uses cups of powdered milk.

2. Make a Plan

You can write and solve an equation. Let x represent the number of cups in the recipe. He uses 12 cups, which is two-thirds of the amount in the recipe.

$$12 = \frac{2}{3}x$$

3. Solve

$$12 = \frac{2}{3}x$$

$$12 \cdot \frac{3}{2} = \frac{2}{3}x \cdot \frac{3}{2} \quad \text{Multiply both sides by } \frac{3}{2}, \text{ the reciprocal of } \frac{2}{3}.$$

$$\frac{12}{1} \cdot \frac{3}{2} = x$$

Simplify. Then multiply.

$$18 = x$$

There are cups of powdered milk in the recipe.

4. Look Back

Check $12 = \frac{2}{3}x$

$$12 \stackrel{?}{=} \frac{2}{3}(18) \quad \text{Substitute 18 for } x.$$

$$12 \stackrel{?}{=} \frac{36}{3} \quad \text{Multiply and simplify.}$$

$$12 \stackrel{?}{=} 12 \checkmark \quad \text{18 is the solution.}$$

Try This

1. Solve the equation. Write the answer in simplest form.

$$\frac{3}{4}j = 19$$

2. Rich makes $\frac{2}{5}$ of a recipe, and he uses 8 cups of wheat flour. How many cups of wheat flour are in the recipe?

5-1 Least Common Multiple

1. What is the LCM of 8 and 16?

3. What is the LCM of 5, 8 and 12?

2. What is the LCM of 9 and 13?

4. What is the LCM of 2, 5, 6, and 8?

Find a pair of numbers that has the given characteristics.

5. The LCM of two numbers is 60. The sum of the numbers is 32.

6. The LCM of two numbers is 56. The difference of the numbers is 6.

7. Pencils come in packs of 10, and pens come in packs of 8. If there are 40 students, what is the least number of packs of pencils and pens needed so that each student gets one pencil and one pen and there are none left over?

5-2 Adding and Subtracting with Unlike Denominators**Find each sum or difference. Write your answer in simplest form.**

8. $\frac{3}{10} + \frac{5}{8}$

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

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

11. $\frac{5}{11} - \frac{2}{7}$

Evaluate each expression for $c = \frac{2}{3}$. Write your answer in simplest form.

12. $c + \frac{1}{8}$

13. $c - \frac{2}{7}$

14. $\frac{2}{9} + c$

15. $\frac{7}{10} - c$

Evaluate. Write each answer in simplest form.

16. $\frac{1}{5} + \frac{1}{10} + \frac{2}{5}$

17. $\frac{5}{12} - \frac{1}{6} + \frac{2}{3}$

18. $\frac{7}{8} - \frac{1}{2} + \frac{1}{4}$

19. $\frac{5}{14} - \frac{4}{28} + \frac{3}{7}$

20. Tina and her friends ate $\frac{2}{3}$ of a cake. Then Mike ate $\frac{1}{5}$ of the cake.

What fraction of the cake was left?

5-3 Adding and Subtracting Mixed Numbers

Add or subtract. Write each answer in simplest form.

21. $12\frac{3}{5} + 16\frac{6}{10}$

22. $18\frac{5}{8} - 4\frac{1}{4}$

23. $20\frac{5}{9} + 14\frac{5}{12}$

24. $48\frac{4}{11} - 16\frac{1}{6}$

Evaluate each expression for $n = 2\frac{1}{4}$. Write your answer in simplest form.

25. $3\frac{3}{4} + n$

26. $7(5\frac{3}{8} + n)$

27. $n - 1\frac{3}{16}$

28. $5(4\frac{2}{3} - n)$

29. Kellie had a piece of wood trim $4\frac{2}{3}$ yards long. She cut the wood into two pieces. One piece of the wood trim was $3\frac{1}{2}$ yards long. How long was the other piece of wood trim?

5-4 Regrouping to Subtract Mixed Numbers

Find each difference. Write the answer in simplest form.

30. $11 - 5\frac{5}{7}$

31. $15\frac{2}{9} - 10\frac{2}{3}$

32. $19\frac{1}{6} - 6\frac{1}{3}$

33. $24\frac{2}{5} - 7\frac{3}{4}$

34. Jack used $4\frac{5}{8}$ pounds of a 30-pound bag of dog food to feed his dogs. How many pounds of dog food were left?

35. Felecia had a piece of ribbon that was $50\frac{1}{4}$ feet long. She used $15\frac{2}{3}$ feet for a project. How many feet were left on the original piece of ribbon?

36. At the start of the month, the snowfall total for the year was $18\frac{1}{8}$ inches. At the end of the month, the snowfall total for the year was 21 inches. How many inches of snow fell during the month?

5-5 Solving Fraction Equations: Addition and Subtraction

Find the solution to each equation. Check your answers.

37. $p + 4\frac{3}{4} = 9$

38. $n - 5\frac{2}{5} = 2\frac{3}{10} + 1\frac{1}{5}$

39. $12 - 3\frac{5}{8} = z - 2\frac{3}{8}$

40. Jenna built a card tower $9\frac{1}{2}$ inches taller than Callie's card tower. Callie's tower was $20\frac{1}{2}$ inches tall. How tall was Jenna's tower?**5-6 Multiplying Fractions by Whole Numbers**

Evaluate each expression. Write each answer in simplest form.

41. $16y$ for $y = \frac{11}{16}$

42. $\frac{3}{4}b$ for $b = 28$

43. $\frac{1}{8}k$ for $k = 32$

44. $\frac{11}{20}p$ for $p = 80$

Compare. Write $<$, $>$, or $=$.

45. $2 \cdot \frac{4}{11}$ $\frac{8}{11}$

46. $5 \cdot \frac{3}{4}$ $\frac{13}{15}$

47. $2 \cdot \frac{5}{8}$ $8 \cdot \frac{2}{5}$

5-7 Multiplying Fractions

Find each product. Simplify the answer.

48. $\frac{4}{5} \cdot \frac{3}{16}$

49. $\frac{9}{10} \cdot \frac{5}{8}$

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

Compare. Write $<$, $>$, or $=$.

51. $\frac{3}{7} \cdot \frac{2}{9}$ $\frac{2}{3} \cdot \frac{9}{11}$

52. $\frac{2}{3} \cdot \frac{4}{10}$ $\frac{8}{15} \cdot \frac{1}{2}$

53. $\frac{5}{6} \cdot \frac{1}{4}$ $\frac{4}{5} \cdot \frac{3}{5}$

54. A recipe calls for $\frac{2}{3}$ cup of sugar. Eric wants to make $\frac{1}{2}$ of the recipe. What fraction of a cup of sugar will he need?

5-8 Multiplying Mixed Numbers

Write each product in simplest form.

55. $2\frac{1}{4} \cdot \frac{2}{9}$

56. $6 \cdot \frac{3}{5}$

57. $3\frac{1}{8} \cdot 2\frac{2}{3}$

58. $1\frac{9}{10} \cdot 5 \cdot \frac{4}{7}$

59. Sydney worked on her scrapbook project for $4\frac{4}{5}$ hours. She spent $\frac{1}{5}$ of that time journaling in the scrapbook. How much time did she spend journaling?

5-9 Dividing Fractions and Mixed Numbers

Decide whether the fractions in each pair are reciprocals. If not, write the reciprocal of each fraction.

60. $\frac{1}{8}, 8$

61. $\frac{5}{6}, \frac{18}{15}$

62. $\frac{4}{7}, \frac{21}{15}$

63. $\frac{4}{9}, \frac{8}{27}$

64. At Freezy Treats a jumbo serving of ice cream is $2\frac{3}{4}$ cups. A container holds 55 cups of ice cream. How many jumbo servings of ice cream are in the container?

5-10 Solving Fraction Equations: Multiplication and Division

Solve each equation. Write the answer in simplest form.

65. $3y = \frac{4}{5}$

66. $\frac{1}{8}w = 1\frac{3}{4}$

67. $9 = \frac{5a}{6}$

68. $8c = \frac{3}{7} \div \frac{2}{7}$

69. Elizabeth is planting flowers in window boxes. Each window box holds $3\frac{1}{3}$ pounds of dirt. Elizabeth has a 20-pound bag of dirt. How many window boxes can she fill with dirt?



Answer these questions to summarize the important concepts from Chapter 5 in your own words.

1. How do you write the prime factorization of a number?

2. Explain how to add or subtract fractions with unlike denominators using the least common denominator (LCD).

3. Explain how to subtract $4\frac{5}{7}$ from 6.

4. Explain how to divide $4\frac{3}{4}$ by $2\frac{1}{2}$.

For more review of Chapter 5:

- Complete the Chapter 5 Study Guide and Review on pages 282–284 of your textbook.
- Complete the Ready to Go On quizzes on pages 252 and 278 of your textbook.

Lesson Objectives

Use tables to record and organize data

Additional Examples**Example 1**

Use the audience data to make a table. Then use your table to describe how attendance changed over time.

On May 1, there were 275 people in the audience at the school play. On May 2, there were 302 people. On May 3, there were 322 people.

Date	People in Audience
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

Make a table. Write the in order so that you can see how the attendance changed over time.

From the table you can see that the number of people in the audience from May 1 to May 3.

Example 2

Use the temperature data to make a table. Then use your table to find a pattern in the data and draw a conclusion.

At 3 A.M., the temperature was 53°F. At 5 A.M., it was 52°F. At 7 A.M., it was 50°F. At 9 A.M., it was 53°F. At 11 A.M., it was 57°F.

Time	Temperature (°F)
<input type="text"/>	<input type="text"/>

The temperature dropped until , then it rose. One conclusion is that the temperature on this day was 50°F.

Try This

1. Use the audience data to make a table. Then use your table to describe how attendance has changed over time.

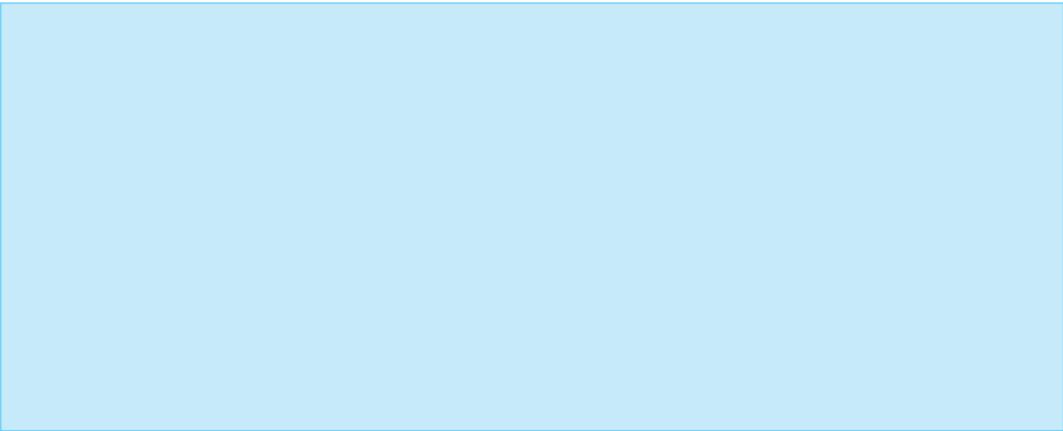
On April 1, there were 212 people at the symphony. On May 1, there were 189 people. On June 1, there were 172 people.



The number of people in the audience from April 1 to June 1.

2. Use the temperature data to make a table. Then use your table to find a pattern in the data and draw a conclusion.

At 2 A.M., the temperature was 48°F. At 4 A.M., it was 46°F. At 6 A.M., it was 44°F. At 8 A.M., it was 47°F. At 10 A.M., it was 51°F.



The temperature dropped until , then it rose. One conclusion is that the temperature on this day was 44°F.

Lesson Objectives

Find the mean, median, mode, and range of a data set

Vocabulary

range (p. 299) _____

mean (p. 298) _____

median (p. 299) _____

mode (p. 299) _____

Additional Examples**Example 1**

Find the mean of each data set.

A.

Depth of Puddles (in.)						
5	8	3	5	4	2	1

Start by writing the data in numerical order.

mean: $1 + 2 + 3 + 4 + 5 + 5 + 8 =$ all values.

$$28 \div \text{} = \text{}$$

the sum by

the of items.

The mean is inches.

Find the mean of each data set.

B.

Number of Points Scores			
96	75	84	7

Start by writing the data in numerical order.

mean: $7 + 75 + 84 + 96 =$ all values.

$262 \div$ $=$ the sum by the
 of items.

The mean is points.

Example 2

Find the mean, median, mode, and range of the data set.

Car Wash Totals			
6 th grade	12	7 th grade	11
8 th grade	14	9 th grade	15

mean: $\frac{12 + 11 + 14 + 15}{4} =$

Write the data in numerical order:

median: 11, 12, 13, 15 There are an even number of items, so find

$\frac{12 + 13}{2} =$ the of the two middle values.

mode:

range: $15 - 11 =$

The mean is ; the median is ; there is mode, and
the range is .

Try This

1. Find the mean of the data set.

Rainfall per Month (in.)						
1	2	10	2	5	6	9

2. Find the mean, median, mode, and range of the data set.

Number of Vacation Days			
53	26	47	12

Lesson Objectives

Learn the effect of additional data and outliers

Vocabulary

outlier (p. 302) _____

Additional Examples**Example 1**

A. Find the mean, median, and mode of the data in the table.

EMS Football Games Won					
Year	1998	1999	2000	2001	2002
Games	11	5	7	5	7

mean = modes = median =

B. EMS also won 13 games in 1997 and 8 games in 1996. Add this data to the data in the table and find the mean, median, and mode.

mean = modes = median =

The increased by 1, the remained the same, and the remained the same.

Example 2

Ms. Gray is 25 years old. She took a class with students who were 55, 52, 59, 61, 63, and 58 years old. Find the mean, median, and mode with and without Ms. Gray's age.

Data with Ms. Gray's age: mean \approx mode
 median =

Data without Ms. Gray's age: mean = mode
 median =

When you add Ms. Gray's age, the mean decreases by about 4.7,
 the stays the same, and the decreases by 0.5.
 The is the most affected by the . The median
 is closer to most of the students' ages.

Example 3

The Yorks found 8 pairs of skates with the following prices:

\$35, \$42, \$75, \$40, \$47, \$34, \$45, \$40

What are the mean, median, and mode of this data set? Which statistic best describes the data set?

mean = modes = median =

The price is the best description of the prices. Most of the
 skates cost about \$. The is higher than most of the
 prices because of the \$ skates.

Try This

1. Find the mean, median, and mode of the data in the table.

MA Basketball Games Won					
Year	1998	1999	2000	2001	2002
Games	13	6	4	6	11

2. Ms. Pink is 56 years old. She volunteered to work with people who were 25, 22, 27, 24, 26, and 23 years old. Find the mean, median, and mode with and without Ms. Pink's age.

3. The Oswalds found 8 pairs of gloves with the following prices: \$17, \$15, \$39, \$12, \$13, \$16, \$19, \$15. What are the mean, median, and mode of this data set? Which statistic best describes the data set?

Lesson Objectives

Display and analyze data in bar graphs

Vocabulary

bar graph (p. 308) _____

double-bar graph (p. 309) _____

Additional Examples**Example 1**

Use the bar graph to answer each question.

- A.** Which biome in the graph has the lowest average summer temperature?

Find the bar.

The has the

lowest average summer

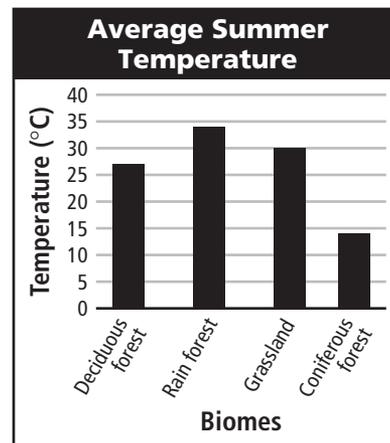
temperature.

- B.** Which biomes in the graph have an average summer temperature of 30°C or greater?

Find the bar or bars whose heights measure or more than .

The and the have average

summer temperatures of 30°C or greater.



Example 2

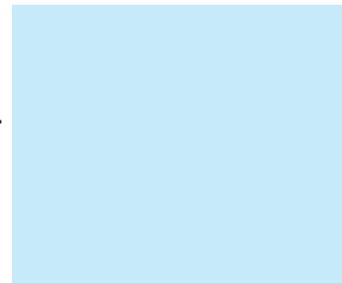
Use the given data to make a bar graph.

Magazine Subscriptions Sold		
Grade 6	Grade 7	Grade 8
258	597	374

Step 1: Find an appropriate and . The scale must include all of the data . The interval separates the scale into parts.

Step 2: Use the to determine the lengths of the bars. Draw bars of equal . The bars cannot touch.

Step 3: Title the graph and label the .



Example 3

PROBLEM SOLVING APPLICATION

Make a double-bar graph to compare the data in the table.

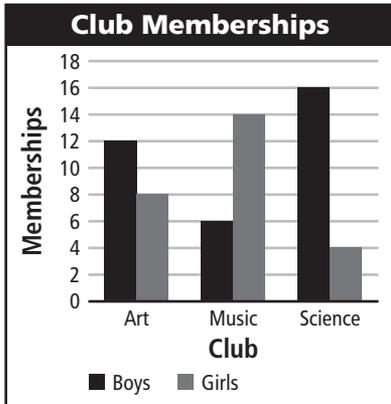
Club Memberships			
Club	Art	Music	Science
Boys	12	6	16
Girls	8	14	4

1. Understand the Problem
 You are asked to use a graph to compare the data given in the table. You will need to use all of the information given.

2. Make a Plan

You can make a graph to display the two sets of data.

3. Solve



Determine appropriate for both sets of data.

Use the to determine the lengths of the bars. Draw bars of equal

. Bars should be in

. Use a different .

for boy memberships and girl memberships. Title the graph and label both

. Include a to show what each bar represents.

4. Look Back

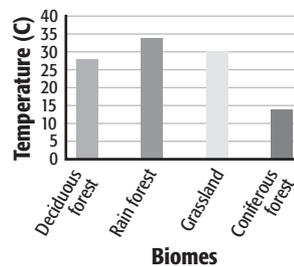
You could make two separate graphs, one of boy memberships and one of girl memberships. However, it is easier to compare the two data sets when they are on the same graph.

Try This

1. Use the bar graph to answer the question.

Which biomes in the graph have an average summer temperature of 25°C or greater?

Average Summer Temperatures



2. Use the given data to make a bar graph.

Tickets Sold		
Grade 6	Grade 7	Grade 8
310	215	285

3. Problem Solving Application

Make a double-bar graph to compare the data in the table.

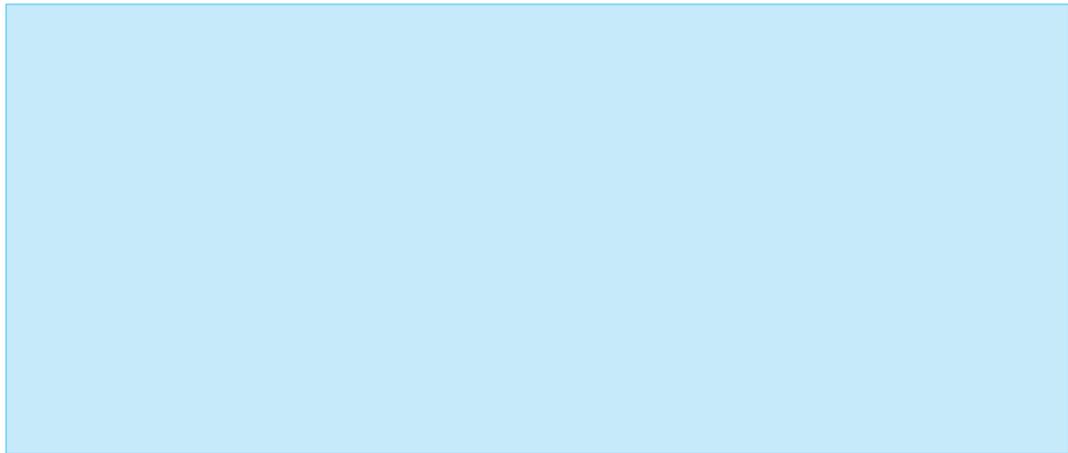
Club Memberships			
Club	Band	Chess	Year Book
Boys	9	14	16
Girls	11	7	15

1. Understand the Problem

You are asked to use a graph to compare the data given in the table. You will need to use all of the information given.

2. Make a Plan

You can make a  graph to display the two sets of data.

3. Solve**4. Look Back**

You could make two separate graphs, one of boy memberships and one of girl memberships. However, it is easier to compare the two data sets when they are on the same graph.

Line Plots, Frequency Tables, and Histograms


 Know it!

Note

Lesson Objectives

Organize data in line plots, frequency tables, and histograms

Vocabulary

line plot (p. 314) _____

frequency table (p. 314) _____

histogram (p. 315) _____

Additional Examples

Example 1

Students in Mr. Ray's class recorded their fingerprint patterns. Which type of pattern do most students in Mr. Ray's class have?

whorl	loop	whorl	loop	loop	arch	whorl	arch
arch	arch	loop	whorl	arch	whorl	arch	loop

Make a tally table to organize the data.

Step 1: Make a for each fingerprint pattern.

Step 2: For each fingerprint, make a mark in the appropriate column.

Number of Fingerprint Patterns		
Whorl	Arch	Loop
<input type="text"/>	<input type="text"/>	<input type="text"/>

Most students in Mr. Ray's class have an fingerprint.

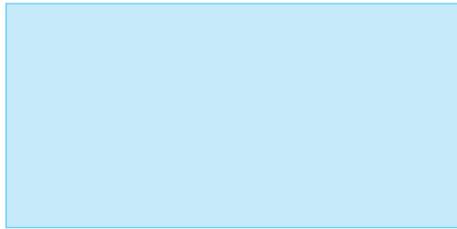
Example 2

Students collected tennis balls for a project. The number of balls collected by the students is recorded in the table. Make a line plot of the data.

Balls Collected					
10	14	11	16	11	10
14	10	15	15	10	11

Step 1: Draw a .

Step 2: For each student, use an on the number line to represent the number of collected.



Example 3

Use the data in the table to make a frequency table with intervals.

Pages Read Last Weekend				
12	15	40	19	7
5	22	34	37	18

Step 1: Choose intervals.

Step 2: Find the number of data values in each . Write these numbers in the “Frequency” row.

Pages Read Last Weekend				
Number	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Frequency	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

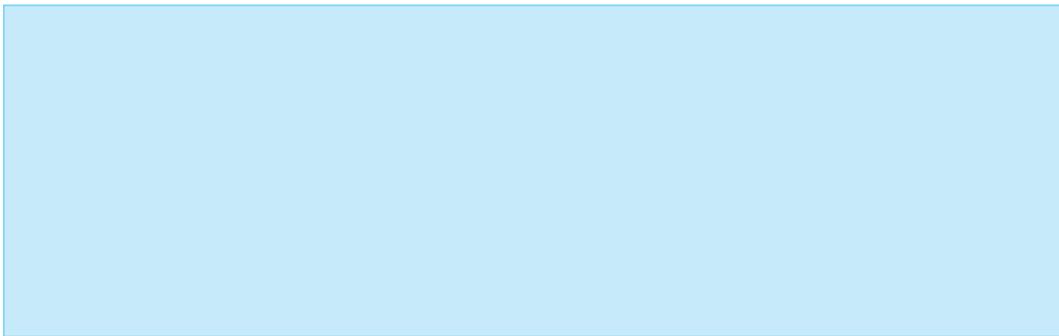
Example 4

Use the frequency table from Additional Example 3 to make a histogram.

Step 1: Choose an appropriate and .

Step 2: Draw a bar for the number of students in each interval. The bars should touch but not overlap.

Step 3: Title the graph and label the axes.



Try This

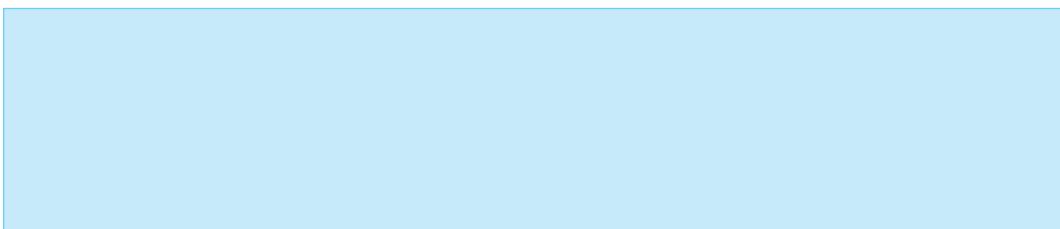
1. Students in Ms. Gracie’s class recorded their fingerprint patterns. Which type of pattern do more students in Ms. Gracie’s class have?

whorl	loop	whorl	loop	loop	whorl	whorl	arch
arch	whorl	loop	whorl	arch	whorl	arch	loop



2. Students collected paperclips for a project. The number of paperclips collected by the students is recorded in the table. Make a line plot of the data.

Paperclips Collected					
6	9	7	6	5	7
8	9	6	5	8	10



Lesson Objectives

Graph ordered pairs on a coordinate grid

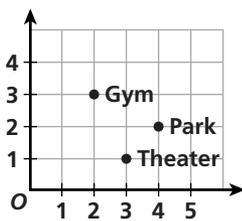
Vocabulary

coordinate grid (p. 319) _____

ordered pair (p. 319) _____

Additional Examples**Example 1**

Name the ordered pair for the location.

**A. Gym**Start at (,). Move right units and then up units.The gym is located at (,).**B. Theater**Start at (,). Move right units and then up unit.The gym is located at (,).**C. Park**Start at (,). Move right units and then up units.The park is located at (,).

Example 2

Graph and label each point on a coordinate grid.

A. $L(3, 5)$

Start at (,)

Move right units.

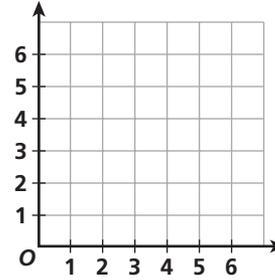
Move up units.

B. $M(4, 0)$

Start at (,)

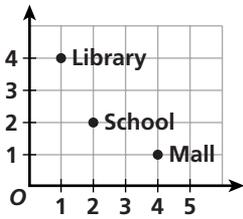
Move right units.

Move up units.



Try This

1. Name the ordered pair for each location.



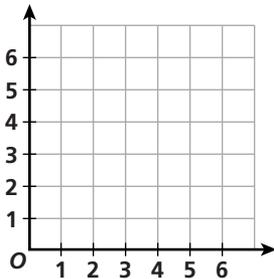
library:

school:

mall:

2. Graph and label each point on a coordinate grid.

$T(2, 6)$ and $V(5, 0)$



Lesson Objectives

Display and analyze data in line graphs

Vocabulary

line graph (p. 322) _____

double-line graph (p. 323) _____

Additional Examples**Example 1**

Use the data in the table to make a line graph.

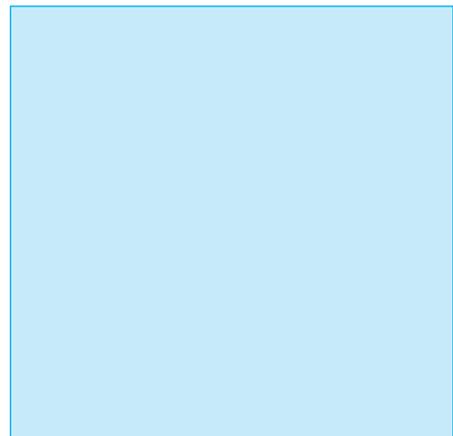
Population of New Hampshire	
Year	Population
1650	1,300
1670	1,800
1690	4,200
1700	5,000

Step 1: Place *years* on the horizontal axis and *population* on the vertical axis. Label the axes.

Step 2: Determine an appropriate and for each axis.

Step 3: Mark a point for each data . Connect the points with lines.

Step 4: the graph.



Example 2

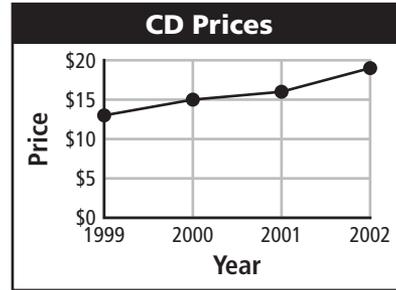
Use the line graph to answer each question.

A. In which year did CDs cost the most?

B. About how much did CDs cost in 2000?

\$

C. Did CD prices increase or decrease from 1999 to 2002?



Example 3

Use the data in the table to make a double-line graph.

Stock Prices				
	1985	1990	1995	2000
Corporation A	\$16	\$20	\$34	\$33
Corporation B	\$38	\$35	\$31	\$21

Step 1: Determine an appropriate and .

Step 2: Mark a for each Corporation A value and the points.

Step 3: Mark a for each Corporation B value and the points.

Step 4: Title the graph and label both . Include a .

Try This

1. Use the data in the table to make a line graph.

School District Enrollment	
Year	Population
1996	2,300
1998	2,800
2000	5,200
2002	6,000



2. Use the line graph to answer each question.

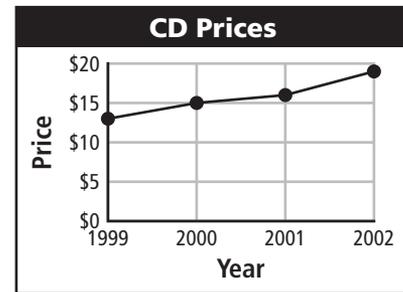
In which year did CDs cost the least?

About how much did CDs cost in 1999?

\$

Did CD prices increase or decrease from 2001 to 2002?

They .

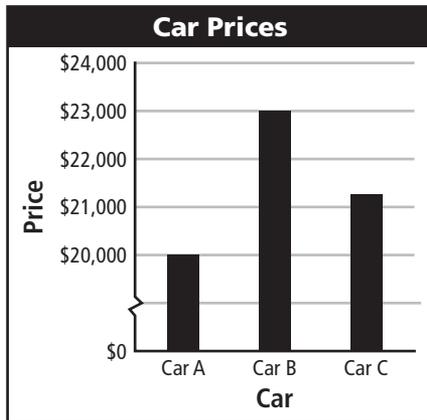


3. Use the data in the table to make a double-line graph.

Stock Prices				
	1985	1990	1995	2000
Corporation C	\$8	\$16	\$20	\$28
Corporation D	\$35	\$22	\$14	\$7

Lesson Objectives

Recognize misleading graphs

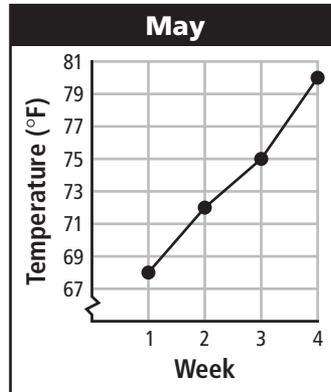
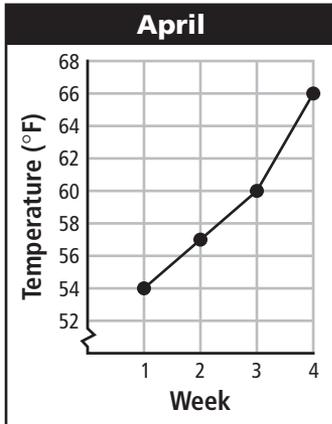
Additional Examples**Example 1****A. Why is this bar graph misleading?**

Because the lower part of the is missing,
the differences in prices are .

B. What might people believe from the misleading graph?

People might believe that Cars and cost $1\frac{1}{2}$ – $2\frac{1}{2}$ times as much
as Car . In reality, Cars and are only a few thousand dollars
more than Car .

Example 2



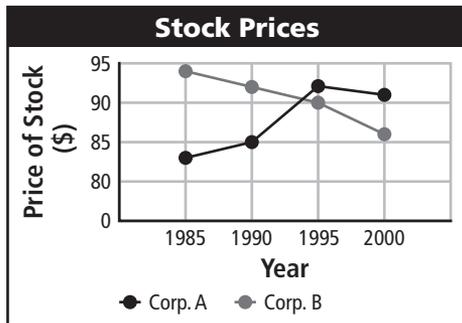
A. Why are these graphs misleading?

If you look at the scale for each graph, you will notice that the April graph goes from ° to ° and the May graph goes from ° to °.

B. What might people believe from these misleading graphs?

People might believe that the in May were about the same as the temperatures in . In reality, the temperatures in April were about degrees .

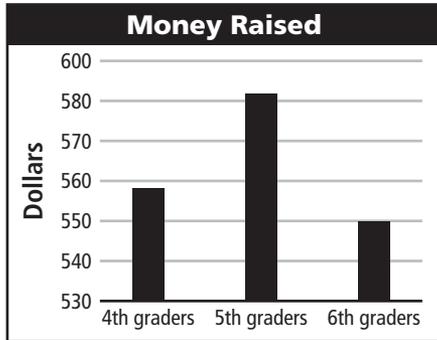
C. Explain why this graph is misleading.



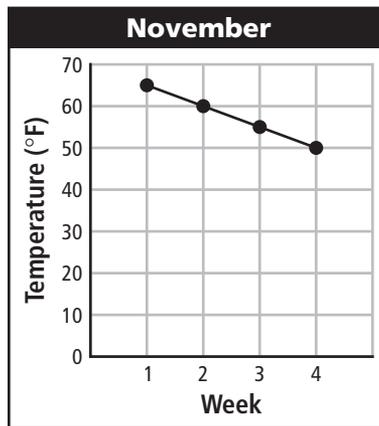
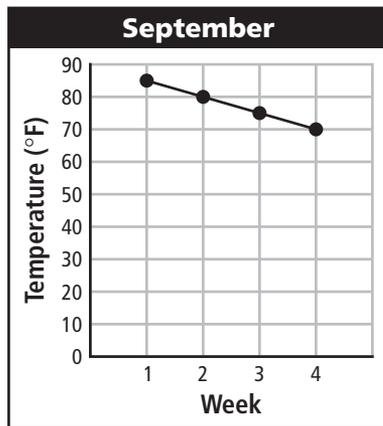
The scale goes from \$ to \$, and then increases by \$.

Try This

1. Why is this bar graph misleading?



2. Why are these line graphs misleading?



Lesson Objectives

Make and analyze stem-and-leaf plots

Vocabulary

stem-and-leaf plot (p. 330) _____

Additional Examples**Example 1**

Use the data to make a stem-and-leaf plot.

75 86 83 91 94 88 84 99 79 86

Step 1: Group the data by digits.

Step 2: Order the data from to

.

75	79
83	84 86 86 88
91	94 99

Step 3: List the digits of the data in order from to . Write these in the "" column.

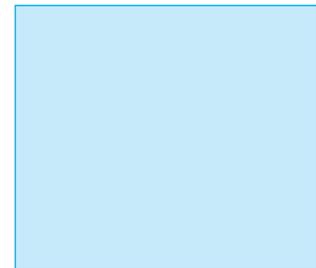
Step 4: For each tens digit, record the digits of each data

value in order from to

. Write these in the

"" column.

Step 5: Title the graph and add a .



Example 2

Find the least value, greatest value, mean, median, mode, and range of the data.

Stems	Leaves
4	0 0 1 5 7
5	1 1 2 4
6	3 3 3 5 9 9
7	0 4 4
8	3 6 7
9	1 4

Key: 4|0 means 40

The stem and

leaf give the value, .

The stem and

leaf give the value, .

Use the data values to find the mean $(40 + \dots + 94) \div 23 =$.

The is the middle value in the table, .

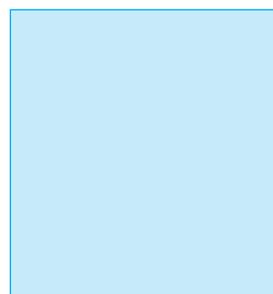
To find the , look for the number that occurs most often in a row of leaves. Then identify its stem. The mode is .

The is the difference between the greatest and the least value. - = .

Try This

1. Use the data in the table to make a stem-and-leaf plot.

Test Scores				
72	88	64	79	61
84	83	76	74	67



2. Find the least value, greatest value, mean, median, mode, and range of the data.



Stems	Leaves
3	0 2 5 6 8
4	1 1 3 4
5	4 5 6 9 9 9
6	1 2 4
7	5 6 9
8	1 5

Key: 3|0 means 30



Lesson Objectives

Choose an appropriate way to display data

Example 1

A. The table shows the miles jogged by five boxers. Which graph would be more appropriate to show the data—a line plot or a line graph? Draw the more appropriate graph.

Boxer	Al	Bo	Max	Jo	Ty
Miles	12	17	10	18	17

Think: Is the information in the table describing a change over ?

Can the information in the table be placed on a ?

The table shows the number of the boxers jogged. The data should be displayed on a with showing the frequencies of values. So a is more appropriate than a .

B. The table shows the heights on some plants. Which graph would be more appropriate to show the data—a bar graph or a stem-and-leaf plot? Draw the more appropriate graph.

Height of Plants (ft)					
11	27	14	35	11	26

Think: Is the information in the table divided into different ?

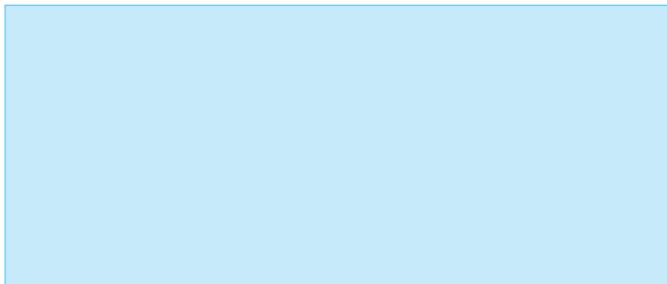
Can the information in the table be placed separated by ?

The table shows the of plants. The data should be displayed on a with

separating groups of values. So a

is more appropriate than a

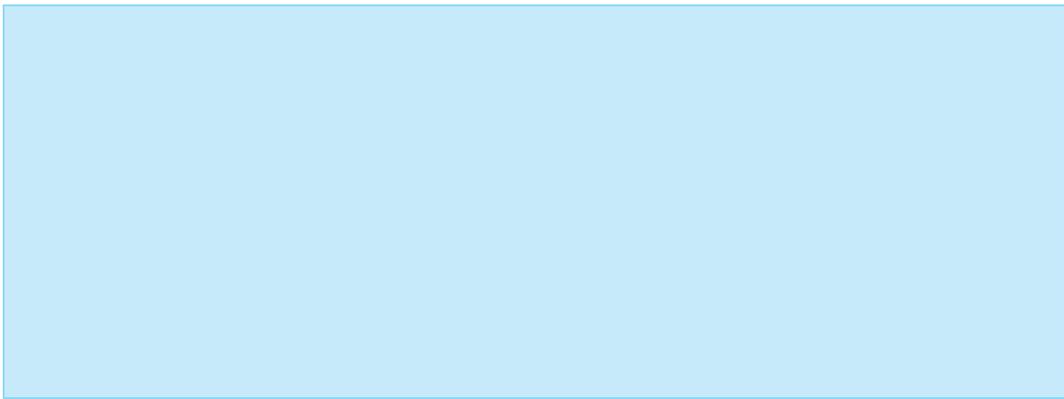
.



Try This

1. The table shows the temperatures for a city over a 5-day period. Which graph would be more appropriate to show the data—a bar graph or a line graph? Draw the more appropriate graph.

Day	Mon	Tues	Wed	Thurs	Fri
Temperature (°F)	65	72	70	68	75





6-1 Make a Table

1. On Thursday, 198 people attended the play. On Friday night, 234 people attended the play. On Saturday, 278 people attended the play. On Sunday, 156 people attended the play. Use this data to make a table.

2. Use your table from Exercise 1 to describe attendance change over time.

6-2 Mean, Median, Mode, and Range

Find the mean, median, mode, and range of each data set.

3.

Bowling Scores		
89	133	123

4.

Number of Seconds in Each Commercial				
29	18	45	60	18

5.

Distance (km)							
8	11	8	4	12	6	9	6

6.

Homework Scores							
21	18	24	16	12	23	20	18

7. Margie's first six test scores were 88, 98, 82, 86, 88, and 98. Create a table using this data. Then find the mean, median, mode, and range.

6-3 Additional Data and Outliers

The table shows the number of miles of Interstate 70 in the states of the Great Plains and Midwest.

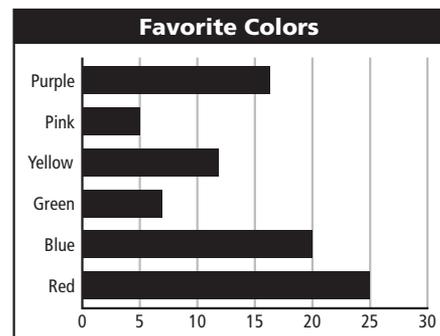
CO	IL	IN	KA	MD	MO	OH	PA	UT	WV
451	126	157	424	94	252	226	168	232	14

- What is the median number of miles of Interstate 70 in the states through which the interstate passes?
- What is the mean number of miles, to the nearest mile, of Interstate 70 in the states through which the interstate passes?
- What is the mean number of miles, to the nearest mile, of Interstate 70 in the states excluding West Virginia?

6-4 Bar Graphs

Use the bar graph to answer each question.

- Which two colors were the favorites of the most children?
- Which color received 5 times fewer votes than red?
- Write a sentence to compare the number of votes for yellow to the number of votes for blue.

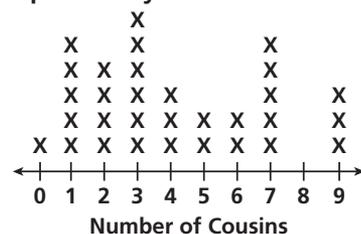


6-5 Line Plots, Frequency Tables, and Histograms

Use the line plot to answer each question.

- How many people were surveyed in all?
- What are the mode and range of the data?
- How many people surveyed have less than 4 cousins?

People Surveyed in the 6th Grade



6-6 Ordered Pairs

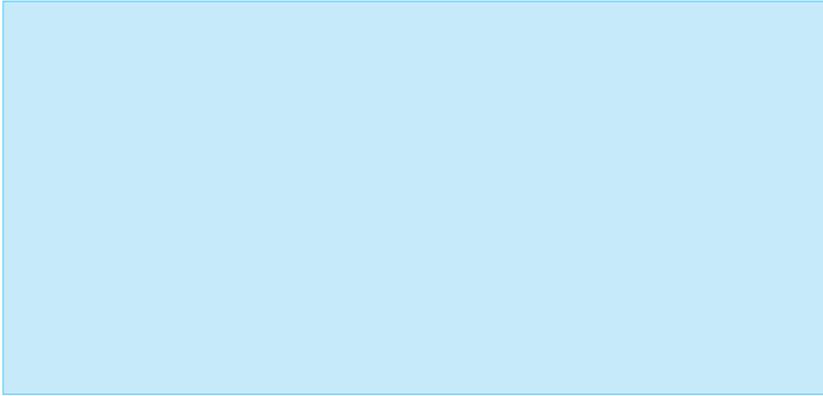
Graph and label each point on a coordinate grid.

17. $K(2, 6)$

18. $W(1, 3)$

19. $L(9, 0)$

20. $D(5, 7)$

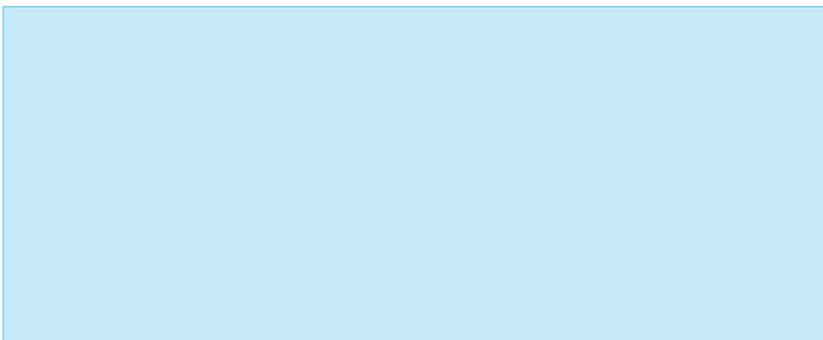


21. The coordinates $(7, 5)$, $(2, 5)$, and $(2, 0)$ form three of the corners of a square. What are the coordinates of the fourth corner?

6-7 Line Graphs

22. Use the data in the table to make a line graph.

Average High Temperature in Rome, Indiana (°F)											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep.	Oct.	Nov.	Dec.
42	46	55	59	68	72	82	89	77	65	48	48



Use the line graph you made in Exercise 22 to answer each question.

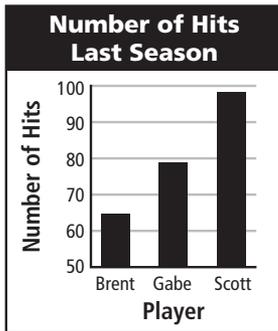
23. Did the average temperature in Rome, Indiana increase or decrease from July to August?

24. Which month has the lowest average temperature in Rome, Indiana?

6-8 Misleading Graphs

25. Olivia made a line graph of temperatures from Exercise 22 using a vertical scale of 0, 40, 50, 55, 60, 65, 70, 80, 90. Explain why her line graph was misleading.

26. Why is the bar graph misleading? What might people believe from this misleading graph?



6-9 Stem-and-Leaf Plots

27. Use the data in the temperature table in Exercise 22 to make a stem-and-leaf plot.

28. Use the stem-and-leaf plot you made in Exercise 27 to find the median, mode, and range average temperature in Rome, Indiana.

6-10 Choosing an Appropriate Display

29. Would it be also be appropriate to present the data about cousins in Exercises 14 – 16 in a bar graph? Explain.



Answer these question to summarize the important concepts from Chapter 6 in your own words.

1. Explain how to find the median of a data set with an even number of data values.

2. Explain how to make a bar graph from a given data set.

3. Explain the similarities and differences between a bar graph and a histogram.

4. Explain how to graph the point $(6, 3\frac{1}{2})$.

5. Explain when you should use a line plot, line graph, bar graph, histogram, or a stem-and-leaf plot to display data.

For more review of Chapter 6:

- Complete the Chapter 6 Study Guide and Review on pages 340–342 of your textbook.
- Complete the Ready to Go On quizzes on pages 306 and 336 of your textbook.

Lesson Objectives

Write ratios and rates and find unit rates

Vocabulary

ratio (p. 352) _____

equivalent ratios (p. 352) _____

rate (p. 353) _____

unit rate (p. 353) _____

Additional Examples**Example 1**

Use the table to write each ratio.

Animals at the Vet	
Cats	5
Dogs	7
Rabbits	2

A. cats to rabbits
 or or to
B. dogs to total number of pets
 or or to
C. total number of pets to cats
 or or to

Example 2

Write three equivalent ratios to compare the number of diamonds to the number of spades in the pattern.



$\frac{\text{number of diamonds}}{\text{number of spades}} = \frac{\square}{\square}$ There are \square diamonds and \square spades.

$\frac{3}{6} = \frac{3 \div 3}{6 \div 3} = \frac{\square}{\square}$ There is \square diamond for every \square spades.

$\frac{3}{6} = \frac{3 \cdot 3}{6 \cdot 3} = \frac{\square}{\square}$ If you triple the pattern, there will be \square diamonds for \square spades.

So, \square , \square , and \square are equivalent ratios.

Example 3

A 3-pack of paper towels costs \$2.79. A 6-pack costs \$5.46. Which is the better deal?

$\frac{\$2.79}{3 \text{ rolls}}$ Write the \square .

$\frac{\$2.79 \div 3}{3 \text{ rolls} \div 3}$ Divide both terms by \square .

$\frac{\square}{1 \text{ roll}}$ \$ \square for 1 roll.

$\frac{\$5.46}{6 \text{ rolls}}$ Write the \square .

$\frac{\$5.46 \div 6}{6 \text{ rolls} \div 6}$ Divide both terms by \square .

$\frac{\square}{1 \text{ roll}}$ \$ \square for 1 roll.

The \square -pack is the better deal.

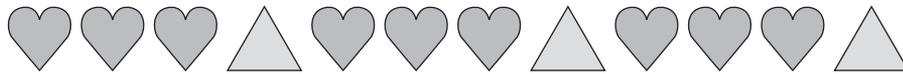
Try This

1. Use the table to write the ratio.

birds to total number of pets

Animals at the Vet	
Birds	6
Hamsters	9
Snakes	3

2. Write three equivalent ratios to compare the number of triangles to the number of hearts in the pattern.



3. A 3-pack of juice boxes costs \$2.10. A 9-pack costs \$5.58. Which is the better deal?

Using Tables to Explore Equivalent Ratios and Rates



Lesson Objectives

Use a table to find equivalent ratios and rates

Additional Examples

Example 1

Use a table to find three equivalent ratios.

A. $\frac{6}{7}$

original $6 \cdot 2$ $6 \cdot 3$ $6 \cdot 4$
 ratio ↓ ↓ ↓

6	12	18	24
7	14	21	28

 ↑ ↑ ↑
 $7 \cdot 2$ $7 \cdot 3$ $7 \cdot 4$

Multiply the numerator and the denominator by , , and .

The ratios $\frac{6}{7}$, , , and are equivalent.

B. $\frac{3}{5}$

original $3 \cdot 2$ $3 \cdot 3$ $3 \cdot 4$
 ratio ↓ ↓ ↓

3	6	9	12
5	10	15	20

 ↑ ↑ ↑
 $5 \cdot 2$ $5 \cdot 3$ $5 \cdot 4$

Multiply the numerator and the denominator by , , and .

The ratios $\frac{3}{5}$, , , and are equivalent.

Use a table to find three equivalent ratios.

C. $\frac{48}{36}$

original	$48 \div 2$	$48 \div 3$	$48 \div 4$
ratio	↓	↓	↓
48	24	16	12
36	18	12	9
	↑	↑	↑
	$36 \div 2$	$36 \div 3$	$36 \div 4$

Divide the numerator and the denominator by , , and .

The ratios $\frac{48}{36}$, , , and are equivalent.

Example 2

Several groups of friends are going to take a shuttle bus to the park. The table shows how much the different groups will pay in all. Predict how much a group of 15 friends will pay.

Number in Group	6	12	18
Bus Fare (\$)	12	24	36

$12 < \text{} < 18$; therefore, the group will pay between and .

The ratio $\frac{6}{12}$ is equivalent to , and is a factor of 15.

· 3 = 15

Multiply the numerator and denominator by the same factor, .

· \$6 =

A group of 15 friends would pay .

Try This

1. Use a table to find three equivalent ratios.

$$\frac{2}{9}$$

2. Several groups of friends are going to take a shuttle bus to the park. The table shows how much the different groups will pay in all. Predict how much a group of 8 friends will pay.

Number in Group	2	6	10
Amount Paid (\$)	8	24	40

Lesson Objectives

Write and solve proportions

Vocabulary

proportion (p. 362) _____

Additional Examples**Example 1**

Write a proportion for the model.



First write the ratio of to .

$$\frac{\text{number of hearts}}{\text{number of stars}} = \frac{\boxed{}}{\boxed{}}$$

Next separate the hearts and stars into two groups.



Now write the ratio of to in each group.

$$\frac{\text{number of hearts}}{\text{number of stars}} = \frac{\boxed{}}{\boxed{}}$$

A proportion shown by the model is .

Example 2

Find the missing value in the proportion $\frac{5}{6} = \frac{n}{18}$.

$$\frac{5}{6} = \frac{n}{18}$$

Find the cross .

$$6 \cdot n = 5 \cdot 18$$

The cross products are .

$$\square = \square$$

n is multiplied by 6.

$$\frac{6n}{6} = \frac{90}{6}$$

both sides by to

undo the .

$$n = \square$$

Example 3

According to the label, 1 tablespoon of plant fertilizer should be used per 6 gallons of water. How many tablespoons of fertilizer would you use for 4 gallons of water?

$$\frac{1 \text{ tbsp}}{6 \text{ gal}} = \frac{f}{4 \text{ gal}}$$

Let be the amount of fertilizer for gallons of water.

$$\frac{1 \text{ tbsp}}{6 \text{ gal}} = \frac{f}{4 \text{ gal}}$$

Write a .

$$6 \cdot f = 1 \cdot 4$$

The cross products are .

$$\square = \square$$

f is multiplied by 6.

$$\frac{6f}{6} = \frac{4}{6}$$

both sides by to undo the

.

$$f = \square$$

Write your answer in simplest form.

You would use tbsp of fertilizer for 4 gallons of water.

Try This

1. Write a proportion for the model.



2. Find the missing value in the proportion.

$$\frac{3}{5} = \frac{n}{15}$$

3. To make a certain shade of pink paint, mix 8 gallons of white paint with 3 gallons of red paint. How many gallons of white paint would you use for 15 gallons of red paint?

Lesson Objectives

Use ratios to identify similar figures

Vocabulary

similar (p. 366) _____

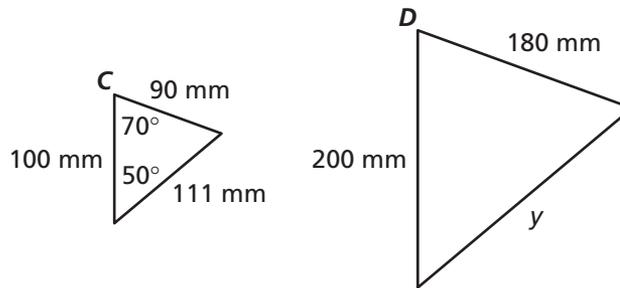
corresponding sides (p. 366) _____

corresponding angles (p. 366) _____

Additional Examples

Example 1

The two triangles are similar. Find the missing length y and the measure of $\angle D$.



$$\frac{100}{200} = \frac{111}{y}$$

Write a using side lengths.

$$200 \cdot 111 = 100 \cdot y$$

The cross products are .

$$\text{[]} = 100y$$

y is multiplied by 100.

$$\frac{22,200}{100} = \frac{100y}{100}$$

both sides by to undo the .

$$\text{[]} \text{ mm} = y$$

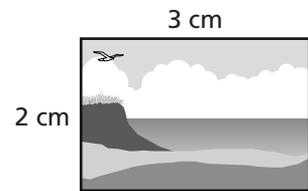
Angle D is congruent to angle , and $m\angle \text{[]} = 70^\circ$.

$$m\angle D = \text{[]}$$

Example 2

PROBLEM SOLVING APPLICATION

This reduction is similar to a picture that Katie painted. The height of the actual painting is 54 centimeters. What is the width of the actual painting?



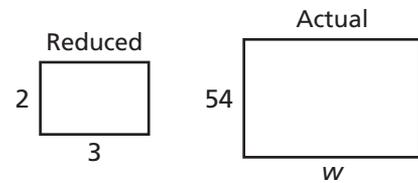
1. Understand the Problem

The answer will be the of the actual painting.
List the important information:

- The actual painting and the reduction above are .
- The reduced painting is cm tall and cm wide.
- The actual painting is cm tall.

2. Make a Plan

Draw a diagram to represent the situation.



Use the corresponding sides to write a .

3. Solve

$$\frac{2 \text{ cm}}{54 \text{ cm}} = \frac{3 \text{ cm}}{w \text{ cm}}$$

Write a .

$$54 \cdot 3 = 2 \cdot w$$

The cross products are .

$$\text{} = \text{$$

w is multiplied by 2.

$$\frac{162}{2} = \frac{2w}{2}$$

both sides by to undo the

$$\text{$$

$$\text{} = w$$

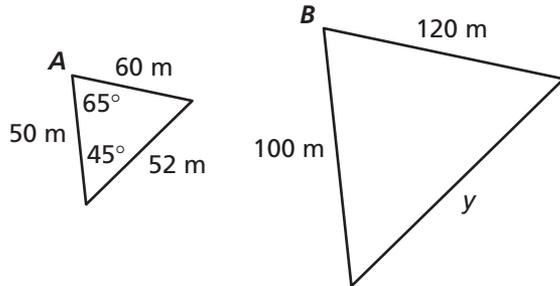
The width of the actual painting is cm.

4. Look Back

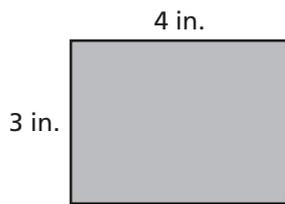
Estimate to check your answer. The ratio of the heights is about 2:50 or 1:25. The ratio of the widths is about 3:90, or 1:30. Since these ratios are close to each other, 81 cm is a reasonable answer.

Try This

1. The two triangles are similar. Find the missing length y and the measure of $\angle B$.



2. This reduction is similar to a picture that Marty painted. The height of the actual painting is 39 inches. What is the width of the actual painting?





Lesson Objectives

Use proportions and similar figures to find unknown measures

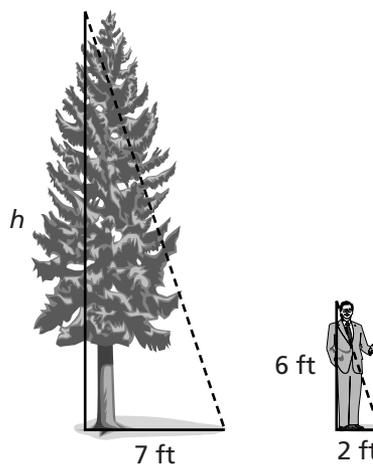
Vocabulary

indirect measurement (p. 370) _____

Additional Examples

Example 1

Use the similar triangles to find the height of the tree.



$$\frac{6}{h} = \frac{2}{7}$$

Write a using sides.

$$h \cdot 2 = 6 \cdot 7$$

The cross products are .

$$\text{[]} = \text{[]}$$

h is multiplied by 2.

$$\frac{2h}{2} = \frac{42}{2}$$

both sides by to undo the .

$$h = \text{[]}$$

The tree is feet tall.

Example 2

A rocket casts a shadow that is 91.5 feet long. A 4-foot model rocket casts a shadow that is 3 feet long. How tall is the rocket?

$$\frac{h}{4} = \frac{91.5}{3}$$

Write a using sides.

$$4 \times 91.5 = h \times 3$$

The cross products are .

$$\text{} = \text{$$

h is multiplied by 3.

$$\frac{366}{3} = \frac{3h}{3}$$

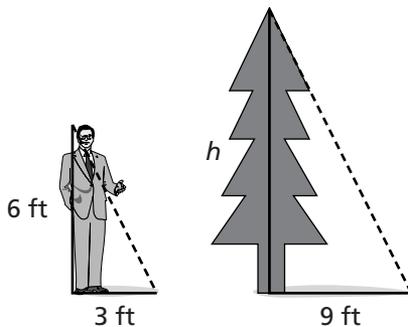
both sides by to undo the .

$$\text{} = h$$

The rocket is feet tall.

Try This

1. Use the similar triangles to find the height of the tree.



2. A building casts a shadow that is 72.5 feet long when a 4-foot model building casts a shadow that is 2 feet long. How tall is the building?

Lesson Objectives

Read and use map scales and scale drawings

Vocabulary

scale drawing (p. 374) _____

scale (p. 374) _____

Additional Examples**Example 1**

The scale on a map is 4 in: 1 mi. On the map, the distance between two towns is 20 in. What is the actual distance?

$$\frac{4 \text{ in.}}{1 \text{ mi.}} = \frac{20 \text{ in.}}{x \text{ mi.}}$$

Write a using the

. Let x be the actual number of miles

between the two towns.

$$1 \cdot 20 = 4 \cdot x$$

The cross products are .

$$\text{} = \text{$$

x is multiplied by 4.

$$\frac{20}{4} = \frac{4x}{4}$$

both sides by to undo the

.

$$\text{} = x$$

The actual distance between the two towns is miles.

Example 2

A. If a drawing of the planets was made using the scale 1 in:30 million km, the distance from Mars to Jupiter on the drawing would be about 18.3 in. What is the actual distance from Mars to Jupiter?

$$\frac{1 \text{ in.}}{30 \text{ million km}} = \frac{18.3 \text{ in.}}{x \text{ million km}}$$

Write a . Let x be the actual distance from Mars to Jupiter.

$$30 \cdot 18.3 = 1 \cdot x$$

The cross products are .

$$\text{[]} = x$$

The actual distance from Mars to Jupiter is about million km.

B. The actual distance from Earth to Mars is about 78 million kilometers. How far apart should they be drawn?

$$\frac{1 \text{ in.}}{30 \text{ million km}} = \frac{x \text{ in.}}{78 \text{ million km}}$$

Write a . Let x be the distance from Earth to Mars on the drawing.

$$30 \cdot x = 1 \cdot 78$$

The cross products are .

$$\text{[]} = \text{[]}$$

x is multiplied by 30.

$$\frac{30x}{30} = \frac{78}{30}$$

both sides by to undo the .

$$x = \text{[]}$$

Earth and Mars should be drawn inches apart.

Try This

1. The scale on a map is 3 in:1 mi. On the map, the distance between two cities is 18 in. What is the actual distance?

Lesson Objectives

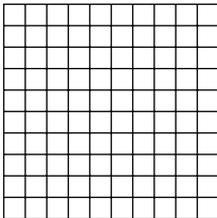
Write percents as decimals and as fractions

Vocabulary

percent (p. 381) _____

Additional Examples**Example 1**

Use a 10-by-10 square grid to model 17%.



A 10-by-10 square grid has squares.

17% means “17 out of ” or .

Shade squares out of squares.

Example 2

Write 35% as a fraction in simplest form.

$$35\% = \frac{35}{100}$$

Write the percent as a fraction with a denominator of

$$\frac{35 \div 5}{100 \div 5} = \frac{\text{ }{\text{ }}}$$

Write the fraction in simplest form.

Written as a fraction, 35% is .

Example 3

Janell has 20% body fat. Write 20% as a fraction in simplest form.

$$20\% = \frac{20}{100}$$

Write the percent as a with a denominator of .

$$\frac{20 \div 20}{100 \div 20} = \text{$$

Write the fraction in simplest form.

Written as a fraction, 20% is .

Example 4

Write 56% as a decimal.

$$56\% = \frac{56}{100}$$

Write the percent as a with a denominator of .

$$\begin{array}{r} \text{} \\ 100 \overline{)56.00} \\ \underline{-50\ 0} \\ 6\ 00 \\ \underline{-6\ 00} \\ 0 \end{array}$$

Write the fraction as a decimal.

Written as a decimal, 56% is .

Example 5

Water made up 85% of the fluids that Kirk drank yesterday. Write 85% as a decimal.

$85\% = \boxed{}$

Write the percent as a $\frac{}{}$ with a denominator of $$.

$85 \div 100 = \boxed{}$

Write the $$ as a decimal.

Written as a decimal, 85% is $$.

Try This

1. Use a 10-by-10 square grid to model 26%.

2. Write 65% as a fraction in simplest form.

3. Timmy is a football player with 10% body fat. Write 10% as a fraction in simplest form.

4. Write 32% as a decimal.

5. Water made up 95% of the fluids that Lisa drank yesterday. Write 95% as a decimal.

Lesson Objectives

Write decimals and fractions as percents

Additional Examples**Example 1**

Write each decimal as a percent.

Method 1: Use place value.

A. 0.7

$0.7 = \boxed{}$

Write the decimal as a $\boxed{}$.

$\frac{7 \times 10}{10 \times 10} = \boxed{}$

Write an $\boxed{}$ fraction with $\boxed{}$ as the denominator.

$\boxed{} = \boxed{}\%$

Write the $\boxed{}$ with a percent symbol.

B. 0.16

$0.16 = \boxed{}$

Write the decimal as a $\boxed{}$.

$\boxed{} = \boxed{}\%$

Write the $\boxed{}$ with a percent symbol.

Method 2: Multiply by 100.

C. 0.4118

$0.4118 \cdot \boxed{}$

Multiply by $\boxed{}$.

$\boxed{}$

Add the percent symbol.

D. 0.067

$0.067 \cdot \boxed{}$

Multiply by $\boxed{}$.

$\boxed{}$

Add the percent symbol.

Example 2

Write each fraction as a percent.

Method 1: Write an equivalent fraction with a denominator of 100.

A. $\frac{9}{25}$

$$\frac{9 \times 4}{25 \times 4} = \boxed{}$$

Write an $\boxed{}$ fraction with $\boxed{}$ as the denominator.

$$\boxed{} = \boxed{}$$

Write the $\boxed{}$ with a percent symbol.

Method 2: Use division to write the fraction as a decimal.

B. $\frac{3}{20}$

$$\begin{array}{r} \boxed{} \\ 20 \overline{)3.00} \\ \underline{-20} \\ 100 \\ \underline{-100} \\ 0 \end{array}$$

Divide the $\boxed{}$ by the

$$\boxed{}$$

$$0.15 = \boxed{}$$

Multiply by $\boxed{}$ by moving the decimal point

$\boxed{}$ two places. Add the percent symbol.

Example 3

One year, $\frac{7}{25}$ of people with home offices were self-employed. What percent of people with home offices were self-employed?

$$\frac{7}{25}$$

$$\frac{7 \cdot 4}{25 \cdot 4} = \boxed{}$$

Find an equivalent fraction with a denominator of $\boxed{}$.

$$\frac{28}{100} = \boxed{}$$

Write the $\boxed{}$ with a percent sign.

$\boxed{}$ of people with home offices were self-employed.

Try This

1. Write the decimal as a percent.

0.023

2. Write the fraction as a percent.

$\frac{7}{50}$

3. During the soccer season, $\frac{9}{20}$ of Evan's teammates scored a goal. What percent of Evan's teammates scored a goal?

Lesson Objectives

Find the missing value in a percent problem

Additional Examples**Example 1**

There are 560 students in Ella's school. If 35% of the students participate in after-school sports, how many students participate in after-school sports?

First estimate your answer. Think: $35\% = \boxed{}$, which is close to $\frac{1}{3}$, and 560 is close to $\boxed{}$. So about $\frac{1}{3}$ of the students participate in after-school sports.

$\frac{1}{3} \cdot 600 = 200$ ← This is the $\boxed{}$.

Now solve:

$$\frac{35}{100} = \frac{s}{560}$$

Let s represent the number of students who participate in after-school sports.

$$100 \cdot s = 35 \cdot 560$$

The cross products are $\boxed{}$.

$$\boxed{} = \boxed{}$$

s is multiplied by 100.

$$\frac{100s}{100} = \frac{19,600}{100}$$

$\boxed{}$ both sides of the equation by $\boxed{}$ to undo

$$\boxed{}$$

$$s = \boxed{}$$

Since $\boxed{}$ is close to your estimate of 200, $\boxed{}$ is a reasonable answer.

$\boxed{}$ students participate in after-school sports.

Example 2

Johan is 25% of the way through his exercises. If he has exercised for 20 minutes so far, how much longer does he have to work out?

$$\frac{\%}{100} = \frac{\text{is}}{\text{of}}$$

$$\frac{25}{100} = \frac{20}{m}$$

$$100 \cdot 20 = 25 \cdot m$$

$$\boxed{} = \boxed{}$$

$$\frac{2000}{25} = \frac{25m}{25}$$

$$\boxed{} = m$$

He has worked out for 25% of the total time, so

$\boxed{}$ minutes is $\boxed{}$ of the total exercise time.

The cross products are $\boxed{}$.

s is multiplied by 100.

$\boxed{}$ both sides of the equation by

$\boxed{}$ to undo $\boxed{}$.

The total exercise time is $\boxed{}$ minutes. So far, he has exercised for 20 minutes. Because $\boxed{} - 20 = \boxed{}$, the remainder of the exercises will take $\boxed{}$ minutes.

He still has another $\boxed{}$ minutes to go.

Example 3

Find 36% of 50.

$$36\% = \boxed{}$$

Write the percent as a $\boxed{}$.

$$\boxed{} \cdot 50$$

$\boxed{}$ using the decimal.

$$\boxed{}$$

So $\boxed{}$ is 36% of 50.



Lesson Objectives

Solve percent problems that involve discounts, tips, and sales tax

Vocabulary

discount (p. 396) _____

tip (p. 396) _____

sales tax (p. 396) _____

Additional Examples

Example 1

A clothing store is having a 10% off sale. If Angela wants to buy a sweater whose regular price is \$19.95, about how much will she pay for the sweater after the discount?

Step 1: First round \$19.95 to \$.

Step 2: Find 10% of \$20 by $\cdot 20$.

(Hint: Moving the decimal point one place left is a shortcut.)

$$10\% \text{ of } 20 = 0.10 \cdot \$20 = \$ \text{ }$$

The approximate discount is \$. this amount from \$20.00 to estimate the cost of the sweater.

$$\$20.00 - \$2.00 = \$ \text{ }$$

Angela will pay about \$ for the sweater.

Example 2

Ben's dinner bill is \$7.85. He wants to leave a tip that is 15% of the bill. About how much should his tip be?

Step 1: First round \$7.85 to \$.

Step 2: Think: $15\% = 10\% + 5\%$

$$10\% \text{ of } \$8 = 0.10 \cdot \$8 = \$ \text{ }$$

Step 3: $5\% = 10\% \div 2$

$$= \$0.80 \div 2 = \$ \text{ }$$

Step 4: $15\% = \text{ } \% + \text{ } \%$

$$= \text{ } + \text{ } = \text{ }$$

Ben should leave about \$ as a tip.

Example 3

Ann is buying a \$29.75 dog bed. The sales tax rate is 7%. About how much will the total cost be?

Step 1: First round \$29.75 to \$.

Step 2: Think: $7\% = 7 \cdot 1\%$

$$1\% \text{ of } \$30 = 0.01 \cdot \$30 = \$ \text{ }$$

Step 3: $7\% = 7 \cdot 1\%$

$$= 7 \cdot \$ \text{ } = \$ \text{ }$$

The approximate sales tax is \$. this amount to \$30 to estimate the total cost of the dog bed.

$$\$30 + \$ \text{ } = \$ \text{ }$$

Ann will pay about \$ for the dog bed.

Try This

1. A fishing store is having a 10% off sale. If Gerald wants to buy a fishing pole whose regular price is \$39.95, about how much will he pay for the pole after the discount?

2. Fran's breakfast bill is \$13.95. She wants to leave a tip that is 20% of the bill. About how much should her tip be?

3. Erik is buying a blanket for \$19.83. The sales tax rate is 8%. About how much will the total cost of the blanket be?



7-1 Ratios and Rates

Use the table to write each ratio.

1. red shirts to gray shirts

2. blue shirts to white shirts

3. white shirts to total shirts

Red	4
White	14
Blue	7
Gray	9

4. Sunshine Gymnastics charges \$60 for a 6-week class. ABC Gymnastics charges \$45 for a 4-week class. Which class is the better deal?

7-2 Using Tables to Explore Equivalent Ratios and Rates

Use a table to find three equivalent ratios.

5. $\frac{9}{13}$

6. 25:7

7. 11 to 30

8. Andrew swims laps for exercise. The table shows how long it takes him to swim different numbers of laps. Predict how long it will take him to swim 50 laps.

Number of laps	10	20	30	60	70
Time (min)	5	10	15	30	35

7-3 Proportions

9. Write a proportion for the model.



Find the missing value in each proportion.

10. $\frac{p}{42} = \frac{15}{7}$

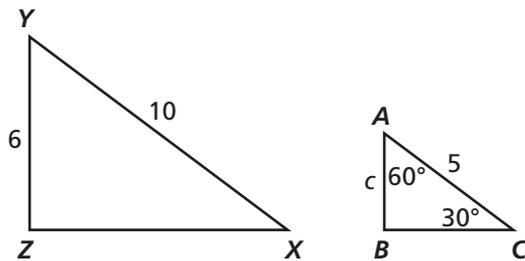
11. $\frac{5}{9} = \frac{8}{n}$

12. $\frac{2}{a} = \frac{34}{51}$

13. $\frac{3}{10} = \frac{b}{30}$

7-4 Similar Figures

14. The two triangles are similar. Find the missing length c and the measure of $\angle Y$.



15. Two paintings are similar in size. The larger painting is three times the size of the smaller painting. The smaller painting has a length of 7 feet and a width of 2 feet. What is the length and width of the larger painting?

**7-5 Indirect Measurement**

16. A 10-foot basketball pole casts a 4-foot shadow. A 4-foot-tall boy is standing by the basketball pole. How long is his shadow? 
17. A telephone pole casts a shadow that is 5 m long. A house next to the pole is 18 m tall and casts a 7.5 m shadow. How tall is the telephone pole? 
18. A 42-foot-tall building casts a 12-foot shadow. A nearby tree casts an 8-foot shadow. How tall is the tree? 

7-6 Scale Drawings and Maps

19. The key on a map is 1 inch = 75 miles. The distance from New York City to Buffalo is 6 inches on the map. How many miles is it from New York City to Buffalo? 
20. A model spaceship has a scale of 3 inches = 50 feet. A spaceship is 225 feet long. How long is the model? 

7-7 Percents

Write each percent as a fraction in simplest form.

21. 36%

22. 55%

23. 68%

24. The city of Chicago's sales tax is 9%. Write 9% as a decimal. **7-8 Percents, Decimals, and Fractions**

Write each decimal as a percent.

25. 0.61

26. 0.0475

27. 0.209

Write each fraction as a percent.

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

29. $\frac{69}{200}$

30. $\frac{9}{15}$

31. A football player completes 11 of 16 passes. What percent of the passes did the football player complete? **7-9 Percent Problems**32. Nick has done 35% of his homework. He has been working for 28 minutes. How long will it take him to complete his homework? 33. Maya's boss wants her to alphabetize 80 files. She has already alphabetized 60 files. What percent of the files has she alphabetized? 34. Find 41% of 120. 35. Find 14% of 60. 36. Find 5% of 650. **7-10 Using Percents**37. A camping store is having a sale. All tents are 30% off. If the regular price of a tent is \$199.00, what is the sale price? 38. Ryan's bill was \$52.00. He left a 20% tip. How much was the tip? 39. Melanie bought a dollhouse for \$130.00. The sales tax was 6%. What was the total price of the dollhouse including tax?

Answer these question to summarize the important concepts from Chapter 7 in your own words.

1. Explain how to find an equivalent ratio.

2. Explain how to find the value of n in the proportion $\frac{5}{20} = \frac{n}{35}$.

3. On a map the distance between two cities is 3.5 inches. The scale on the map is 1 inch = 10 miles. Explain how to find the actual distance between the two cities.

4. Explain how to write 45% as a fraction.

5. Explain how to write 0.08 as a percent.

For more review of Chapter 7:

- Complete the Chapter 7 Study Guide and Review on pages 404–406 of your textbook.
- Complete the Ready to Go On quizzes on pages 378 and 398 of your textbook.

Lesson Objectives

Describe figures by using the terms of geometry

Vocabulary

point (p. 416) _____

line (p. 416) _____

plane (p. 416) _____

line segment (p. 417) _____

ray (p. 417) _____

Additional Examples**Example 1**

Use the diagram to name each geometric figure.

A. three points

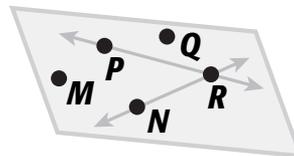
□, □, and □

Five points are labeled: points □, □,

□, □, and □.

B. two lines

□ and □

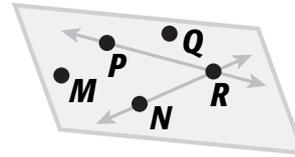
You can also write \overleftrightarrow{RP} and \overleftrightarrow{RN} .

Use the diagram to name each geometric figure.

C. a point shared by two lines

point

Point R is a point on and .



D. a plane

plane

Use any points in the plane that are on the same line. Write the points in any order.

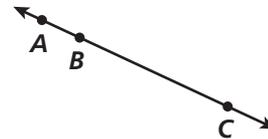
Example 2

Use the diagram to give a possible name to each figure.

A. three different line segments

, , and

You can also write , , and .



B. three ways to name the line

, , and

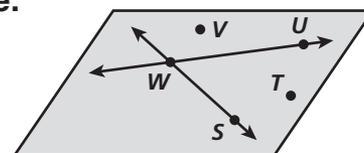
You can also write , , and .

Try This

1. Use the diagram to name each geometric figure.

two lines

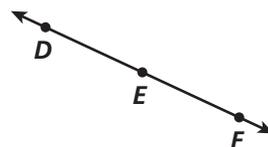
and



2. Use the diagram to give a possible name to each figure.

three different line segments

, , and



Lesson Objectives

Name, measure, draw, and classify angles

Vocabulary

angle (p. 420) _____

vertex (p. 420) _____

acute angle (p. 421) _____

right angle (p. 421) _____

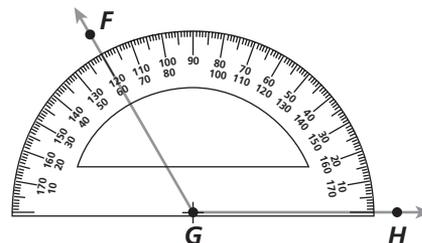
obtuse angle (p. 421) _____

straight angle (p. 421) _____

Additional Examples**Example 1**

Use a protractor to measure the angle.
Tell what type of angle it is.

- Place the point of the protractor on the of the angle.



- Place the protractor so that ray passes through the ° mark.

- Using the scale that starts with ° along ray GH , read the measure where ray crosses.
- The measure of $\angle FGH$ is °. Write this as $m\angle FGH =$ °.
- Since $120^\circ > 90^\circ$ and $120^\circ < 180^\circ$, the angle is .

Example 2

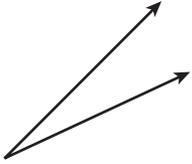
Use a protractor to draw an angle that measures 80° .

- Draw a on a sheet of paper.
- Place the point of the protractor on the endpoint of the .
- Place the so that the passes through the ° mark.
- Make a mark at ° above the scale on the .
- Use a straightedge to draw a from the endpoint of the first ray through the mark you make at °.

Example 3

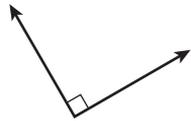
Classify each angle as acute, right, obtuse, or straight.

A.



The angle measures 90° , so it is an angle.

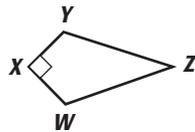
B.



The angle measures 90° , so it is a angle.

Example 4

A welder used this piece of metal on his project. Classify $\angle X$, $\angle Y$, and $\angle Z$.



$\angle X$ The angle is marked as a angle.

$\angle Y$ The angle measures more than $^\circ$ and less than $^\circ$.

$\angle Z$ The angle measures less than $^\circ$.

Lesson Objectives

Understand relationships of angles

Vocabulary

congruent (p. 424) _____

vertical angles (p. 424) _____

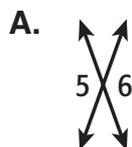
adjacent angles (p. 424) _____

complementary angles (p. 425) _____

supplementary angles (p. 425) _____

Additional Examples**Example 1**

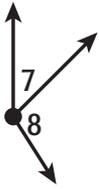
Identify the type of each angle pair shown.



$\angle 5$ and $\angle 6$ are _____ each other and
are formed by two _____ lines.

They are _____ angles.

B.



$\angle 7$ and $\angle 8$ are side by side and have a common

and .

They are angles.

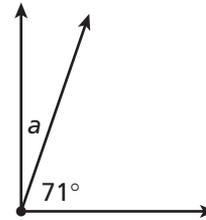
Example 2

Find each unknown angle measure.

A. The angles are complementary.

The sum of the measures is °.

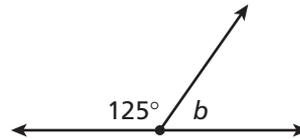
$$\begin{array}{r} 71^\circ + a = 90^\circ \\ - 71^\circ \quad - 71^\circ \\ \hline a = \text{}^\circ \end{array}$$



B. The angles are supplementary.

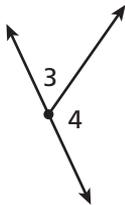
The sum of the measures is °.

$$\begin{array}{r} 125^\circ + b = 180^\circ \\ - 125^\circ \quad - 125^\circ \\ \hline b = \text{}^\circ \end{array}$$



Try This

1. Identify the type of angle pair shown.





Lesson Objectives

Classify the different types of lines

Vocabulary

parallel lines (p. 428) _____

perpendicular lines (p. 428) _____

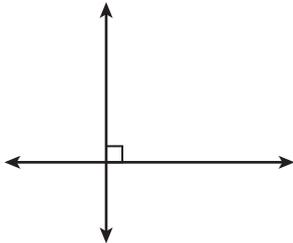
skew lines (p. 428) _____

Additional Examples

Example 1

Classify each pair of lines.

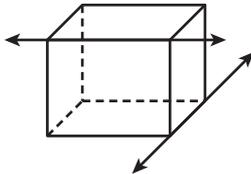
A.



The lines intersect to form angles.

They are .

B.

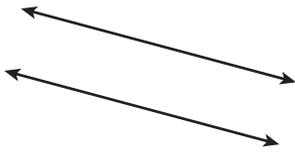


The lines are in different and are not or

.

They are .

C.



The lines are in the same .

They do not appear to .

They are .

D.

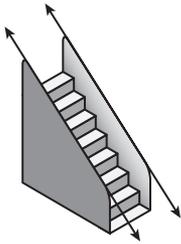


The lines cross at common point.

They are .

Example 2

The handrails on an escalator are in the same plane. What type of line relationship do they represent?

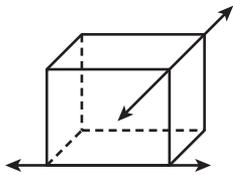


The handrails are in the same and do not .

They are .

Try This

1. Classify the pair of lines.



Lesson Objectives

Classify triangles and solve problems involving angle and side measures of triangles

Vocabulary

acute triangle (p. 437) _____

obtuse triangle (p. 437) _____

right triangle (p. 437) _____

scalene triangle (p. 438) _____

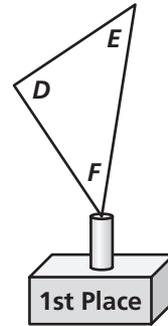
isosceles triangle (p. 438) _____

equilateral triangle (p. 438) _____

Additional Examples

Example 1

Sara designed this triangular trophy. The measure of $\angle E$ is 38° , and the measure of $\angle F$ is 52° . Classify the triangle.



To classify the triangle, find the measure of \angle on the trophy.

$$m\angle D = 180^\circ - (\text{ }^\circ + \text{ }^\circ)$$

$$m\angle D = 180^\circ - \text{ }^\circ$$

$$m\angle D = \text{ }^\circ$$

Subtract the sum of the known angle measures from $^\circ$.

So the measure of $\angle D$ is $^\circ$. Because $\triangle DEF$ has one angle, the trophy is a triangle.

Example 2

Use the diagram to find the measure of the indicated angle.

A. $\angle QTR$

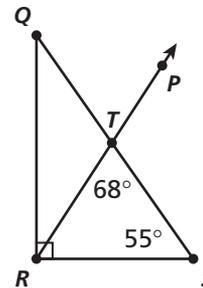
$\angle QTR$ and $\angle STR$ are

angles, so the sum of $m\angle QTR$ and

$$m\angle STR \text{ is } \text{ }^\circ.$$

$$m\angle QTR = 180^\circ - \text{ }^\circ$$

$$= \text{ }^\circ$$



B. $\angle QRT$

$\angle QRT$ and $\angle SRT$ are

angles, so the sum of $m\angle QRT$ and

$m\angle SRT$ is °.

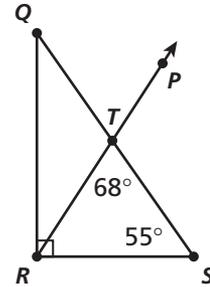
$$m\angle SRT = 180^\circ - (\text{input}^\circ + \text{input}^\circ)$$

$$= 180^\circ - \text{input}^\circ$$

$$= \text{input}^\circ$$

$$m\angle QRT = 90^\circ - \text{input}^\circ$$

$$= \text{input}^\circ$$



Example 3

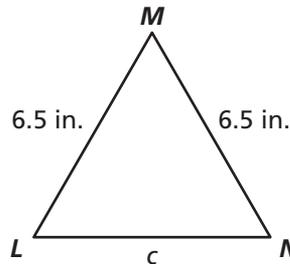
Classify the triangle. The sum of the lengths of the sides is 19.5 in.

$$c + (6.5 + 6.5) = 19.5$$

$$c + \text{input} = 19.5$$

$$c + 13 - \text{input} = 19.5 - \text{input}$$

$$c = \text{input}$$



Side c is inches long. Because $\triangle LMN$ has three

sides, it is .

Lesson Objectives

Identify, classify, and compare quadrilaterals

Vocabulary

quadrilateral (p. 442) _____

parallelogram (p. 442) _____

rectangle (p. 442) _____

rhombus (p. 442) _____

square (p. 442) _____

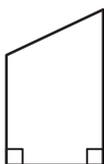
trapezoid (p. 442) _____

Additional Examples

Example 1

Give the most descriptive name for each figure.

A.



The figure is a

and a

is the most descriptive name.



The figure is a

, a

, and a

.

is the most descriptive name.

Example 2

Complete the statement.

A. A rectangle can also be called a ____?__.

A rectangle has opposite sides that are ; it can be called a .

B. A parallelogram cannot be a ____?__.

A parallelogram has opposite sides that are ; it cannot be called a .

Try This

1. Give the most descriptive name for the figure.



2. Complete the statement.

A rhombus with four right angles is a ____?__.



Lesson Objectives

Identify regular and not regular polygons; find the angle measures of regular polygons

Vocabulary

polygon (p. 446) _____

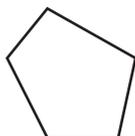
regular polygon (p. 446) _____

Additional Examples

Example 1

Tell whether each shape is a polygon. If so, give its name and tell whether it appears to be regular or not regular.

A.

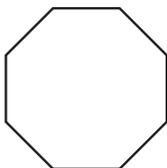


The shape is a plane figure formed by or more line segments.

There are sides and angles.

All 5 sides do not appear to be congruent.

B.



The shape is a plane figure formed by or more line segments.

There are sides and angles.

All sides appear to be congruent.

Example 2

PROBLEM SOLVING APPLICATION

Malcolm designed a wall hanging that was a regular 9-sided polygon (called a *nonagon*). What is the measure of each angle of the nonagon?

1. Understand the Problem

The answer will be the measure of each angle in a nonagon.

List the important information:

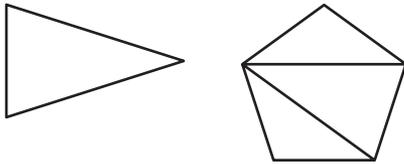
- A regular nonagon has 9 congruent sides and 9 congruent angles.

2. Make a Plan

Make a table to look for a pattern using regular polygons.

3. Solve

Draw some regular polygons and divide each into triangles.



Polygon	Sides	Triangles	Sum of Angle Measures
Triangle	3	<input type="text"/>	<input type="text"/>
Quadrilateral	4	<input type="text"/>	<input type="text"/> $\times 180^\circ =$ <input type="text"/>
Pentagon	5	<input type="text"/>	<input type="text"/> $\times 180^\circ =$ <input type="text"/>
Hexagon	6	<input type="text"/>	<input type="text"/> $\times 180^\circ =$ <input type="text"/>

The number of triangles is always fewer than the number of sides.

A can be divided into $9 -$ $=$ triangles.

The sum of the interior angle measures in a nonagon is

$$\square \times 180^\circ = \square^\circ.$$

So the measure of each angle is $1,260^\circ \div 9 = \square^\circ$.

4. Look Back

Each angle in a nonagon is obtuse. 140° is a reasonable answer, because an obtuse angle is between 90° and 180° .

Try This

1. Tell whether the shape is a polygon. If so, give its name and tell whether it appears to be regular or not regular.



2. Problem Solving Application

Sara designed a picture that was a regular 6-sided polygon (called a hexagon). What is the measure of each angle of the hexagon?



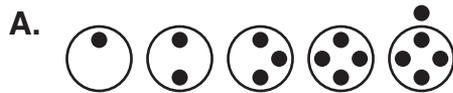
Lesson Objectives

Recognize, describe, and extend geometric patterns

Additional Examples

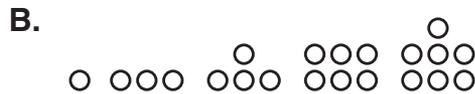
Example 1

Identify a possible pattern. Use the pattern to draw the next figure.



Each circle has one more dot than the one to its . The dots are positioned around the circle from top to bottom and to .

So the next figure might be .



Each figure has or more circles than the figure to its .

So the next figure might be .

Example 2

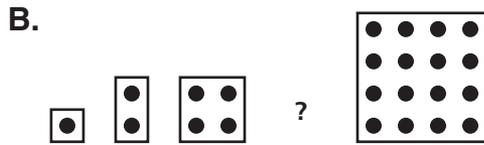
Identify a possible pattern. Use the pattern to draw the missing figure.



The first figure has right triangle. The second figure has right triangles arranged counterclockwise. The fourth figure has right triangles.

So the missing figure might be

Identify a possible pattern. Use the pattern to draw the missing figure.

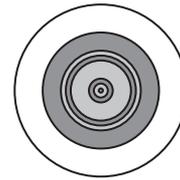


The first figure has 1 dot. The second figure is double the first figure . The third figure is double the second figure . The fourth figure could be double the third figure , and then the fifth figure will be double the fourth figure .

So the missing figure might be

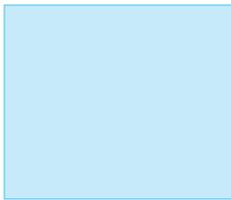
Example 3

Travis is painting a platter. Identify a pattern that Travis is using and draw what the finished platter might look like.



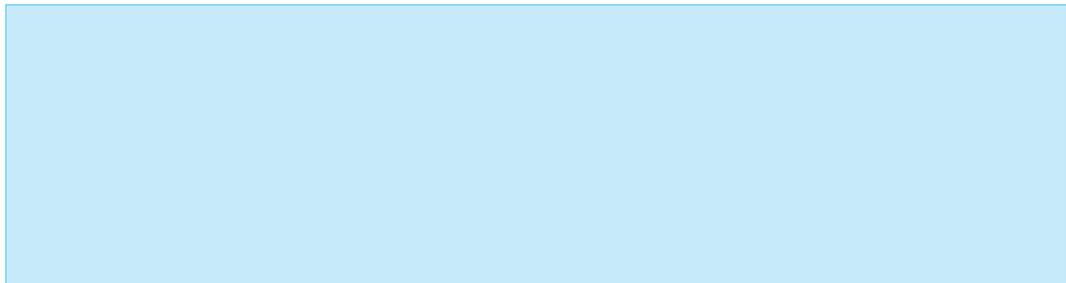
The pattern from inside to outside is stripe,
 stripe, stripe, stripe,
 stripe, stripe.

Following this pattern, the finished platter might look like this platter.



Try This

1. Identify a possible pattern. Use the pattern to draw the next figure.





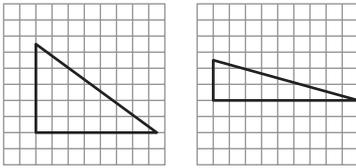
Lesson Objectives

Identify congruent figures; use congruence to solve problems

Additional Examples

Example 1

Decide whether the figures in each pair are congruent. If not, explain.

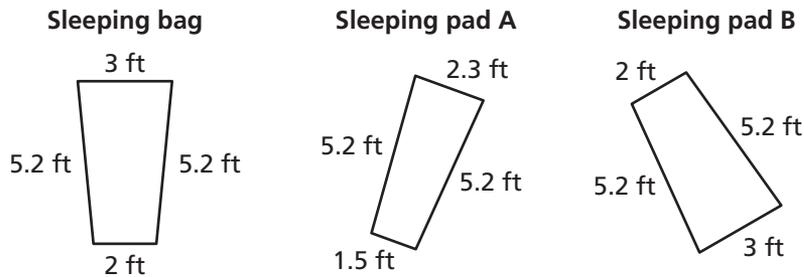


These figures do not have the same and they are not the same .

These figures are .

Example 2

Jodi needs a sleeping pad that is congruent to her sleeping bag. Which sleeping pad should she buy?



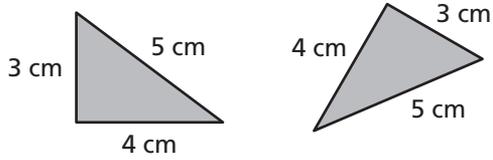
Which sleeping pad is the same and as the sleeping bag?

Both sleeping pads are . Only sleeping pad is the same size as the sleeping bag.

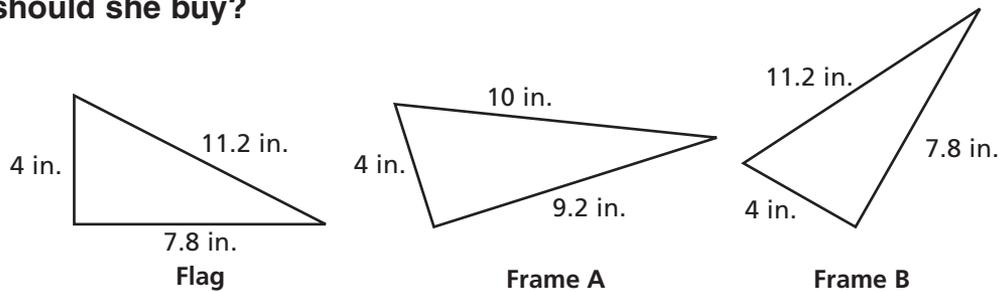
Sleeping pad is to the sleeping bag.

Try This

1. Decide whether the figures in each pair are congruent. If not, explain.



2. Melody needs a frame that is congruent to her flag. Which frame should she buy?





Lesson Objectives

Use translations, reflections, and rotations to transform geometric shapes

Vocabulary

transformation (p. 459) _____

translation (p. 459) _____

rotation (p. 459) _____

reflection (p. 459) _____

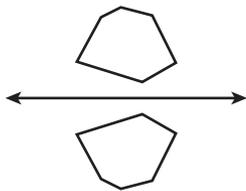
line of reflection (p. 459) _____

Additional Examples

Example 1

Tell whether each is a translation, rotation, or reflection.

A.

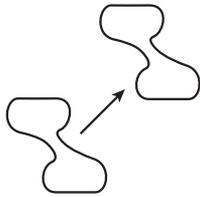


The figure is over a line.

It is a .

Tell whether the transformation is a translation, rotation, or reflection.

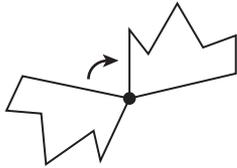
B.



The figure is along a line.

It is a .

C.



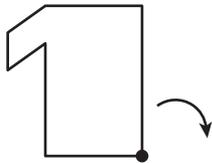
The figure moves a point.

It is a .

Example 2

Draw each transformation.

A. Draw a 180° rotation about the point shown.



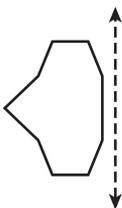
Trace the figure and the point of .

Place your pencil on the point of .

Rotate the figure °.

Trace the figure in its new location.

B. Draw a horizontal reflection.



Trace the figure and the line of .

Fold along the on the line of .

Trace the figure in its new location.

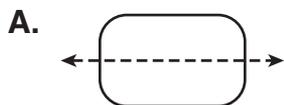
Lesson Objectives

Identify line symmetry

Vocabulary

line symmetry (p. 464) _____

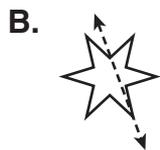
line of symmetry (p. 464) _____

Additional Examples**Example 1****Determine whether each dashed line appears to be a line of symmetry.**

The two parts of the figure appear to

_____ exactly when _____ or
 _____ across the line.

The line _____ to be a line of symmetry.



The two parts of the figure do not appear

_____.

The line _____ to be a line of symmetry.

Example 2**Find all of the lines of symmetry in the regular polygon.**

Trace the figure and cut it out.

Fold the figure in _____ in different ways.

_____ the lines of symmetry.

_____ lines of symmetry.

B.



Count the lines of symmetry.

lines of symmetry.

Example 3

Find all the lines of symmetry in each flag.

A. Alaska



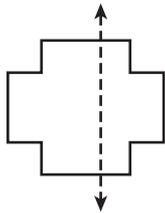
B. Arizona



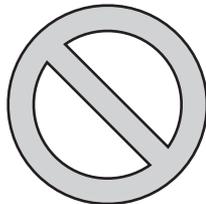
There are lines of symmetry. line of symmetry

Try This

1. Determine whether the dashed line appears to be a line of symmetry.



2. Find all of the lines of symmetry in the design.





8-1 Building Blocks of Geometry

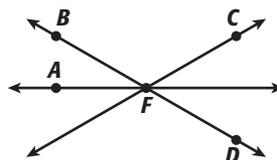
Use the diagram to find a name for each geometric figure described.

1. a point shared by 3 lines

2. three points on the same line

3. two different rays

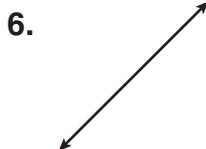
4. two different names for the same line



8-2 Measuring and Classifying Angles

Classify each angle as acute, right, obtuse, or straight.







Use a protractor to draw an angle with each given measure.

8. 45°

9. 120°

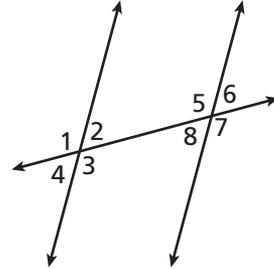
10. 95°

8-3 Angle Relationships

Use the figure for Exercises 11–13.

11. Which angles are not adjacent to $\angle 5$?

12. If the $m\angle 8$ is 54° , what are the measures of $\angle 5$, $\angle 6$, and $\angle 7$?



Find the measure of the angle that is complementary to each given angle.

13. 33°

14. 64°

15. 75°

16. 17°

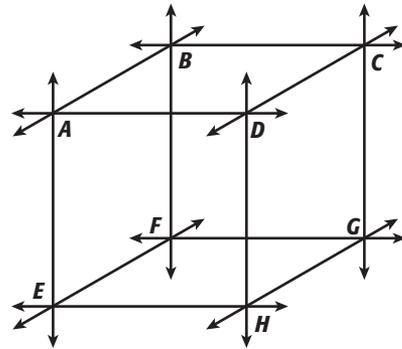
8-4 Classifying Lines

The lines in the figure intersect to form a rectangular box.

17. Name all lines that are parallel to \overleftrightarrow{DC} .

18. Name all lines that are perpendicular to \overleftrightarrow{AD} .

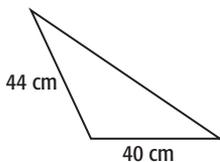
19. Name a pair of lines that are skew.



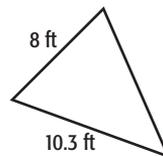
8-5 Triangles

Classify each triangle using the given information.

20. The perimeter of the triangle is 160 cm.



21. The perimeter of the triangle is 28.6 ft.



The lengths of two sides are given for $\triangle ABC$. Use the sum of the lengths of the three sides to calculate the length of the third side and classify each triangle.

22. $AB = 14$ cm; $BC = 14$ cm;
sum = 42 cm

23. $AB = 4\frac{1}{8}$ in.; $BC = 5\frac{5}{8}$ in.;;
sum = $16\frac{7}{8}$

8-6 Quadrilaterals

Complete each statement.

24. A rectangle with 4 congruent sides is a ____? ____.

25. A quadrilateral with exactly two parallel sides is a ____? ____.

Determine if the given statements are sometimes, always or never true.

26. A square is a parallelogram.

27. A parallelogram is a rectangle.

8-7 Polygons

Explain why each shape is NOT a polygon.





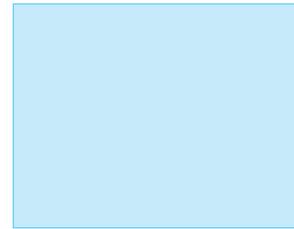
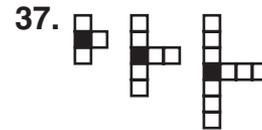
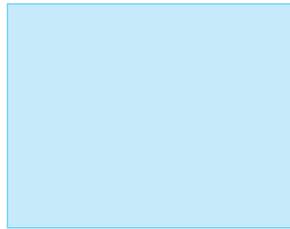
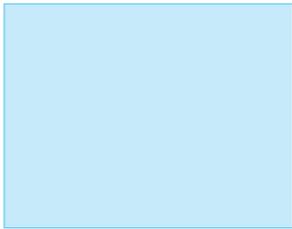


Classify each of the following polygons as either *always* regular, *sometimes* regular, or *never* regular.

		Always	Sometimes	Never
31.	Rhombus	?	?	?
32.	Rectangle	?	?	?
33.	Right Triangle	?	?	?
34.	Parallelogram	?	?	?

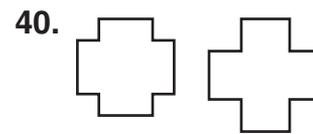
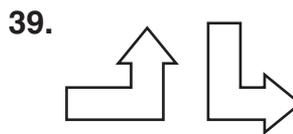
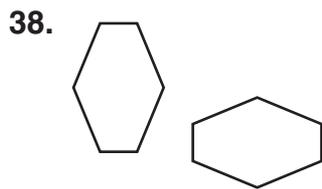
8-8 Geometric Patterns

Draw the next figure in the pattern.



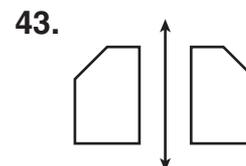
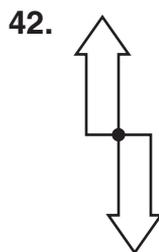
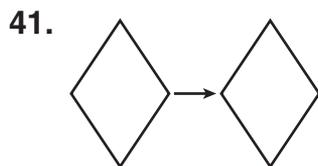
8-9 Congruence

Decide whether the figures in each pair are congruent. If not, explain.



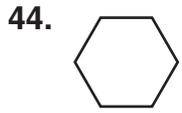
8-10 Transformations

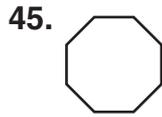
Tell whether each is a translation, rotation, or reflection.



8-11 Line Symmetry

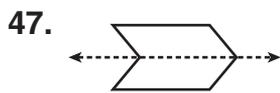
Find all the lines of symmetry in each regular polygon.

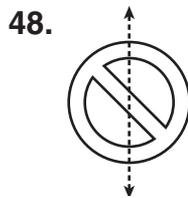


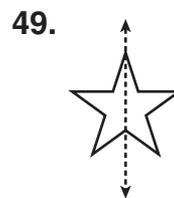




Determine whether each dashed line appears to be a line of symmetry.









Answer these questions to summarize the important concepts from Chapter 8 in your own words.

1. Explain how to measure an angle with a protractor.

2. Explain why the angle measures 55° and 35° are complementary angles.

3. Two angle measures in a triangle are 85° and 62° . Explain how to find the measure of the third angle in the triangle.

4. Explain how to draw a 90° clockwise rotation about a point.

5. Explain how to find all the lines of symmetry in a regular octagon.

For more review of Chapter 8:

- Complete the Chapter 8 Study Guide and Review on pages 474–476 of your textbook.
- Complete the Ready to Go On quizzes on pages 434, 454, and 470 of your textbook.

Understanding Customary Units of Measure

Lesson Objectives

Understand and select appropriate customary units of measure

Vocabulary

customary system (p. 488) _____

Additional Examples

Example 1

What unit of measure provides the best estimate?

A. A doorway is about 7 _____ high.

Think: The height of a doorway is about 7 times the distance from your

to your .

A doorway is about 7 high.

B. A calculator is about 6 _____ long.

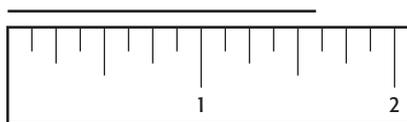
Think: The length of a calculator is about 6 times the width of your

.

A calculator is about 6 long.

Example 2**What unit of measure provides the best estimate?****A.** A loaf of bread weighs about 16 _____.Think: A loaf of bread has the weight of 16 of bread.A loaf of bread weighs about 16 .**B.** A bike could weigh 20 _____.Think: A bike could have the weight of 20 of bread.A bike could weigh 20 .**Example 3****What unit of measure provides the best estimate?**

A large watercooler holds about 10 _____ of water.

Think: A large watercooler holds about 10 containers of milk.A large watercooler holds about 10 .**Example 4****Measure the length of the line segment to the nearest half, fourth, or eighth of an inch.**The line segment is between and in. It is closer to in.The length of the line segment is about in.

Understanding Metric Units of Measure


 Know it!

Note

Lesson Objectives

Understand and select appropriate metric units of measure

Vocabulary

metric system (p. 492) _____

Additional Examples

Example 1

What unit of measure provides the best estimate?

A. A ballpoint pen is about 14 _____ long.

Think: The length of a ballpoint pen is about 14 times the width of a

A ballpoint pen is about 14 long.

B. A football field is about 100 _____ long.

Think: The length of a football field is about 100 times the width of a

A football field is about 100 long.

Example 2

What unit of measure provides the best estimate?

An orange has a mass of about 600 _____.

Think: An orange has the mass of about 600 large .

An orange has a mass of about 600 .

Example 3

What unit of measure provides the best estimate?

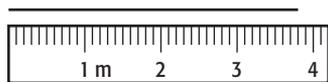
An ice cream scoop holds about 100 _____.

Think: An ice cream scoop holds about 100 of water.

An ice cream scoop holds about 100 .

Example 4

Measure the length of the line segment to the nearest meter.



The line segment is between m and m. It is closer to m.

The length of the line segment is about m.

Try This

1. What unit of measure provides the best estimate?

A doorway is about 3 _____ high.

2. What unit of measure provides the best estimate?

An encyclopedia has a mass of about 4 _____.

3. What unit of measure provides the best estimate?

There are about 2 _____ of lemonade in a full pitcher.

Lesson Objectives

Convert customary units of measure

Additional Examples

Example 1

A. Convert 9 yards to feet.

$$9 \cancel{\text{ yd}} \times \frac{\boxed{} \text{ ft}}{1 \cancel{\text{ yd}}}$$

$$9 \text{ yd} = \boxed{} \text{ ft}$$

Think: feet to yards — $\boxed{} \text{ ft} = 1 \text{ yd}$,so use $\frac{\boxed{} \text{ ft}}{1 \text{ yd}}$.

Multiply 9 yd by the conversion factor.

Cancel the common unit, $\boxed{}$.

B. Convert 10,000 pounds to tons.

$$10,000 \cancel{\text{ lb}} \times \frac{1 \text{ ton}}{\boxed{} \cancel{\text{ lb}}}$$

$$10,000 \text{ lb} = \boxed{} \text{ tons}$$

Think: pounds to tons — 1 ton =

 $\boxed{} \text{ lb}$, so use $\frac{1 \text{ ton}}{\boxed{} \text{ lb}}$.

Multiply 10,000 lb by the conversion factor.

Cancel the common unit, $\boxed{}$.

Example 2

Convert 3 quarts to cups.

$$3 \text{ quarts} = \underline{\hspace{2cm}} \text{ cups}$$

$$\frac{4 \text{ c}}{1 \text{ qt}} = \frac{x \text{ c}}{3 \text{ qt}}$$

$$1 \cdot \boxed{} = 4 \cdot \boxed{}$$

$$x = \boxed{}$$

$$3 \text{ quarts} = \boxed{} \text{ cups}$$

1 quart is $\boxed{}$ cups. Write a proportion.Use a $\boxed{}$ for the value you are trying to find.

The cross products are equal.

Example 3

The football goal posts are 30 feet tall. How many inches is this?

1. Understand the Problem

The answer will be the of the goal posts in .

List the important information:

- The height of the goal posts are 30 .

2. Make a Plan

Make a table from the information to show the number of in 1, 2, and 3 feet. Then find the number of inches in n feet.

3. Solve

Feet	Inches
1	<input type="text"/>
2	<input type="text"/>
3	<input type="text"/>
n	<input type="text"/>

Look for a pattern.

$$1 \cdot 12 = \text{$$

$$2 \cdot 12 = \text{$$

$$3 \cdot 12 = \text{$$

$$n \cdot 12 = \text{$$

$30 \cdot \text{$ = so the goal posts are inches tall.

4. Look Back

Round 12 to 10. Then multiply by 30.

$$30 \cdot 10 = 300$$

The answer is reasonable because 360 is close to 300.

Lesson Objectives

Convert metric units of measure

Additional Examples

Example 1

The high-jumper cleared a height of 1.75 m. How many centimeters is this height?

$$1.75 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$$

Think: Meter to centimeter is going

from a unit to a

unit. A centimeter is

places to the right of meter in the

chart, so $10 \cdot 10$ or $10^2 = \underline{\hspace{2cm}}$.

$$1.75 \text{ m} = (1.75 \cdot \underline{\hspace{2cm}}) \text{ cm}$$

1 m = cm. You are converting

a unit to a

unit, so by 100.

$$1.75 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$$

Move the decimal point places to the right.

Example 2

Convert.

A. The CD case is 14 cm wide. 14 cm = m

$$14 \text{ cm} = (14 \div \underline{\hspace{2cm}}) \text{ m}$$

cm = m,

unit to unit, so

by .

$$14 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$$

Move the decimal point places to

the .

B. The ball of clay has a mass of 4 kg. $4 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$

$$4 \text{ kg} = (4 \cdot \boxed{\hspace{2cm}}) \text{ g}$$

$$\boxed{\hspace{1cm}} \text{ kg} = \boxed{\hspace{2cm}} \text{ g}, \boxed{\hspace{2cm}}$$

unit to $\boxed{\hspace{2cm}}$ unit, so

$\boxed{\hspace{2cm}}$ by $\boxed{\hspace{2cm}}$.

$$4 \text{ kg} = \boxed{\hspace{2cm}} \text{ g}$$

Move the decimal point $\boxed{\hspace{1cm}}$ places to

the $\boxed{\hspace{2cm}}$.

Example 3

Convert.

A. Method 1: Use a conversion factor.

$$16 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$$

Think: $1 \text{ m} = \boxed{\hspace{2cm}} \text{ cm}$, so use

$$\frac{\boxed{\hspace{2cm}} \text{ cm}}{1 \text{ m}}$$

$$16 \cancel{\text{ m}} \times \frac{\boxed{\hspace{2cm}} \text{ cm}}{1 \cancel{\text{ m}}} = \boxed{\hspace{2cm}} \text{ cm}$$

Multiply by the conversion factor.

Cancel the common unit, $\boxed{\hspace{1cm}}$.

B. Method 2: Use proportions.

$$450 \text{ g} = \underline{\hspace{2cm}} \text{ kg}$$

$$\frac{450 \text{ g}}{x \text{ kg}} = \frac{1,000 \text{ g}}{1 \text{ kg}}$$

Write a proportion.

$$1,000 \boxed{\hspace{1cm}} = \boxed{\hspace{2cm}}$$

The cross products are equal.

$$x = \boxed{\hspace{2cm}} \text{ kg}$$

Divide both sides by $\boxed{\hspace{2cm}}$ to undo the multiplication.

Lesson Objectives

Find measures of time and temperature

Additional Examples**Example 1****Convert.**

A. $2 \text{ hr } 5 \text{ min} = \underline{\hspace{2cm}} \text{ min}$

2 hours 5 minutes

$\underline{\hspace{2cm}}$ minutes + 5 minutes

$\underline{\hspace{2cm}}$ minutes

$2 \text{ hr } 5 \text{ min} = \underline{\hspace{2cm}} \text{ min}$

Think: 1 hour = $\underline{\hspace{2cm}}$ minutes.

B. $195 \text{ min} = \underline{\hspace{2cm}} \text{ hr}$

$195 \cancel{\text{ min}} \cdot \frac{1 \text{ hr}}{60 \cancel{\text{ min}}} = \frac{\underline{\hspace{2cm}}}{\underline{\hspace{2cm}}} \text{ hr}$

Think: 1 hour = $\underline{\hspace{2cm}}$ minutes.

$195 \text{ min} = \underline{\hspace{2cm}} \text{ hr}$

Write as a mixed number.

Example 2**Solve each equation.**

A. Shawn was scheduled to arrive at 10:15 A.M. He was 1 hour and 55 minutes late. When did he arrive?

Scheduled time: $\underline{\hspace{2cm}}$ A.M.

Think: $\underline{\hspace{2cm}}$ hour after 10:15 A.M.

is $\underline{\hspace{2cm}}$ A.M. $\underline{\hspace{2cm}}$ minutes

after 11:15 A.M. is $\underline{\hspace{2cm}}$ P.M.

Arrival time: $\underline{\hspace{4cm}}$

Shawn arrived at $\underline{\hspace{4cm}}$

B. Ty met his friends at 1:35 P.M. He had traveled for 2 hours and 45 minutes. At what time did Ty begin his trip?

Meeting time: P.M.

Think: hours before 1:35 P.M.

is A.M. minutes

before 11:35 A.M. is A.M.

Begin time:

Ty began his trip at

Example 3

Estimate the temperature.

A. 40°C is about ____° F.

$$F = \frac{9}{5} \cdot C + 32$$

Use the formula.

Round $\frac{9}{5}$ to , and 32 to .

$$F = 2 \cdot \text{} + 30$$

Use the order of operations.

$$F = \text{} + 30$$

$$F = \text{} \quad 40^\circ\text{C is about } \text{}^\circ \text{ F.}$$

B. 70°F is about ____° C.

$$C = \frac{5}{9}(F - 32)$$

Use the formula.

Round $\frac{5}{9}$ to , and 32 to .

$$C = \frac{1}{2}(\text{} - 30)$$

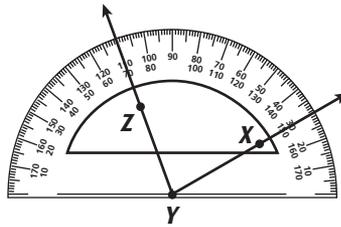
Use the order of operations.

$$C = \frac{1}{2}(\text{)}$$

$$C = \text{} \quad 70^\circ\text{F is about } \text{}^\circ \text{ C.}$$

Lesson Objectives

Find angle measures in polygons

Additional Examples**Example 1**Use the protractor to find the measure of $\angle XYZ$. Then classify the angle.

- Place the center point of the protractor on the of the angle.
- Read the measure where ray and ray cross.
- Ray YX crosses at [°], and ray YZ crosses at [°].
- The measure of $\angle XYZ$ is [°] - [°], or [°].

Write this as $m\angle XYZ = \text{\color{lightblue} }^{\circ}$.

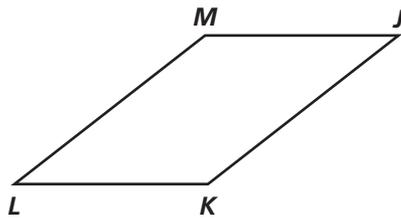
- Since [°] \leq 90° , the angle is .

CheckUse the other scale on the protractor to find the measure of $\angle XYZ$.

$$\text{\color{lightblue} }^{\circ} - \text{\color{lightblue} }^{\circ} = \text{\color{lightblue} }^{\circ}$$

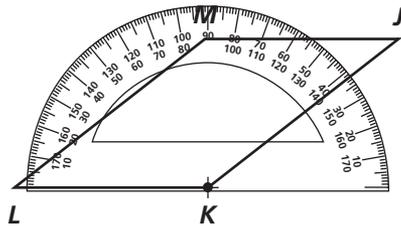
Example 2

Estimate the measure of $\angle K$ in parallelogram $JKLM$ below. Then use a protractor to check the reasonableness of your answer.



Think: The measure of the angle is close to 135° ($90^\circ + \square^\circ$), but it is a little more. A good estimate would be about \square° .

Use the protractor.

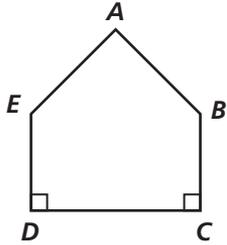


The measure of the angle is \square° .

$m\angle K = 142^\circ$, so the estimate of 145° is reasonable.

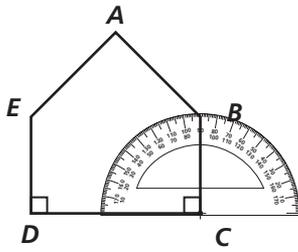
Example 3

A softball home plate is shown below. Find the measures of $\angle C$ and $\angle E$.



Use a protractor to measure $\angle C$.

$\angle C =$ $^\circ$



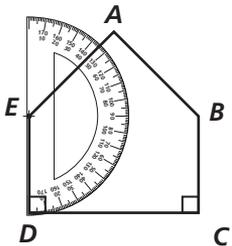
Estimate the $m\angle E$.

It is greater than 90° , so it is . It looks as if the angle measure is $90^\circ +$ $^\circ$.

So $m\angle$ is about $^\circ$.

Use a protractor to measure $\angle E$.

$\angle E =$ $^\circ$



Lesson Objectives

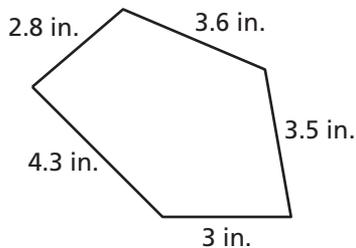
Find the perimeter and missing side lengths of a polygon

Vocabulary

perimeter (p. 514) _____

Additional Examples**Example 1**

Find the perimeter of the figure.



all the side lengths.

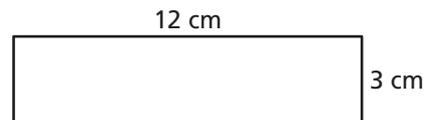
$$\boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{}$$

$$= \boxed{}$$

The perimeter is in.

Example 2

Find the perimeter P of the rectangle.



$$P = 2l + 2w$$

$$P = (2 \cdot \boxed{}) + (2 \cdot \boxed{})$$

Substitute for l and for w .

$$P = \boxed{} + \boxed{}$$

Multiply.

$$P = \boxed{}$$

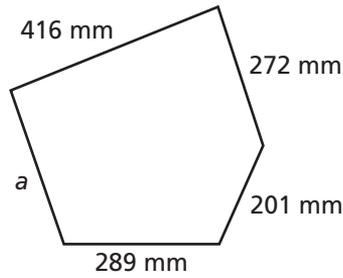
Add.

The perimeter is cm.

Example 3

Find the unknown measure.

A. What is the length of side a if the perimeter equals 1,471 mm?



$P = \text{sum of side lengths}$

Use the values you know.

$$1,471 = \boxed{} + \boxed{} + \boxed{} + \boxed{} + a$$

$$1,471 = \boxed{} + a$$

$$1,471 - 1,178 = 1,178 + a - 1,178$$

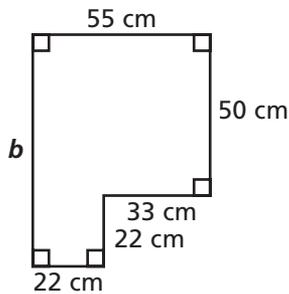
$$\boxed{} = a$$

Add the known lengths.

Subtract $\boxed{}$ from both sides.

Side a is $\boxed{}$ mm long.

B. What is the perimeter of the polygon?



First find the $\boxed{}$ side length.

Find the sides $\boxed{}$ side b .

The length of side $b = \boxed{} + \boxed{}$.

Side b is $\boxed{}$ cm long.

$$P = \boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{} + \boxed{} = \boxed{}$$

Find the perimeter.

The perimeter of the polygon is $\boxed{}$ cm.

Circles and Circumference

Lesson Objectives

Identify the parts of a circle and find the circumference of a circle

Vocabulary

circle (p. 520) _____

center (p. 520) _____

radius (p. 520) _____

diameter (p. 520) _____

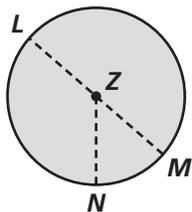
circumference (p. 520) _____

pi (p. 520) _____

Additional Examples

Example 1

Name the circle, a diameter, and three radii.



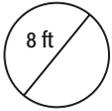
The circle is circle .

is a diameter.

, , and are radii.

Example 2

A skydiver is laying out a circular target for his next jump. Estimate the circumference of the target by rounding π to 3.



$$C = \pi d$$

Use the formula.

$$C \approx \square \cdot \square$$

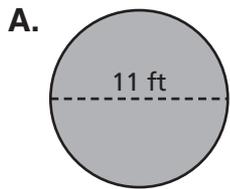
Replace π with \square and d with \square .

$$C \approx \square$$

The circumference of the circle is about \square feet.

Example 3

Find the missing value to the nearest hundredth. Use 3.14 for π .



$$d = 11 \text{ ft}; C = ?$$

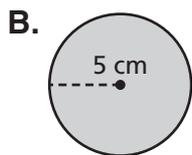
$$C = \pi d$$

Write the formula.

$$C \approx \square \cdot \square$$

Replace π with \square and d with \square .

$$C \approx \square \text{ ft}$$



$$r = 5 \text{ cm}; C = ?$$

$$C = 2\pi r$$

Write the formula.

$$C \approx 2 \cdot \square \cdot \square$$

Replace π with \square and r with \square .

$$C \approx \square \text{ cm}$$

**9-1 Understanding Customary Units of Measure**

What unit of measure provides the best estimate?

1. An ink pen is about 6 _____ long.

2. A horse weighs about 1,000 _____.

3. A small fish tank holds about 10 _____ of water.

9-2 Understanding Metric Units of Measure

What unit of measure provides the best estimate? Justify your answer.

4. The length of a screwdriver is about 20 _____.

5. The mass of a full soup can is 305 _____.

6. A baby bottle holds about 250 _____ of liquid.

9-3 Converting Customary Units

Convert.

7. 33 ft = _____ yd

8. 3 pt = _____ oz

9. 60 in. = _____ ft

10. 20,000 lb = _____ T

11. 7 lb = _____ oz

12. 192 oz = _____ gal

9-4 Converting Metric Units

13. A soda container holds 2 liters. How many milliliters of soda are in the container?

14. A juice glass holds 150 mL. 150 mL = _____ L.

15. The length of a driveway is 45 meters. 45 m = _____ km.

16. The mass of a brick is 1.5 kg. 1.5 kg = _____ g.

9-5 Time and Temperature

Convert.

17. 40 min = _____ s 18. 49 days = _____ weeks
 19. 240 min = _____ h 20. 84 mo = _____ yr

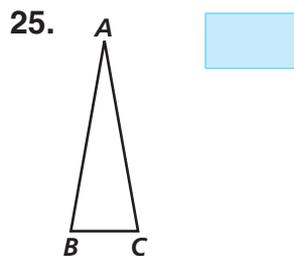
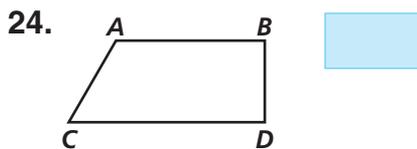
21. A baseball game which began at 2:10 P.M. lasted 2 hours and 25 minutes.
 At what time was the game over?

Estimate the temperature.

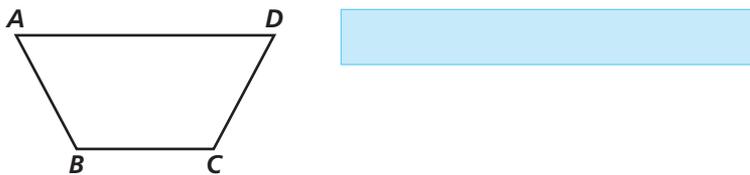
22. 15°C is about _____°F. 23. 84°F is about _____°C.

9-6 Finding Angle Measures in Polygons

Estimate the measure of $\angle A$ in each figure. Then use a protractor to check the reasonableness of your answer.

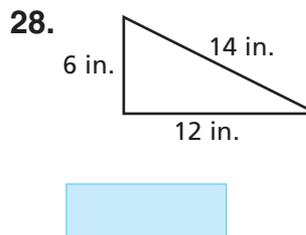
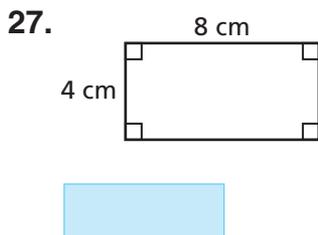


26. The shape of a flower garden is shown below. Find the measure of $\angle A$ and $\angle B$.



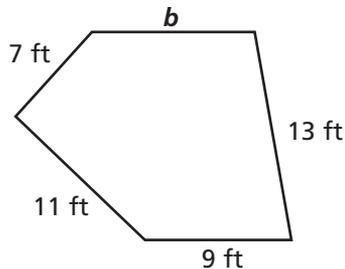
9-7 Perimeter

Find the perimeter of each figure.



Find the unknown measure.

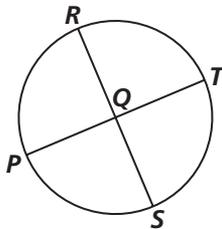
29. What is the length of side b if the perimeter equals 50 ft?



30. The width of a rectangle is 6 in. The perimeter of the rectangle is 30 in. What is the length of the rectangle?

9-8 Circles and Circumference

31. Point Q is the center of the circle. Name the circle, a diameter, and three radii.



32. A landscaping company needs to dig a circular hole for planting a tree. If the diameter of the circular hole is 3 ft, what is its circumference? (Find the circumference by rounding π to 3).

Find each missing value to the nearest hundredth. Use 3.14 for π .

33. $r = 5$ cm; $C =$ _____.

34. $d = 12$ in.; $C =$ _____.



Answer these questions to summarize the important concepts from Chapter 9 in your own words.

1. Explain how to convert 108 inches to feet.

2. Explain how to convert 5 weeks to seconds.

3. Explain how to convert 70°F to $^{\circ}\text{C}$ using estimation.

4. Explain how to find the perimeter of a rectangle with length 4 ft and width 7 ft.

5. Explain how to find the circumference of a circle with radius 6 inches.

For more review of Chapter 9:

- Complete the Chapter 9 Study Guide and Review on pages 530–532 of your textbook.
- Complete the Ready to Go On quizzes on pages 508 and 526 of your textbook.



Lesson Objectives

Estimate the area of irregular figures; find the area of rectangles and parallelograms

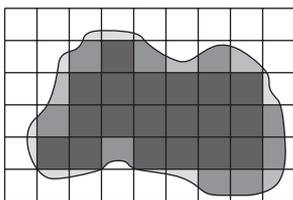
Vocabulary

area (p. 542) _____

Additional Examples

Example 1

Estimate the area of the figure.



$\square = 1 \text{ mi}^2$

Count full squares: squares.

Count almost-full squares: squares.

Count squares that are about half-full:

half-full squares = full squares.

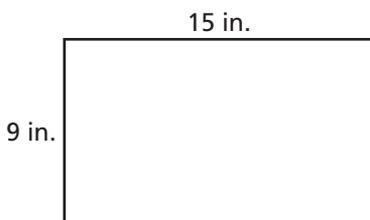
Do not count almost empty squares.

Add. + + =

The area of the figure is about mi^2 .

Example 2

Find the area of the rectangle.



$$A = lw$$

$$A = \square \cdot \square$$

$$A = \square$$

Write the formula.

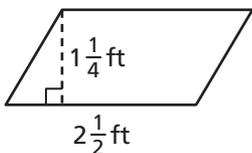
Substitute for l .

Substitute for w .

The area is in^2 .

Example 3

Find the area of the parallelogram.



$$A = bh$$

$$A = \boxed{} \cdot \boxed{}$$

$$A = \boxed{} \cdot \boxed{}$$

$$A = \boxed{} \text{ or } \boxed{}$$

The area is $\boxed{}$ ft².

Write the formula.

Substitute $\boxed{}$ for b and $\boxed{}$ for h .

Multiply.

Example 4

Jessika is going to tile a kitchen that measures 13 ft by 17 ft. Some floor space is taken up by an island that measures 3 ft by 6 ft. How much area remains to be tiled in the kitchen?

To find the area of the kitchen that remains, $\boxed{}$ the area of the $\boxed{}$ from the area of the $\boxed{}$.

kitchen area – island area = kitchen area remaining

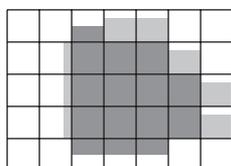
$$(13 \cdot 17) - (3 \cdot 6) = n$$

$$\boxed{} - \boxed{} = \boxed{}$$

The area of the kitchen that remains is $\boxed{}$ ft².

Try This

1. Estimate the area of the figure.



$\square = 1 \text{ mi}^2$





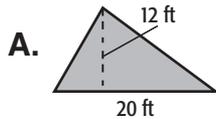
Lesson Objectives

Find the area of triangles and trapezoids

Additional Examples

Example 1

Find the area of each triangle.



$$A = \frac{1}{2}bh$$

Write the formula.

$$A = \frac{1}{2}(\text{ } \cdot \text{ })$$

Substitute for b .

Substitute for h .

$$A = \frac{1}{2}(\text{ })$$

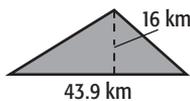
Multiply.

$$A = \text{ }$$

The area is ft^2 .

Example 2

The diagram shows the section of a forest being studied. What is the area of the section?



$$A = \frac{1}{2}bh$$

Write the formula.

$$A = \frac{1}{2}(\text{ } \cdot \text{ })$$

Substitute for b . Substitute for h .

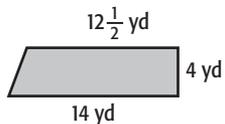
$$A = \frac{1}{2}(\text{ }) = \text{ }$$

Multiply.

The area of the forest being studied is ft^2 .

Example 3

Find the area of the trapezoid.



$$A = \frac{1}{2}h(b_1 + b_2)$$

$$A = \frac{1}{2}(\text{ })(\text{ } + \text{ })$$

$$A = \frac{1}{2}(4)(\text{ }) = \text{ }$$

$$A = \text{ }$$

The area is $\text{ } \text{yd}^2$.

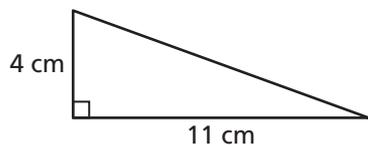
Write the formula.

Substitute for h , for b_1
and for b_2 .

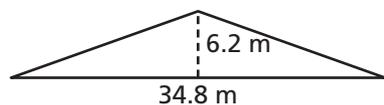
Multiply.

Try This

1. Find the area of the triangle.



2. The diagram shows the floor plan for a triangular dining area. What is the area of the floor?





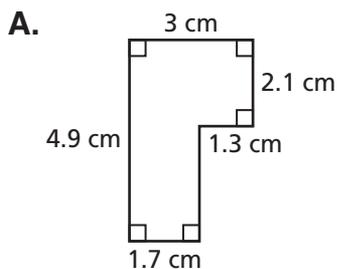
Lesson Objectives

Break a polygon into simpler parts to find its area

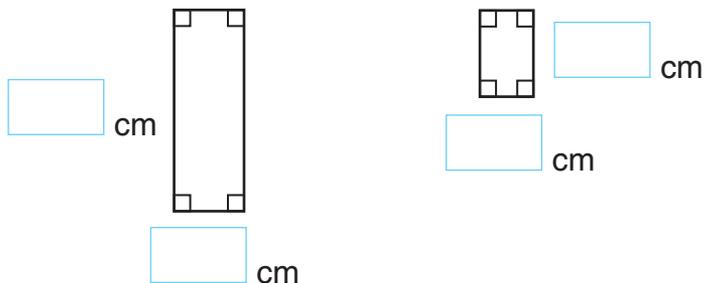
Additional Examples

Example 1

Find the area of each polygon.



Think: Break the polygon apart into



Find the area of each rectangle.

$A = lw$

$A = lw$

Write the formula for the area of a

$A = \boxed{} \cdot \boxed{}$

$A = \boxed{} \cdot \boxed{}$

$A = \boxed{}$

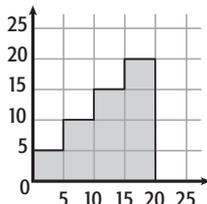
$A = \boxed{}$

$\boxed{} + \boxed{} = \boxed{} \quad \boxed{} \text{ to find the total area.}$

The area of the polygon is cm^2 .

Example 2

Patrick made a design. Use the coordinate grid to find its area.



Think: Divide the design into rectangles.

Find the area of each rectangle.

Rectangle 1

$$l = \text{, } w = \text{; } A = \text{} \cdot \text{} = \text{$$

Rectangle 2

$$l = \text{, } w = \text{} \cdot \text{} = \text{$$

Rectangle 3

$$l = \text{, } w = \text{} \cdot \text{} = \text{$$

Rectangle 4

$$l = \text{, } w = \text{} \cdot \text{} = \text{$$

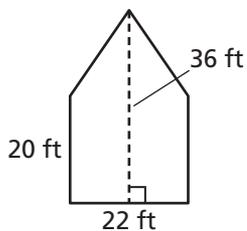
Add the area of the rectangles to find the total area of the figure.

$$\text{} + \text{} + \text{} + \text{} = \text{} \text{ square units}$$

The area of the design is square units.

Try This

1. Find the area of the polygon.





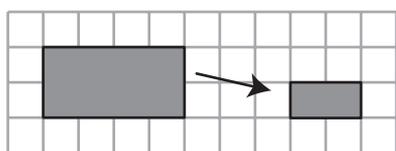
Lesson Objectives

Make a model to explore how area and perimeter are affected by changes in the dimensions of a figure

Additional Examples

Example 1

Find how the perimeter and area of the figure change when its dimensions change.



Divide each dimension by 2.

$$P = \boxed{} \text{ units}$$

$$P = \boxed{} \text{ units}$$

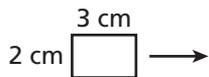
$$A = \boxed{} \text{ square units}$$

$$A = \boxed{} \text{ square units}$$

When the dimensions of the rectangle are divided by 2, the perimeter is divided by , and the area is divided by .

Example 2

Draw a rectangle whose dimensions are 4 times as large as the given rectangle. How do the perimeter and area change?



Multiply each dimension by 4.

$$P = \boxed{} \text{ cm}$$

$$P = \boxed{} \text{ cm}$$

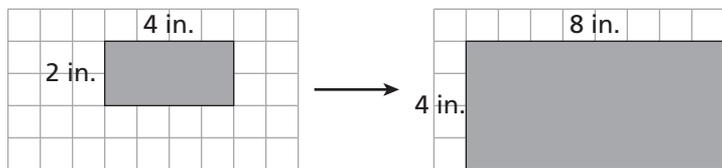
$$A = \boxed{} \text{ cm}^2$$

$$A = \boxed{} \text{ cm}^2$$

When the dimensions of the rectangle are multiplied by 4, the perimeter is multiplied by , and the area is multiplied by , or .

Try This

1. Find how the perimeter and area of the figure change when its dimensions change.





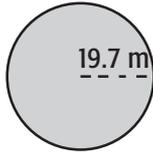
Lesson Objectives

Find the area of a circle

Additional Examples

Example 1

Estimate the area of the circle.



$$A = \pi r^2$$

Write the formula for the area.

$$A \approx \boxed{} \cdot \boxed{}^2$$

Replace π with 3 and r with $\boxed{}$.

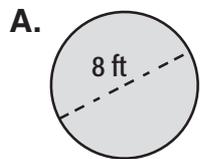
$$A \approx 3 \cdot \boxed{}$$

Use the order of operations.

$$A \approx \boxed{}$$

Example 2

Find the area of the circle. Use $\frac{22}{7}$ for pi.



$$A = \pi r^2$$

Write the formula for the area.

$$r = \boxed{} \div 2$$

The length of the is half the length of the .

$$r = \boxed{} \div 2 = \boxed{}$$

$$A \approx \frac{22}{7} \cdot \boxed{}^2$$

Replace π with $\frac{22}{7}$ and r with .

$$A \approx \frac{22}{7} \cdot \boxed{}$$

Simplify.

$$A \approx \boxed{} \text{ ft}^2$$

Example 3

A drum head has a radius of 18 in. Find the area of the material covering the drum head. Use 3.14 for pi.

$$A = \pi r^2$$

Write the formula for the area.

$$A \approx 3.14 \cdot \boxed{}^2$$

Replace π with 3.14 and r with .

$$A \approx 3.14 \cdot \boxed{}$$

Simplify.

$$A \approx \boxed{}$$



Lesson Objectives

Name three-dimensional figures

Vocabulary

polyhedron (p. 566) _____

face (p. 566) _____

edge (p. 566) _____

vertex (p. 566) _____

prism (p. 566) _____

base (p. 566) _____

pyramid (p. 567) _____

cylinder (p. 566) _____

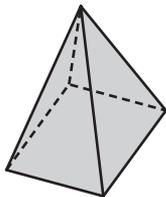
cone (p. 567) _____

Additional Examples

Example 1

Identify the number of faces, edges, and vertices on each three-dimensional figure.

A.

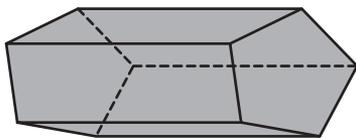


faces

edges

vertices

B.



faces

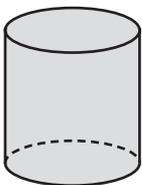
edges

vertices

Example 2

Name the three-dimensional figure represented by each object.

A.



There is a surface.

The figure is not a .

There are two ,
 bases.

The bases are .

The figure represents a .



Lesson Objectives

Estimate and find the volumes of rectangular prisms and triangular prisms

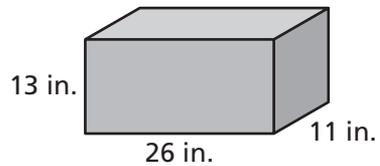
Vocabulary

volume (p. 572) _____

Additional Examples

Example 1

Find the volume of the rectangular prism.



$V = lwh$ Write the formula.

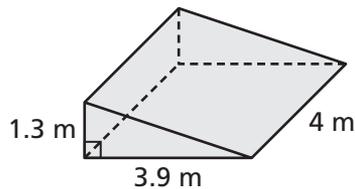
$V = \square \cdot \square \cdot \square$ $l = \square$; $w = \square$; $h = \square$

$V = \square \text{ in}^3$ Multiply.

Example 2

Find the volume of each triangular prism.

A.



$V = Bh$ Write the formula.

$V = \left(\frac{1}{2} \cdot \square \cdot \square\right) \cdot \square$ $B = \frac{1}{2} \cdot \square \cdot \square$; $h = \square$

$V = \square \text{ m}^3$ Multiply.

Example 3

PROBLEM SOLVING APPLICATION

Suppose a facial tissue company ships 16 cubic tissue boxes in each case. What are the possible dimensions for a case of tissue boxes?

1. Understand the Problem

The answer will be all possible dimensions for a case of 16 cubic boxes. List the important information:

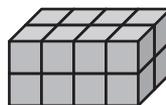
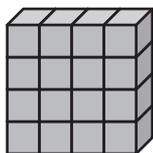
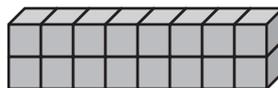
- There are tissue boxes in a case.
- The boxes are , or prisms.

2. Make a Plan

You can make using cubes to find the possible for a case of 16 tissue boxes.

3. Solve

You can make models using cubes to find the possible dimensions for a case of 16 cubes.



The possible dimensions for a case of 16 cubic tissue boxes are the following: · · , · · , · · , and · · .

4. Look Back

Notice that each dimension is a factor of 16. Also, the product of the dimensions (length · width · height) is 16, showing that the volume of each case is 16 cubes.



Lesson Objectives

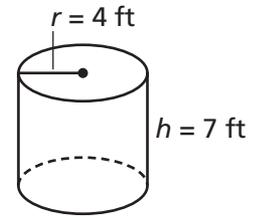
Find volumes of cylinders

Additional Examples

Example 1

Find the volume V of the cylinder to the nearest cubic unit.

A. $r = 4$ ft; $h = 7$ ft



$$V = \pi r^2 h$$

$$V = \square \times \square^2 \times \square$$

Replace π with \square , r with \square , and h with \square .

$$V = \square$$

Multiply.

The volume is about \square ft³.

Example 2

Ali has a cylinder-shaped pencil holder with a 3-in. diameter and a height of 5 in. Scott has a cylinder-shaped pencil holder with a 4-in. diameter and a height of 6 in. Estimate the volume of each cylinder holder to the nearest cubic inch.

A. Ali's pencil holder

$$3 \text{ in.} \div 2 = 1.5 \text{ in.}$$

Find the radius.

$$V = \pi r^2 h$$

Write the formula.

$$V = \square \times \square^2 \times \square$$

Replace π with \square , r with \square , and h with \square .

$$V = \square$$

Multiply.

The volume of Ali's pencil holder is about \square in³.

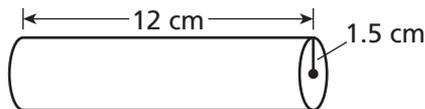
Example 3

Find which cylinder has the greater volume.

Cylinder 1:

$$V = \boxed{} \times \boxed{}^2 \times \boxed{}$$

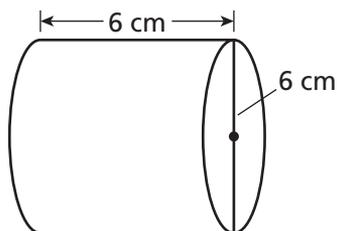
$$V = \boxed{} \text{ cm}^3$$



Cylinder 2:

$$V = \boxed{} \times \boxed{}^2 \times \boxed{}$$

$$V = \boxed{} \text{ cm}^3$$



Cylinder 2 has the greater volume because $\boxed{} \text{ cm}^3 >$

$\boxed{} \text{ cm}^3$.

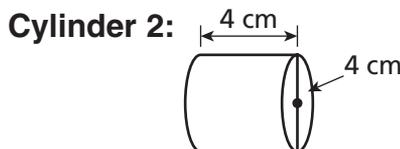
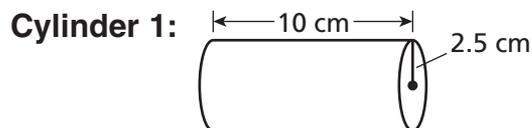
Try This

1. Find the volume V of the cylinder to the nearest cubic unit.

$$r = 6 \text{ ft}; h = 5 \text{ ft}$$

2. Julie built a cylinder-shaped tower with a 12-yd diameter and a height of 8 yd. Estimate the volume of Julie's tower to the nearest cubic yard.

3. Find which cylinder has the greater volume.





Lesson Objectives

Find the surface areas of prisms, pyramids, and cylinders

Vocabulary

surface area (p. 582) _____

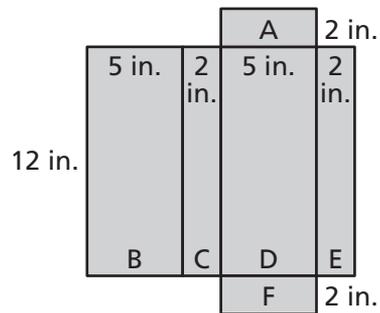
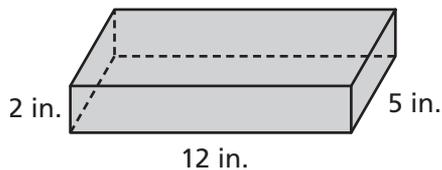
net (p. 582) _____

Additional Examples

Example 1

Find the surface area S of the prism.

A. Method 1: Use a net.



Draw a to help you see each of the prism.

Use the formula to find the area of each face.

A: $A = \square \times \square = \square$

D: $A = \square \times \square = \square$

B: $A = \square \times \square = \square$

E: $A = \square \times \square = \square$

C: $A = \square \times \square = \square$

F: $A = \square \times \square = \square$

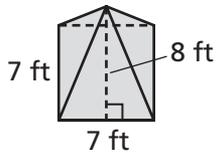
the areas of each face.

$S = \square + \square + \square + \square + \square + \square = \square \text{ in}^2$

The surface area is in^2 .

Example 2

Find the surface area S of the pyramid.



$$S = \text{area of } \boxed{} + 4 \times (\text{area of } \boxed{} \text{ face})$$

$$S = s^2 + 4 \times \left(\frac{1}{2}bh\right)$$

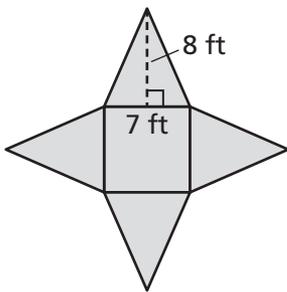
$$S = \boxed{}^2 + 4 \times \left(\frac{1}{2} \times 7 \times 8\right) \quad \text{Substitute.}$$

$$S = \boxed{} + 4 \times \boxed{}$$

$$S = \boxed{} + \boxed{}$$

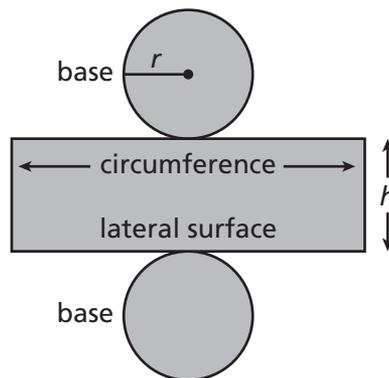
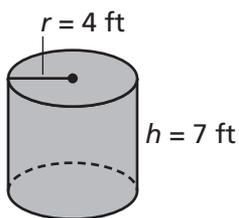
$$S = \boxed{}$$

The surface area is $\boxed{}$ ft².



Example 3

Find the surface area S of the cylinder. Use 3.14 for π , and round to the nearest hundredth.



$$S = \text{area of } \boxed{} \text{ surface} + 2 \times (\text{area of each } \boxed{})$$

$$S = h \times (2\pi r) + 2 \times (\pi r^2)$$

Substitute.

$$S = \square \times (2 \times \pi \times \square) + 2 \times (\pi \times \square^2)$$

$$S = \square \times \square \pi + 2 \times \square \pi$$

$$S \approx 7 \times 8(\square) + 2 \times 16(\square)$$

Use 3.14 for π .

$$S \approx 7 \times 25.12 + 2 \times 50.24$$

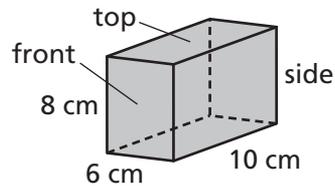
$$S \approx \square + \square$$

$$S \approx \square$$

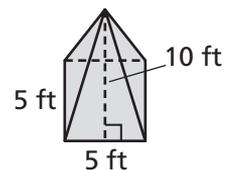
The surface area is about \square ft².

Try This

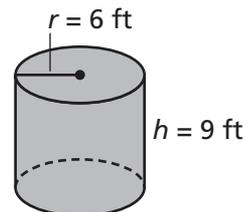
1. Find the surface area S of the prism.



2. Find the surface area S of the pyramid.



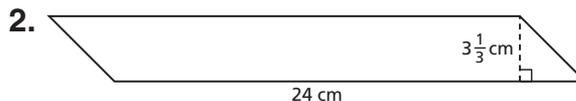
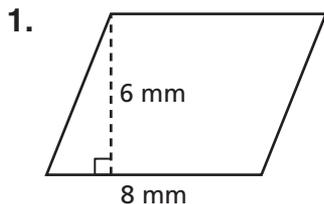
3. Find the surface area S of the cylinder. Use 3.14 for π , and round to the nearest hundredth.



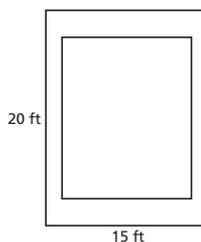


10-1 Estimating and Finding Area

Find the area of each parallelogram.

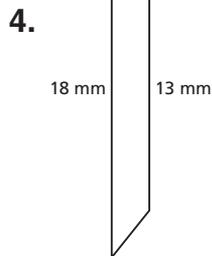
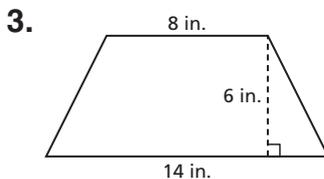


3. Trisha has a rectangular garden with a walkway around it. The garden is 15 ft by 12 ft. Find the area of the walkway.



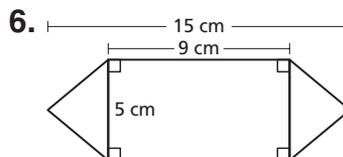
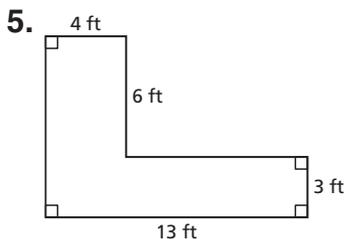
10-2 Area of Triangles and Trapezoids

Find the area of each figure.



10-3 Area of Composite Figures

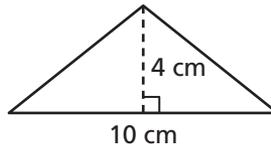
Find the area of each polygon.



10-4 Converting Perimeter and Area

7. Find how the perimeter and area of the rectangle change when its dimensions are multiplied by 5.

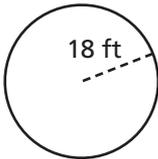
8. The dimensions of a triangle drawn on an overhead are 3 times larger when it is projected on the screen. Find the area of the new triangle if the original triangle is shown below.



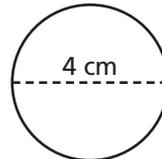
10-5 Area of Circles

Find the area and circumference of each circle. Use 3.14 for π and round to the nearest hundredth.

9.



10.



10-6 Three-Dimensional Figures

Identify the number of faces, edges, and vertices in each three-dimensional figure. Then name the figure and tell whether it is a polyhedron.

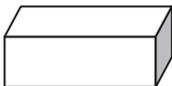
11.



12.

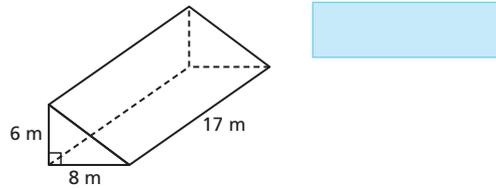
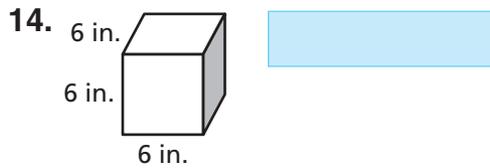


13.



10-7 Volume of Prisms

Find the volume of each figure.

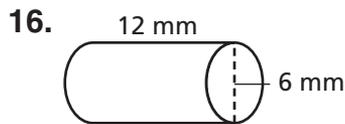
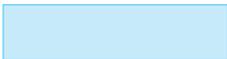
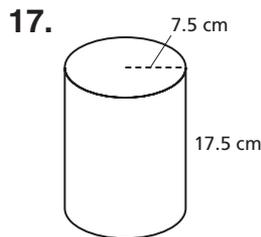
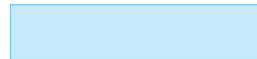


15. A book company packs 16 cubic boxes of books in a case. What are all the possible dimensions for a case of books?



10-8 Volumes of Cylinders

Find the volume of each cylinder to the nearest cubic unit.

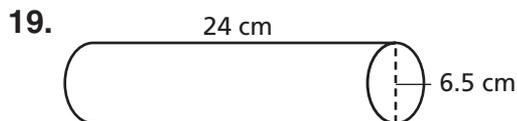





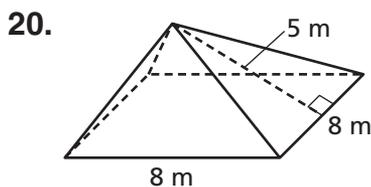
18. Soup is sold in a cylindrical container with a diameter of 8 cm and a height of 12 cm. Estimate the volume of the soup container to the nearest cubic cm.



10-9 Surface Area

Find the surface area of each figure. Use 3.14 for π and round to the nearest hundredth.






Answer these questions to summarize the important concepts from Chapter 10 in your own words.

1. Explain how to find the area of a triangle with base 13 inches and height 12 inches.

2. Explain how to find the area of a composite figure.

3. Explain how the perimeter and area of a square change when its dimensions are doubled.

4. Explain how to find the volume of a cylinder with diameter 14 centimeters and height 18 centimeters.

5. Explain how to find the surface area of a square pyramid with base measurements of 5 feet and lateral height 7 feet.

For more review of Chapter 10:

- Complete the Chapter 10 Study Guide and Review on pages 590–592.
- Complete the Ready to Go On quizzes on pages 562 and 586.

Lesson Objectives

Identify and graph integers, find opposites of an integer

Vocabulary

positive number (p. 602) _____

negative number (p. 602) _____

opposites (p. 602) _____

integers (p. 602) _____

Additional Examples**Example 1**

Name a positive or negative number to represent each situation.

A. a jet climbing to an altitude of 20,000 feet

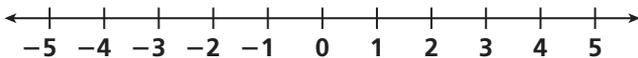
numbers can represent climbing or rising.

Example 2

Graph the integer and its opposite on a number line.

A. +2

is the same from 0 as +2.



Example 3

Mark enters his office building on the ground floor. Using the elevator, he goes up 6 floors to place a call, then down 4 floors for lunch, and then up 8 floors for a meeting. Write an expression to represent this situation.

Mark starts on the ground floor.

Mark goes up six floors.

Mark goes down four floors.

Mark goes up eight floors.

Write an expression.

An expression for this situation is .

Try This

1. Name a positive or negative number to represent the situation.

300 feet below sea level

2. Graph -4 and its opposite on a number line.

3. Liu enters her apartment building on the ground floor. Using the elevator, she goes up 10 floors to her apartment, then down 7 floors to her grandmother's apartment, and then up 2 floors to the exercise room. Write an expression to represent this situation.



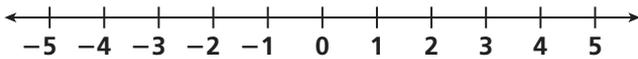
Lesson Objectives

Compare and order integers

Additional Examples

Example 1

Use the number line to compare each pair of integers. Write $<$ or $>$.



A. $-2 \blacksquare 2$

-2 2 -2 is to the of 2 on the number line.

B. $3 \blacksquare -5$

3 -5 3 is to the of -5 on the number line.

C. $-1 \blacksquare -4$

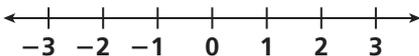
-1 -4 -1 is to the of -4 on the number line.

Example 2

Order the integers in each set from least to greatest.

A. $-2, 3, -1$

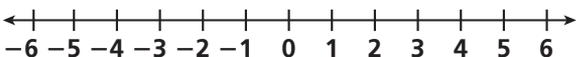
Graph the integers on the same number line.



Then read the numbers from left to right: , , .

B. $4, -3, -5, 2$

Graph the integers on the same number line.



Then read the numbers from left to right: , , , .

Example 3

PROBLEM SOLVING APPLICATION

In a golf match, Craig scored +2, Cameron scored +3, and Rob scored -1. Who won the golf match?

1. Understand the Problem

The answer will be the player with the score.

List the important information:

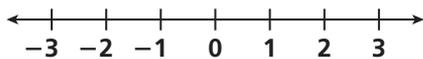
- Craig scored .
- Cameron scored .
- Rob scored .

2. Make a Plan

You can draw a diagram to order the scores from to .

3. Solve

Draw a number line and graph each player's score on it.



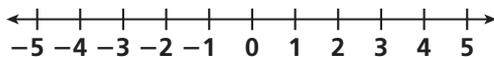
Rob's score, , is farthest to the , so it is the score. won the golf match.

4. Look Back

Negative integers are always less than positive integers, so neither Craig nor Cameron won the golf match.

Try This

1. Use the number line to compare each pair of integers. Write $<$ or $>$.



2 -3



Lesson Objectives

Locate and graph points on the coordinate plane

Vocabulary

coordinate plane (p. 610) _____

axes (p. 610) _____

x-axis (p. 610) _____

y-axis (p. 610) _____

quadrant (p. 610) _____

origin (p. 610) _____

coordinate (p. 610) _____

x-coordinate (p. 610) _____

y-coordinate (p. 610) _____

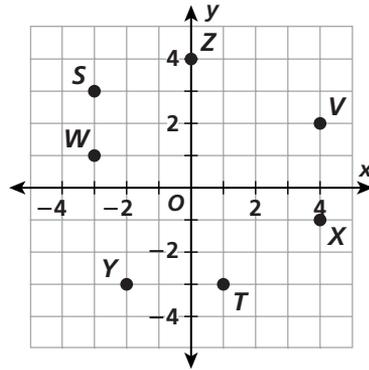
Additional Examples

Example 1

Name the quadrant where each point is located.

A. X

Quadrant



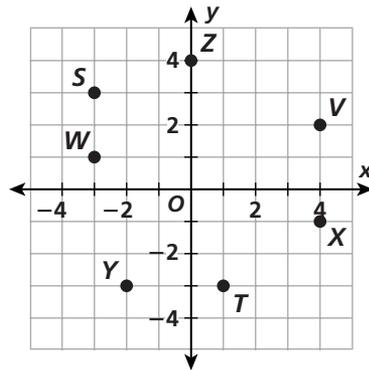
Example 2

Give the coordinates of each point.

A. X

From the origin, X is units right and unit down.

()

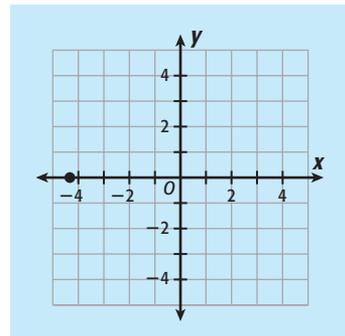


Example 3

Graph each point on a coordinate plane.

A. $M(4, 3)$

From the origin, move units , and units .



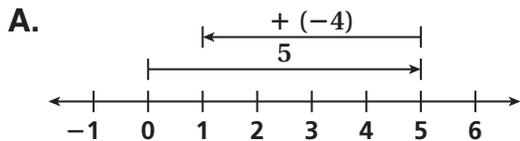
Lesson Objectives

Add integers

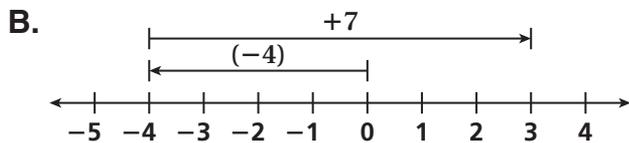
Additional Examples

Example 1

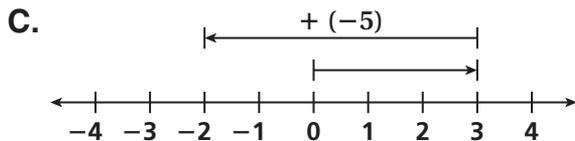
Write the addition modeled on each number line.



The addition modeled is $\square + (\square) = \square$.



The addition modeled is $\square + \square = \square$.



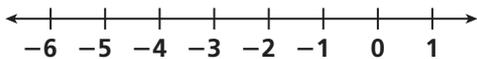
The addition modeled is $\square + (\square) = \square$.

Example 2

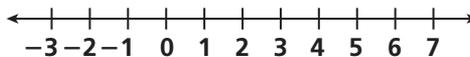
Find each sum.

A. $-3 + (-2)$

B. $6 + (-8)$



$$-3 + (-2) = \square$$



$$6 + (-8) = \square$$

Example 3

Evaluate $y + (-2)$ for $y = 7$.

$y + (-2)$ Write the expression.

+ (-2) Substitute for y .

Add.

Example 4

A sunken ship is 12 m below sea level. A search plane flies 35 m above the sunken ship. How far above the sea is the plane?

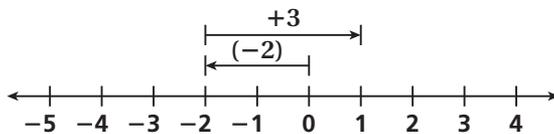
The ship is m below the sea level and the plane is m above the ship.

+

The plane is m above the sea.

Try This

1. Write the addition modeled on the number line.



2. Find the sum.

$-2 + (-4)$

3. Evaluate $z + (-4)$ for $z = 2$.

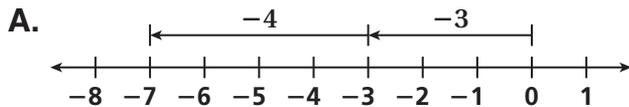
Lesson Objectives

Subtract integers

Additional Examples

Example 1

Write the subtraction modeled on each number line.

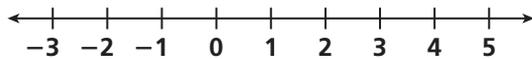


The subtraction modeled is - = .

Example 2

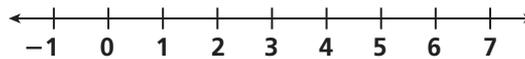
Find each difference.

A. $4 - 6$



$4 - 6 =$

B. $3 - (-3)$



$3 - (-3) =$

Example 3

Evaluate $a - 4$ for $a = 2$. $a - 4$ Write the expression. - 4 Substitute for a . Subtract.

Lesson Objectives

Multiply integers

Additional Examples**Example 1**

Find each product.

A. $5 \cdot 2$

$5 \cdot 2 = \boxed{}$

Think: 5 groups of $\boxed{}$.

B. $4 \cdot (-5)$

$4 \cdot (-5) = \boxed{}$

Think: 4 groups of $\boxed{}$.**Example 2**Evaluate $-7x$ for each value of x .

A. $x = -3$

$-7x$

Write the expression.

$-7 \cdot (\boxed{})$

Substitute $\boxed{}$ for x .

$\boxed{}$

The signs are the $\boxed{}$, so the answer is

$\boxed{}$.

B. $x = 5$

$-7x$

Write the expression.

$-7 \cdot \boxed{}$

Substitute $\boxed{}$ for x .

$\boxed{}$

The signs are $\boxed{}$, so the answer is

$\boxed{}$.

Lesson Objectives

Divide integers

Additional Examples

Example 1

Find each quotient.

A. $-30 \div 6$

Think: What number times equals -30 ?

$\cdot 6 = -30$, so $-30 \div 6 =$.

B. $-42 \div (-7)$

Think: What number times equals -42 ?

$\cdot (-7) = -42$, so $-42 \div (-7) =$.

Example 2

Evaluate $\frac{d}{4}$ for each value of d .

A. $d = 16$

$\frac{d}{4}$

Write the expression.

$=$ $\div 4$

Substitute for d .

$=$

The signs are the , so the answer is

.

B. $d = -24$

$\frac{d}{4}$

Write the expression.

$=$ $\div 4$

Substitute for d .

$=$

The signs are , so the answer is .



Lesson Objectives

Solve equations containing integers

Additional Examples

Example 1

A. Solve $-8 + y = -13$.

$$-8 + y = -13$$

$$\begin{array}{r} + 8 \\ + 8 \\ y = \end{array}$$

-8 is added to y .

Subtracting from both sides to undo the is the same as adding .

B. Solve $n - 2 = -8$.

$$n - 2 = -8$$

$$\begin{array}{r} + 2 \\ + 2 \\ n = \end{array}$$

2 is subtracted from n .

Add to both sides to undo the .

Example 2

Solve each equation. Check your answer.

A. $4m = -20$

$$\frac{4m}{4} = \frac{-20}{4}$$

m is multiplied by 4 . both sides by to undo the .

$$m = \text{$$

Try This

1. Solve $-2 + y = -7$. Check your answer.

Lesson Objectives

Use data in a table to write an equation for a function and use the equation to find a missing value

Vocabulary

function (p. 640) _____

input (p. 640) _____

output (p. 640) _____

Additional Examples**Example 1**

Write an equation for a function that gives the values in the table. Use the equation to find the value of y for the indicated value of x .

x	3	4	5	6	7	10
y	13	16	19	22	25	■

y is times x + .

Compare x and y to find a pattern.

$y =$

Use the pattern to write an equation.

$y = 3(\text{input}) + 4$

Substitute for x .

$y =$ + =

Use your function rule to find y when

$x =$.

Example 2

Write an equation for the function. Tell what each variable you use represents.

The height of a painting is 7 times its width.

$h =$ of painting

Choose for the equation.

$w =$ of painting



Write an equation.

Example 3

PROBLEM SOLVING APPLICATION

The school choir tracked the number of tickets sold and the total amount of money received. They sold each ticket for the same price. They received \$80 for 20 tickets, \$88 for 22 tickets, and \$108 for 27 tickets. Write an equation for the function.

1. Understand the Problem

The answer will be an equation that describes the relationship between the number of sold and the money .

2. Make a Plan

You can make a table to display the data.

3. Solve

Let t be the number of . Let m be the amount of received.

t	20	22	27
m	80	88	108

m is equal to times t . Compare t and m .



Write an equation.

4. Look Back

Substitute the t and m values in the table to check that they are solutions of the equation $m = 4t$.

$$m = 4t \text{ (20, 80)} \quad m = 4t \text{ (22, 88)} \quad m = 4t \text{ (27, 108)}$$

$$80 \stackrel{?}{=} 4 \cdot 20 \quad 88 \stackrel{?}{=} 4 \cdot 22 \quad 108 \stackrel{?}{=} 4 \cdot 27$$

$$80 \stackrel{?}{=} 80 \checkmark \quad 88 \stackrel{?}{=} 88 \checkmark \quad 108 \stackrel{?}{=} 108 \checkmark$$

Try This

Write an equation for a function that gives the values in the table. Use the equation to find the value of y for the indicated value of x .

1.

x	3	4	5	6	7	10
y	10	12	14	16	18	■

2. Write an equation for the function. Tell what each variable you use represents.

The height of a mirror is 4 times its width.

3. Problem Solving Application

The school choir tracked the number of tickets sold and the total amount of money received. They sold each ticket for the same price. They received \$60 for 20 tickets, \$66 for 22 tickets, and \$81 for 27 tickets. Write an equation for the function.



Lesson Objectives

Represent linear functions using ordered pairs and graphs

Vocabulary

linear equation (p. 647) _____

Additional Examples

Example 1

Use the given x -values to write solutions of the equation as ordered pairs.

$y = 4x + 2$; $x = 1, 2, 3$

Make a table by using the given values for x to find values for y .

Write these solutions as pairs.

x	$4x + 2$	y	(x, y)
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Example 2

Determine whether the ordered pair is a solution to the given equation.

$(3, 21)$; $y = 7x$

$y = 7x$ Write the equation.

$\stackrel{?}{=} 7(\text{input type="text"/>)$ Substitute for x and 21 for .

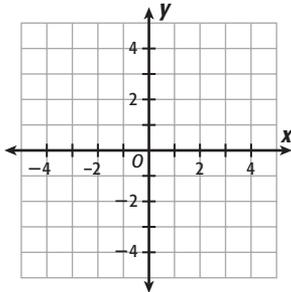
$21 \stackrel{?}{=} 21 \checkmark$

So () is a solution to $y = 7x$.

Example 3

Use the graph of the linear function to find the value of y for the given value of x .

$x = 4$



Start at the origin and move units

Move until you reach the graph. Move left

to find the y -value on the .

When $x = 4$, $y =$. The ordered pair is

(,)

Example 4

Graph the function described by the equation.

$y = -x - 2$

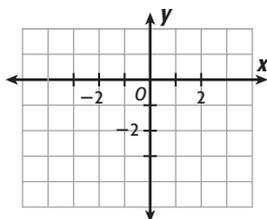
Make a function table.

x	$-x - 2$	y
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Write these solutions as ordered pairs.

(x, y)

Graph the pairs on a plane.



Draw a line through the points to represent

the values of you could have

chosen and the values of y .



11-1 Integers in Real-World Situations

Write the opposite of each decimal or fraction.

1. $+\frac{1}{5}$ 2. -4.8 3. $\frac{3}{8}$ 4. $+0.6$

5. One morning, the temperature was 63°F . Throughout the day, the temperature rose 12 degrees and then dropped 15 degrees. Write an expression to represent this situation.

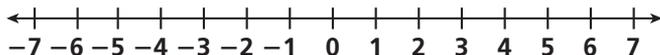
11-2 Comparing and Ordering Integers

6. Use the table, which shows a part of Beth's checking account statement.

Date	Balance
May 1	\$125.08
May 4	\$205.67
May 11	\$-15.32

- a. Which day did Beth have the highest balance in her checking account?
- b. Which day did Beth have the smallest balance in her checking account?

Use the number line to compare each pair of integers. Write $<$ or $>$.



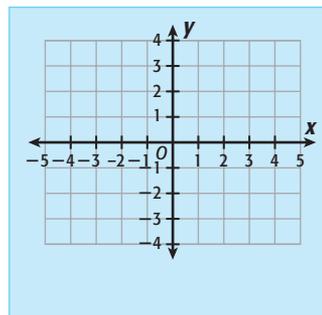
7. $0 \blacksquare 5$ 8. $3 \blacksquare -3$ 9. $-6 \blacksquare 4$ 10. $1 \blacksquare -2$

11-3 The Coordinate Plane

Name the quadrant where each ordered pair is located.

11. $(-3, 5)$ 12. $(4, -2)$ 13. $(-1\frac{1}{3}, -6)$ 14. $(2, 8)$

15. Graph points $A(-3, -3)$, $B(3, -3)$, $C(2, 2)$, and $D(-4, 2)$. Connect the points. What type of quadrilateral do the points form?



11-4 Adding Integers

Evaluate each expression for the given value of the variable.

16. $x + (-6)$; $x = 8$

17. $n + (-4)$; $n = -9$

18. $-7 + r$; $r = 6$

19. Madison was playing a trivia game. She answered her first three 100-point questions incorrectly, and then answered a 500-point question correctly.

How many points did she have after answering the 4 questions?

11-5 Subtracting Integers

Find each difference.

20. $9 - (-6)$

21. $-4 - 8$

22. $-10 - (-7)$

23. $4 - (-6)$

24. One December day in Breckenridge, Colorado, the high temperature was 24°F and the low temperature was -18°F . Find the difference between the high and low temperatures.

11-6 Multiplying Integers

Evaluate each expression for the given value of the variable.

25. $n \cdot (-5)$; $n = -4$

26. $-6 \cdot m$; $m = 7$

27. $14b$; $b = -8$

28. While playing a game, Tom scored -20 points for each question that he answered incorrectly. Tom answered 7 questions incorrectly. How many points did Tom score for those 7 questions?

11-7 Dividing Integers

Divide.

29. $-8 \div 4$

30. $\frac{30}{-6}$

31. $-49 \div (-7)$

32. $\frac{-81}{-9}$

33. The low temperature in Chicago was -4°F on Friday, -8°F on Saturday, and 3°F on Sunday. What was the average low temperature over the 3 days?

11-8 Solving Integer Equations

Solve each equation. Check your answers.

34. $y - 9 = 5$

35. $-8j = -72$

36. $b \div 6 = -9$

37. $25 + h = 15$

38. $\frac{s}{-4} = 9$

39. $-8c = 64$

40. $a - 13 = 4$

41. $e + 35 = -50$

11-9 Tables and Functions

Write an equation for a function that gives the values in each table, and then find the missing terms.

42.

x	1	2	3	6	10
y	3	7	11	23	■

43.

x	35	20	10	0	-15
y	-7	-4	■	0	3

Write an equation for the function. Tell what each variable you use represents.

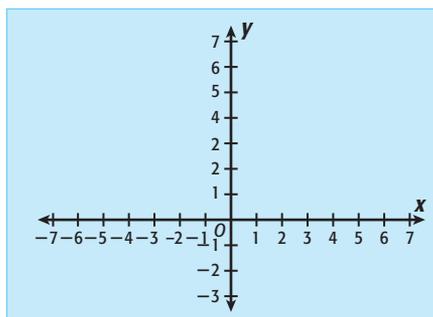
44. Ashlynn earned three times as much allowance as her sister, Danica.

11-10 Graphing Functions

Complete each table, and then use the table to graph the function.

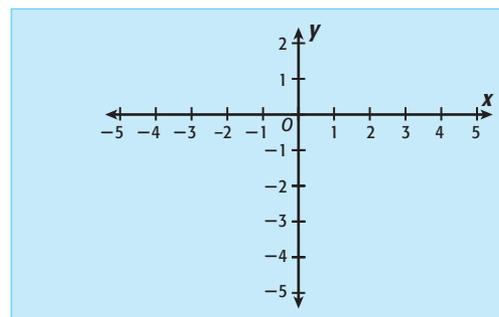
45. $y = 3x + 1$

x	-1	0	1	2
y	■	■	■	■



46. $y = x - 4$

x	-1	0	1	2
y	■	■	■	■





Answer these questions to summarize the important concepts from Chapter 11 in your own words.

1. Explain why -8 and 8 are opposites.

2. Explain how to graph the point $(-7, 9)$.

3. Explain how to evaluate $x - (-7)$ for $x = -6$.

4. Explain the rules for multiplying integers.

5. Explain the rules for dividing integers.

6. Explain how to solve the equation $5 + x = 12$.

For more review of Chapter 11:

- Complete the Chapter 11 Study Guide and Review on pages 656–658 of your textbook.
- Complete the Ready to Go On quizzes on pages 614, 632 and 650 of your textbook.



Lesson Objectives

Estimate the likelihood of an event and write and compare probabilities

Vocabulary

probability (p. 668) _____

Additional Examples

Example 1

Write *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain* to describe each event.

A. You roll an even number on a standard number cube.

B. The month of February has 28 days.

Example 2

A. Write the probability 75% as a decimal and as a fraction.

75% = Write as a decimal.

75% = = Write as a fraction in simplest form.

B. Write the probability 0.8 as a fraction and as a percent.

0.8 = = Write as a fraction in simplest form.

0.8 = Write as a percent.

C. Write the probability $\frac{7}{50}$ as a decimal and as a percent.

$$\frac{7}{50} = \boxed{} \div \boxed{} = \boxed{} \quad \text{Write as a decimal.}$$

$$\frac{7}{50} = \frac{7 \times 2}{50 \times 2} = \boxed{} = \boxed{}\% \quad \text{Write as a percent.}$$

Example 3

A. On a standard number cube, there is a 50% chance of rolling a multiple of 2 and a $33\frac{1}{3}\%$ chance of rolling a multiple of 3. Is it more likely to roll a multiple of 2 or a multiple of 3?

Compare: $33\frac{1}{3}\%$ 50%

It is more likely to roll a multiple of .

Try This

1. Write *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain* to describe each event.

Sallie thinks of a number between 1 and 1,000. Ryan guesses the number Sallie is thinking of.

2. Write the probability 0.6 as a fraction and as a percent.

3. When you spin a certain spinner, there is a 35% chance that it will land on house, a 22% chance it will land on car, and a 43% chance that it will land on bicycle. Is it more likely to land on bicycle or house?



Lesson Objectives

Find the experimental probability of an event

Vocabulary

experiment (p. 672) _____

outcome (p. 672) _____

experimental probability (p. 672) _____

Additional Examples

Example 1

For each experiment, identify the outcome shown.

A. tossing two coins

outcome shown:



B. rolling two number cubes

outcome shown:



Example 2

For one month, Mr. Crowe recorded the time at which his train arrived. He organized his results in a frequency table.

Time	6:50–6:52	6:53–6:56	6:57–7:00
Frequency	7	8	5

A. Find the experimental probability that the train will arrive between 6:57 and 7:00.

$$P(\text{between 6:57 and 7:00}) \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

$$= \boxed{} = \boxed{}$$

Example 3

Erika tossed a cylinder 30 times and recorded whether it landed on one of its bases or on its side. Based on Erika’s experiment, which way is the cylinder more likely to land?

Outcome	On a base	On its side
Frequency		

Find the experimental probability of each outcome.

$$P(\text{base}) \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} = \frac{\boxed{}}{\boxed{}}$$

$$P(\text{side}) \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} = \frac{\boxed{}}{\boxed{}}$$

$$\frac{9}{30} \quad \boxed{} \quad \frac{21}{30}$$

Compare the probabilities.

It is more likely that the cylinder will land on its .



Lesson Objectives

Make an organized list to find all possible outcomes

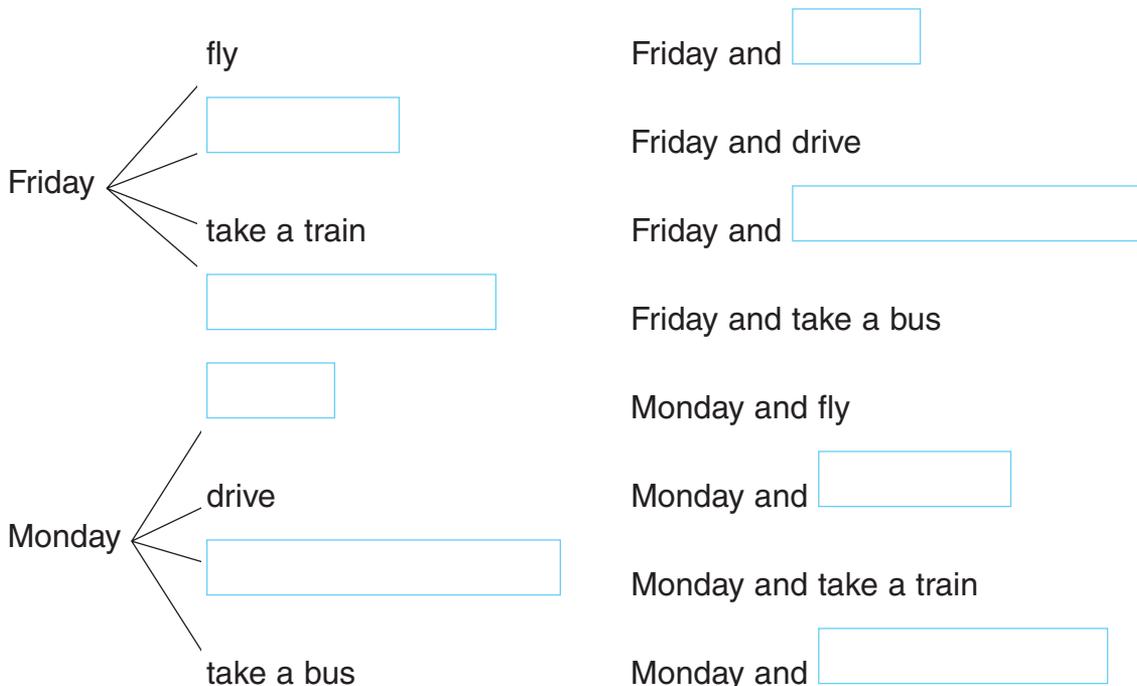
Vocabulary

sample space (p. 678) _____

Additional Examples

Example 1

Matt wants to take a 3-day weekend trip to visit his grandparents. He can take either Friday or Monday off from work, and he can either fly, drive, take a train, or take a bus. How many options are available to Matt?



Follow each branch on the tree diagram to find all of the possible outcomes.

There are different weekend trip combinations available to Matt.

Example 2

PROBLEM SOLVING APPLICATION

One girl and one boy will be chosen to go to the state science fair. The girl finalists are Alia, Brenda, Cathy, Deb, and Erika. The boy finalists are Frank, Greg, and Hal. How many different pairs of one girl and one boy can be formed?

1. Understand the Problem

The answer will be the number of different pairs of one girl and one boy.
List the important information: Use each student's first initial.

- There are girls, A, B, C, D, and E.
- There are boys, F, G, and H.
- Only girl and boy will be chosen.

2. Make a Plan

You can make an list to keep track of the sequences.

3. Solve

- List all pairs that begin with A.
- List all pairs that begin with B.
- List all pairs that begin with C.
- List all pairs that begin with D.
- List all pairs that begin with E.

There are groups of pairs.

$$\text{} + \text{} + \text{} + \text{} + \text{} = \text{}$$

There are pairs of one girl and one boy.

4. Look Back

You could have made a list beginning with a boy's name. There would be 3 groups of 5 pairs.

$$5 + 5 + 5 = 15$$

Each list would have 15 pairs of one girl and one boy.

Example 3

Rick wants to buy a mammal and a reptile for pets. The pet shop has dogs, cats, rabbits, hamsters, and ferrets, which are all mammals. It also has lizards, monitors, and boa constrictors, which are all reptiles. How many combinations of one mammal and one reptile are possible?

There are choices for mammals and choices for reptiles.

· = Multiply the number of choices in each category.

There are possible combinations.

Try This

- 1. For her work uniform, Missy has a choice of three colors of pants—black, khaki, or navy. She has four choices for shirt colors—red, white, green, and yellow. How many different uniforms can Missy wear?**

- 2. One girl and one boy will be chosen to go to the movie preview. The girl finalists are Fay, Gerri, Heidi, and Ingrid. The boy finalists are Kevin, Larry, and Marc. How many different pairs of one girl and one boy can be formed?**

- 3. Aubrey's Wing Shop offers three types of sauce: mild, medium, or hot. It also offers three flavors: original, garlic, or barbeque. How many combinations of one sauce and one flavor are possible?**

Lesson Objectives

Find the theoretical probability and complement of an event

Vocabulary

theoretical probability (p. 682) _____

equally likely (p. 682) _____

fair (p. 682) _____

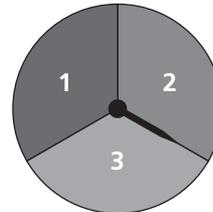
complement (p. 683) _____

Additional Examples**Example 1****A. What is the probability that this fair spinner will land on 3?**

There are possible outcomes when

spinning this spinner: 1, 2, or 3. All are

likely because the spinner is .



$$P(3) = \frac{\text{}}{3 \text{ possible outcomes}}$$

There is only way for the spinner to land on 3.

$$P(3) = \frac{1 \text{ way event can occur}}{3 \text{ possible outcomes}} = \text{$$

Example 2

Suppose there is a 45% chance of snow tomorrow. What is the probability that it will not snow?

In this situation there are two possible outcomes, either it will snow or it will not snow.

$$P(\text{snow}) + P(\text{not snow}) = \boxed{}\%$$

$$\boxed{}\% + P(\text{not snow}) = \boxed{}\%$$

$$\underline{- 45\%}$$

$$\underline{- 45\%}$$

Subtract $\boxed{}\%$ from each side.

$$P(\text{not snow}) = \boxed{}\%$$

Try This

1. What is the probability of rolling a number less than 4 on a fair number cube?

2. Suppose there is a 35% chance of rain tomorrow. What is the probability that it will not rain?



Lesson Objectives

List all the outcomes and find the theoretical probability of a compound event

Vocabulary

compound event (p. 686) _____

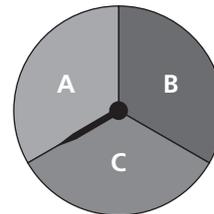
Additional Examples

Example 1

Jerome spins the spinner and rolls a fair number cube.

- A. Find the probability of the number cube showing an even number and the spinner showing a B.

First find all of the possible outcomes.



Number Cube

		1	2	3	4	5	6
Spinner	A	1, A	2, A	3, A	4, A	5, A	6, A
	B	1, B	2, B	3, B	4, B	5, B	6, B
	C	1, C	2, C	3, C	4, C	5, C	6, C

There are possible outcomes, and all are equally likely.

of the outcomes have an even number and B: , ;
, ; and , .

$$P(\text{even, B}) = \frac{3 \text{ ways events can occur}}{18 \text{ possible outcomes}}$$

$$= \frac{\text{}}{\text{}}$$

$$= \text{} \quad \text{Write your answer in simplest form.}$$

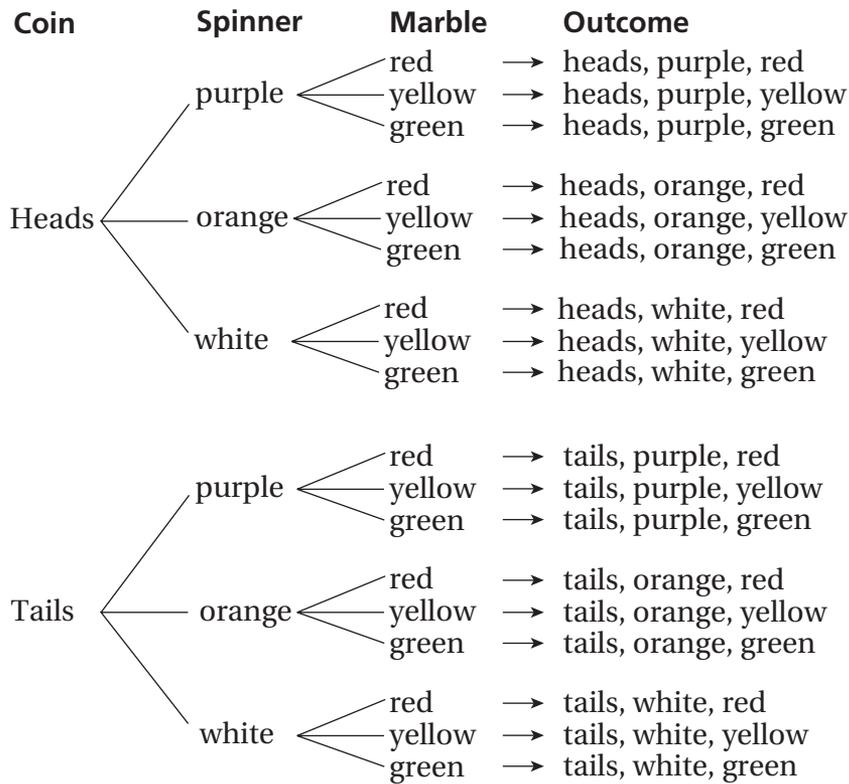
B. Find the probability of the number cube showing 4 and the spinner showing A.

Only one outcome is 4, A.

$$P(4, A) = \frac{\boxed{} \text{ way event can occur}}{\boxed{} \text{ possible outcomes}}$$

$$= \boxed{}$$

C. In the experiment on page 689, what is the probability of the coin showing tails, the spinner showing purple, and a green marble being chosen?



There are $\boxed{}$ equally likely outcomes.

$$P(\text{tails, purple, green}) = \frac{\boxed{} \text{ way event can occur}}{\boxed{} \text{ possible outcomes}}$$

$$= \boxed{}$$



Lesson Objectives

Use probability to predict events

Vocabulary

prediction (p. 694) _____

population (p. 694) _____

sample (p. 694) _____

Additional Examples

Example 1

A. A store claims that 78% of shoppers end up buying something. Out of 1,000 shoppers, how many would you predict will buy something?

You can write a proportion. Remember that percent means “per hundred.”

$$\frac{78}{100} = \frac{x}{1,000}$$

Think: out of 100 is how many out of ?

$$100 \cdot x = 78 \cdot 1,000$$

The cross products are .

$$\text{} x = \text{}$$

x is multiplied by .

$$\frac{100x}{100} = \frac{78,000}{100}$$

both sides by to undo the .

$$x = \text{}$$

You can predict that about out of 1,000 customers will buy something.

Example 2

If you roll a number cube 30 times, how many times do you expect to roll a number greater than 2?

$$P(\text{greater than } 2) = \frac{4}{6} = \frac{2}{3}$$

$$\frac{2}{3} = \frac{x}{30}$$

Think: 2 out of 3 is how many out of 30.

$$3 \cdot x = 2 \cdot 30$$

The cross products are .

$$\text{} \cdot x = 60$$

x is multiplied by 3.

$$\frac{3x}{3} = \frac{60}{3}$$

both sides by to

undo the .

$$x = \text{}$$

You can expect to roll a number greater than 2 about times.

Example 3**PROBLEM SOLVING APPLICATION**

A stadium sells yearly parking passes. If you have a parking pass, you can park at that stadium for any event during that year.

The managers of the stadium estimate that the probability that a person with a pass will attend any one event is 50%. The parking lot has 400 spaces. If the managers want the lot to be full at every event, how many passes should they sell?

1. Understand the Problem

The answer will be the number of parking passes they should sell. List the important information:

- $P(\text{person with pass attends event}) = \text{}\%$
- There are parking spaces.

2. Make a Plan

The managers want to fill all spaces. But on average, only % of parking pass holders will attend. So 50% of the pass holders must equal 400. You can write an equation to find this number.

3. Solve

$$\frac{50}{100} = \frac{400}{x}$$

Think: 50 out of is 400 out of how many?

$$100 \cdot 400 = 50 \cdot x$$

The cross products are .

$$40,000 = \text{}x$$

x is multiplied by .

$$\frac{40,000}{50} = \frac{50x}{50}$$

both sides by 50 to undo the .

$$\text{} = x$$

The managers should sell parking passes.

4. Look Back

If the managers sold only 400 passes, the parking lot would not usually be full because only about 50% of the people with passes will attend any one event. The managers should sell more than 400 passes, so 800 is a reasonable answer.

Try This

1. A store claims 62% of shoppers end up buying something. Out of 1,000 shoppers, how many would you predict will buy something?

2. If you roll a number cube 90 times, how many times do you expect to roll a factor of 4?



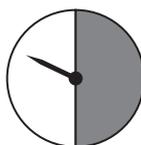
12-1 Introduction to Probability

Write *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain* to describe each event.

1. This week has 7 days.

2. The spinner lands on the color purple.

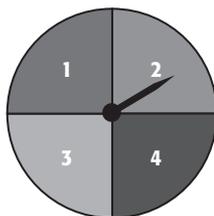
3. The spinner lands on white.



12-2 Experimental Probability

For each experiment, identify the outcome shown.

4. spinning a spinner



5. tossing two coins



Jake recorded the number of strikes he bowled in his last 20 games. He organized his results in a frequency table.

number of strikes	0	1	2	3	4
frequency	2	8	5	3	2

6. Find the experimental probability that Jake will get one strike in a game.

7. Based upon Jake's results, what are the two numbers of strikes he has an equal chance of getting?

12-3 Counting Methods and Sample Spaces

8. Shannon is shopping for a cell phone case. The cell phone cases come in black, white, red, blue, and pink. She can choose between cell phones with a car charger and cell phones without a car charger. What are the possible cell phone combinations Shannon can choose from?

9. Megan will choose a blouse, a shirt, and a pair of shoes from her closet to wear to school. Find the number of different outfits she can make if she has

a. 3 blouses, 4 skirts, 2 pairs shoes

b. 5 blouses, 2 skirts, 3 pairs shoes

12-4 Theoretical Probability

10. What is the probability of rolling a number that is a multiple of 2 on a fair number cube?

11. What is the probability of rolling a prime number on a fair number cube?

12. What is the probability of rolling either a 4 or a 5 on a fair number cube?

13. What is the probability of NOT rolling a 1 on a fair number cube?

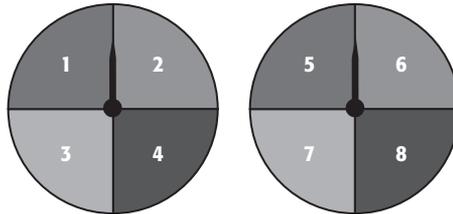
14. Suppose there is a 60% chance of rain tomorrow. What is the probability it will NOT rain tomorrow?

15. Suppose there is a 79% chance of Lance making a free throw. What is the probability that Lance will NOT make a free throw?

12-5 Compound Events

16. Bob rolled a fair number cube twice. Find the probability that the number cube will show an even number on the first roll and an odd number on the second roll.

An experiment involves spinning each spinner once. Find each probability.



17. $P(3 \text{ on the first spinner and } 7 \text{ on the second spinner})$

18. $P(\text{NOT a } 3 \text{ on the first spinner and } 8 \text{ on the second spinner})$

19. $P(\text{NOT a } 4 \text{ on the first spinner and NOT a } 6 \text{ on the second spinner})$

20. $P(1 \text{ or } 2 \text{ on the first spinner and NOT a } 5 \text{ on the second spinner})$

12-6 Making Predictions

21. Based on a sample survey, a broadcasting company claims that 78% of the household televisions were tuned into the new reality series on Tuesday night. Out of 40,000 households, how many would you predict watched the new reality series?

22. A sack holds 4 orange marbles, 2 green marbles, 3 red marbles, and 1 clear marble. You pick a marble from the sack, record its color, and place the marble back in the sack. If you repeat this process 50 times, how many times do you expect to pick a red marble from the sack?



Answer these questions to summarize the important concepts from Chapter 12 in your own words.

1. Explain how to find the experimental probability of an event.

2. Explain how to use the Fundamental Counting Principle to find the total number of possible outcomes for an event.

3. Explain how to find the theoretical probability of rolling a number greater than 2 on a fair number cube.

4. Explain how to find the complement of an event.

6. Explain how to predict the number of times you can expect to roll a 3 when rolling a number cube 210 times.

For more review of Chapter 12:

- Complete the Chapter 12 Study Guide and Review on pages 704–706 of your textbook.
- Complete the Ready to Go On quizzes on pages 686 and 698 of your textbook.