Introduction At www.progressinmathematics.com, you will find a lot of technology resources that you can use at home, and your teacher may make them available when you are at school.

Technology Resources:

- **AUDIO GLOSSARY**
  - **From A to Z** Find the meanings and hear the pronunciations of math words and phrases.

- **ALTERNATIVE TEACHING MODELS**
  - **Tutorials** Watch and listen to these animated math lessons.

- **VIRTUAL MANIPULATIVES**
  - ** Manipulatives** Practice and model math concepts with virtual manipulatives.

- **PRACTICE**
  - **Problem of the Day** Tackle a new problem every day!
  - **Skills Update** Review your skills with Lesson and Practice pages.
  - **Math Minutes** Race against the clock with timed activities!
  - **Practice Activities** Practice makes perfect with these fun activities!
  - **Vocabulary Activities** Review your math vocabulary while playing Hangman or Word Scramble.

- **ENRICHMENT**
  - **Activities** Challenge yourself with these interactive activities.

- **MATH ALIVE AT HOME**
  - **Take-Home Activities** Share your math experience at home!
Click **From A to Z.**
If you are not sure what a certain word means or how to pronounce it, use your online Audio Glossary. The glossary is easy to use. Just choose your grade level and the first letter of the term you want to review.

**Grade 3 Glossary**

1. Choose the first letter of a term you want to review.
2. Click on the term.
3. Listen as the glossary pronounces the word.

**Factors (FAK-turz)**

Two or more numbers that are multiplied to give a product.
Click **Tutorials**. If there is a skill or concept that you need help with or do not understand, review the animated Alternative Teaching Models (there are 2 for each chapter). Each Alternative Teaching Model gives a step-by-step explanation of one of the skills or concepts in the chapter.
Click **Manipulatives.**
Virtual Manipulatives are visual models that you can actually move or manipulate to show what is happening. You can use these tools to build numbers, rotate shapes, and even jump on a number line.

Select your grade and the chapter you are working on. The manipulatives that are listed will be ones that you can use to visualize the concepts of the chapter.
Click **Practice Activities.** There is an interactive activity for each chapter in your textbook. The activity practices the most important skills of the chapter. Use the activity while you are learning the skills, or come back to it later to review.

Click **Math Minutes.** You can practice your basic facts as well as compute with larger numbers to see how accurately you can compute if you are given a time limit.

Click **Vocabulary Activities.** In each chapter, you will be learning new math terms that you will need to know. A good way to review these terms is to play either the Hangman game or Word Scramble in your online vocabulary activities.
Click **Problem of the Day**.* Sharpen your problem-solving skills every day. Print and solve one problem each day!

Click **Skills Update**.* Print Skills Update lessons and practice pages to review previously taught math skills and concepts.

Click **Activities**. The Enrichment activities online are topics that go beyond what you are learning in class.

Each activity starts with a page that explains the concept and then gives you time to practice the concept.

*Whiteboard projectable only.*
Dear Family,

Today our class began Chapter 1. We will learn about place value. Let’s do the activity below together so I can review the skills I will need in order to understand the math in this chapter. Then we can read some of the new vocabulary I will learn in Chapter 1.

Love, ____________________

How Many Tens, How Many Ones?

With your child, list the age of everyone in your family on a sheet of paper. Ask your child to say how many tens and how many ones there are in each age. Draw a frame like the one at the right for each family member. Tell your child to write in each frame the number of tens and ones for each age. Then have her/him write an addition with the number of tens and the number of ones for each age, and find the sum.

expanded form
shows the place value of the digits
600 + 10 + 7
standard form
617
nearest ten
the number achieved after rounding to the nearest ten
251 ➔ 250
nearest hundred
the number achieved after rounding to the nearest hundred

Dear Family,

Today our class completed Chapter 1. We learned how to read, write, compare, and order numbers to hundred thousands. These skills are needed to work with numbers and to understand place value. We explored patterns of skip counting with 2s, 3s, 4s, 5s, and 10s, which will help us to learn multiplication facts. We practiced rounding 3- and 4-digit numbers to the nearest ten, hundred, or thousand. This skill is necessary for estimating with numbers. We also worked with money, which will help us make and count change.

Love, ______________________

Key Skills and Concepts

Students’ learning in Chapter 1 was guided by giving particular emphasis to the following key skills and concepts:

- Identify the place value for each digit in numbers to 10,000.
- Use expanded notation to represent numbers.
- Identify the nearest ten, hundred, thousand, and nearest hundred of a number.
- Use money to count and make change.

At Home Activities

www.progressinmathematics.com

Dear Family:

Today our class began Chapter 1. We will learn about place value. Let’s do the activity below together so I can review the skills I will need in order to understand the math in this chapter. Then we can read some of the new vocabulary I will learn in Chapter 1.

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With your child, list the age of everyone in your family on a sheet of paper. Ask your child to say how many tens and how many ones there are in each age. Draw a frame like the one at the right for each family member. Tell your child to write in each frame the number of tens and ones for each age. Then have her/him write an addition with the number of tens and the number of ones for each age, and find the sum.

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600 + 10 + 7
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the number achieved after rounding to the nearest hundred

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- Identify the nearest ten, hundred, thousand, and nearest hundred of a number.
- Use money to count and make change.

At Home Activities

www.progressinmathematics.com
Progress in Mathematics

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Dear Family

Progress in Mathematics, now in its sixth decade of user-proven success, is a complete basal mathematics program. Written by experienced teacher-authors, it integrates a traditional course of study and today’s academic Standards with the most up-to-date methods of teaching.

Progress in Mathematics is designed to meet the individual needs of all learners. Teachers who use Progress come to understand that students may progress as quickly as they can or as slowly as they must.

In Grade 4, multiplication and division will be further developed, and your fourth grader will apply both operations throughout the grade-level, as he or she studies the concepts of measurement, probability and statistics, fractions, geometry, perimeter, area, volume, and decimals. There will also be an increased emphasis on algebraic thinking. Special attention is given to critical thinking, problem solving, mental math, and journalizing.

But overall success in achieving the goals of this program depends on ongoing teacher-family-student interaction. It is important for you to encourage your fourth grader to achieve success in mathematics and to enjoy it as well. You can help your student see math as useful and practical by relating it to everyday situations. It is also helpful to provide a quiet space and time for homework, and to reinforce the idea that by practicing math concepts and skills in your home environment, your student can have fun while learning mathematics.

Throughout the school year, you and your student can access Math Alive At Home pages at www.sadlier-oxford.com. These pages include the math vocabulary of each chapter plus fun-filled activities that will help you relate the math your student is learning in school to the real world.

We know that by using Progress in Mathematics your fourth grader will not only learn to value math, but become a confident problem solver and learn to reason and communicate mathematically as well.

The Authors

For Additional Resources: VISIT US ON-LINE www.sadlier-oxford.com
## Contents

Letter to the Family .................................................. iii

### Skills Update

A handbook for reviewing essential and previously taught skills

**Introduction to Skills Update** ................................. xii

**Numeration**

I Hundred .................................................. 1

II Compare Whole Numbers .............................. 2

**Money**

Recognize and Count Money .................................. 3

**Whole Number Operations**

I Addition and Subtraction Facts ....................... 4

II Related Facts ........................................... 5

III Add and Subtract without Regrouping ........... 6

IV Meaning of Multiplication .......................... 7

V Multiplication Facts .................................. 8

VI Multiply with 10, 11, and 12 .................... 9

VII Understand Division ................................ 10

VIII Division Facts ....................................... 11

IX Relate Multiplication and Division .......... 12

**Fractions**

Identify Fractions ........................................... 13

**Measurement**

I Customary Units of Length ......................... 14

II Cup, Pint, Quart, Gallon .......................... 15

III Pound ................................................... 16

IV Centimeter and Meter ............................. 17

V Liter ....................................................... 18

VI Kilogram .................................................. 19

**Geometry**

I Perimeter ................................................... 20

II Congruent Figures ..................................... 21

III Lines of Symmetry ................................... 22

IV Ordered Pairs on a Grid ............................ 23

V Area ......................................................... 24

**Statistics**

I Record and Organize Data ............................ 25

II Graphing Sense ......................................... 26

**Probability**

Probability Experiments ................................ 27

---

**Introduction to Problem Solving**

Problem-Solving Model ...................................... 28

Problem-Solving Strategy:

Choose the Operation .................................... 30

Problem-Solving Strategy:

Guess and Test ........................................... 31

Problem-Solving Strategy:

Use More Than One Step ................................ 32

Problem-Solving Strategy:

Write a Number Sentence ................................ 33

Problem-Solving Applications ......................... 34

*Lesson promotes algebraic reasoning.*
**Chapter 1: Place Value**

Chapter Opener ............................................. 35

1-1 Thousands ............................................. 36

*1-2 What Is One Million? .............................. 38

1-3 Millions ................................................. 40

1-4 Place Value ............................................. 42

*1-5 Estimation .............................................. 44

1-6 Compare and Order Whole Numbers  ...... 46

1-7 Number Sense: Use a Number Line  ....... 48

1-8 Make Change .......................................... 50

1-9 Compare and Order Money  ..................... 52

1-10 Rounding .............................................. 54

1-11 Work with Money .................................... 56

1-12 Problem-Solving Strategy: Make a Table or List 58

1-13 Problem-Solving Applications: Mixed Review 60

End of Chapter

Check Your Progress (Lessons 1–13) . . . 62

Enrichment: Billions ................................. 63

Chapter 1 Test ............................................. 64

Cumulative Review .................................... 65

**Chapter 2: Addition and Subtraction Concepts**

Chapter Opener ............................................. 67

2-1 Addition Properties ................................. 68

2-2 Addition Strategies .................................. 70

2-3 Subtraction Concepts ................................ 72

2-4 Expressions and Variables ...................... 74

2-5 Addition and Subtraction Sentences ....... 76

2-6 Mental Math ............................................ 78

2-7 Estimate Sums and Differences ............... 80

2-8 Add and Subtract Money .......................... 82

2-9 Check Addition and Subtraction .......... 84

2-10 Problem-Solving Strategy: Logical Reasoning 86

2-11 Problem-Solving Applications: Mixed Review 88

End of Chapter

Check Your Progress (Lessons 1–11) . . . 90

Enrichment: The Abacus .............................. 91

Chapter 2 Test ............................................. 92

Cumulative Review .................................... 93

*Develops concept or skill with manipulatives. 

Lesson promotes algebraic reasoning.
CHAPTER 3

Addition and Subtraction

Chapter Opener ...................... 95
3-1 Front-End Estimation ............ 96
3-2 Add with Regrouping ............ 98
3-3 Four-Digit Addition .............. 100
3-4 Add Larger Numbers ............. 102
3-5 Three or More Addends 104
3-6 Subtract with Regrouping ...... 106
3-7 Subtraction: Regroup Twice .... 108
3-8 Subtract Larger Numbers ....... 110
3-9 Zeros in Subtraction .......... 112
3-10 Addition and Subtraction Practice 114
3-11 Problem-Solving Strategy: Choose the Operation ............ 116
3-12 Problem-Solving Applications: Mixed Review ............ 118

End of Chapter

Check Your Progress (Lessons 1–12) . 120
Enrichment: Roman Numerals ........ 121
Chapter 3 Test ....................... 122
Cumulative Review .................. 123

CHAPTER 4

Multiply by One and Two Digits

Chapter Opener ...................... 125
4-1 Multiplication Properties 126
4-2 Multiplication Models ............ 128
4-3 Special Factors 130
4-4 Multiply by One-Digit Numbers .... 132
4-5 Products: Front-End Estimation .... 134
4-6 Multiply with Regrouping ....... 136
4-7 Multiply Three-Digit Numbers .... 138
4-8 Multiply Money .................. 140
4-9 Multiply Four-Digit Numbers .... 142
4-10 Patterns in Multiplication 144
4-11 Products: Rounding to Estimate .... 146
4-12 Multiply by Two-Digit Numbers .... 148
4-13 More Multiplying by Two-Digit Numbers .... 150
4-14 Multiply with Three-Digit Numbers .... 152
4-15 Problem-Solving Strategy: Work Backward .... 154
4-16 Problem-Solving Applications: Mixed Review .... 156

End of Chapter

Check Your Progress (Lessons 1–16) . 158
Enrichment: Clustering ............... 159
Chapter 4 Test ....................... 160
Cumulative Review .................. 161

*Develops concept or skill with manipulatives.
Algebra Lesson promotes algebraic reasoning.
### Chapter 5

#### Divide by One Digit

- **Chapter Opener** .................................................. 163
- 5-1 Division Rules ................................................. 164
- 5-2 Relate Multiplication and Division .......................... 166
- 5-3 Missing Numbers .............................................. 168
- 5-4 Number Patterns .............................................. 170
- 5-5 Estimate in Division ........................................... 172
- 5-6 One-Digit Quotients .......................................... 174
- 5-7 Divisibility ...................................................... 176
- 5-8 Two-Digit Quotients .......................................... 178
- 5-9 More Two-Digit Quotients ................................... 180
- 5-10 Three-Digit Quotients ....................................... 182
- 5-11 More Quotients ............................................... 184
- 5-12 Zeros in the Quotient ......................................... 186
- 5-13 Larger Numbers in Division ................................. 188
- 5-14 Divide Money .................................................. 190
- 5-15 Order of Operations ......................................... 192
- 5-16 Find the Mean ................................................ 194
- 5-17 Problem-Solving Strategy: Interpret the Remainder ... 196
- 5-18 Problem-Solving Applications: Mixed Review ........ 198

### Chapter 6

#### Measurement

- **Chapter Opener** .................................................. 205
- 6-1 Measure with Inches ......................................... 206
- 6-2 Rename Units of Length ..................................... 208
- 6-3 Compute Customary Units ................................... 210
- 6-4 Customary Units of Capacity ................................. 212
- 6-5 Customary Units of Weight .................................. 214
- 6-6 Measure with Metric Units .................................. 216
- 6-7 Work with Metric Units ....................................... 218
- 6-8 Metric Units of Capacity ...................................... 220
- 6-9 Metric Units of Mass .......................................... 222
- 6-10 Temperature .................................................... 224
- 6-11 Time ............................................................ 226
- 6-12 Elapsed Time .................................................... 228
- 6-13 Problem-Solving Strategy: Use More Than One Step 230
- 6-14 Problem-Solving Applications: Mixed Review ........ 232

#### End of Chapter

- Check Your Progress (Lessons 1–14) ........................... 234
- Enrichment: Time Zones .......................................... 235
- Chapter 6 Test ....................................................... 236
- Cumulative Review .................................................. 237
Develops concept or skill with manipulatives. Lesson promotes algebraic reasoning.
# Chapter 9

## Fractions: Addition and Subtraction

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-1</td>
<td>Add Fractions: Like Denominators</td>
<td>296</td>
</tr>
<tr>
<td>9-2</td>
<td>Subtract Fractions: Like Denominators</td>
<td>298</td>
</tr>
<tr>
<td>9-3</td>
<td>Improper Fractions</td>
<td>300</td>
</tr>
<tr>
<td>9-4</td>
<td>Estimate with Mixed Numbers</td>
<td>302</td>
</tr>
<tr>
<td>9-5</td>
<td>Add and Subtract Mixed Numbers</td>
<td>304</td>
</tr>
<tr>
<td>9-6</td>
<td>Multiples</td>
<td>306</td>
</tr>
<tr>
<td>9-7</td>
<td>Add Fractions: Unlike Denominators</td>
<td>308</td>
</tr>
<tr>
<td>9-8</td>
<td>Subtract Fractions: Unlike Denominators</td>
<td>310</td>
</tr>
<tr>
<td>9-9</td>
<td>Compute Probability</td>
<td>312</td>
</tr>
<tr>
<td>9-10</td>
<td>Find Part of a Number</td>
<td>314</td>
</tr>
<tr>
<td>9-11</td>
<td>Problem-Solving Strategy: Use Simpler Numbers</td>
<td>316</td>
</tr>
<tr>
<td>9-12</td>
<td>Problem-Solving Applications: Mixed Review</td>
<td>318</td>
</tr>
</tbody>
</table>
CHAPTER 11
Perimeter, Area, and Volume

Chapter Opener ................................................. 357
11-1 Use Perimeter Formulas ......................... 358
11-2 Use Area Formulas ......................................... 360
11-3 Perimeter and Area ....................................... 362
11-4 Solid Figures ........................................ 364
11-5 Solid Figures and Polygons ...................... 366
*11-6 Spatial Relationships ......................... 368
11-7 Volume .................................................. 370
11-8 Problem-Solving Strategy: Use a Drawing or Model .......................... 372
11-9 Problem-Solving Applications: Mixed Review ........................................... 374

End of Chapter

Check Your Progress (Lessons 1–9) .................. 376
Enrichment: Missing Cubic Units ..................... 377
Chapter 11 Test .................................................. 378
Cumulative Review ............................................. 379

CHAPTER 12
Divide by Two Digits

Chapter Opener ................................................. 381
12-1 Division Patterns ......................................... 382
12-2 Divisors: Multiples of Ten ......................... 384
12-3 Estimate Quotients ....................................... 386
12-4 Two-Digit Dividends .............................. 388
12-5 Three-Digit Dividends ......................... 390
12-6 Trial Quotients ......................................... 392
12-7 Greater Quotients ....................................... 394
12-8 Four-Digit Dividends ......................... 396
12-9 Zero in the Quotient ..................................... 398
12-10 Greater Dividends .......................... 400
12-11 Problem-Solving Strategy: Use More Than One Step ..................... 402
12-12 Problem-Solving Applications: Mixed Review ........................................... 404

End of Chapter

Check Your Progress (Lessons 1–12) ............... 406
Enrichment: Logic ............................................. 407
Chapter 12 Test .................................................. 408
Cumulative Review ............................................. 409

*Develops concept or skill with manipulatives. Lesson promotes algebraic reasoning.
Chapter 13
Decimals

Chapter Opener ........................................... 411
13-1 Tenths and Hundredths ..................... 412
13-2 Decimals Greater Than One ............... 414
13-3 Decimal Place Value ......................... 416
13-4 Compare Decimals ............................ 418
13-5 Order Decimals ................................. 420
13-6 Round Decimals ............................... 422
13-7 Estimate with Decimals ...................... 424
13-8 Add Decimals .................................. 426
13-9 Subtract Decimals ............................ 428
13-10 Divide with Money ............................ 430
13-11 Problem-Solving Strategy:
   Use More Than One Step ........................ 432
13-12 Problem-Solving Applications:
   Mixed Review ..................................... 434

End of Chapter

Check Your Progress (Lessons 1–12) ............. 436
Enrichment: Magic Squares ....................... 437
Chapter 13 Test ........................................ 438
Cumulative Review ..................................... 439

Chapter 14
Get Ready for Algebra

Chapter Opener ........................................... 441
14-1 Equations ........................................ 442
14-2 Find Missing Numbers ...................... 444
14-3 Functions ...................................... 446
14-4 Graph Equations .............................. 448
14-5 Missing Symbols ............................... 450
14-6 Use Parentheses ............................... 452
14-7 Problem-Solving Strategy:
   More Than One Way ............................. 454
14-8 Problem-Solving Applications:
   Mixed Review ..................................... 456

End of Chapter

End-of-Book Materials
Still More Practice ..................................... 461
Brain Builders .......................................... 473
Mental Math ............................................. 477
Glossary .................................................. 486
Index ..................................................... 491
Symbols and Tables .................................... 500

* Develops concept or skill with manipulatives.
Algebra Lesson promotes algebraic reasoning.
A Review of Mathematical Skills from Grade 3

Progress in Mathematics includes a “handbook” of essential skills, Skills Update, at the beginning of the text. These one-page lessons review skills you learned in previous years. It is important for you to know this content so that you can succeed in math this year.

If you need to review a concept in Skills Update, your teacher can work with you using manipulatives, which will help you understand the concept better.

The Skills Update handbook can be used throughout the year to review skills you may already know. Since many lessons in your textbook refer to pages in the Skills Update, you can use a particular lesson at the beginning of class as a warm-up activity. Or your class may choose to do the Skills Update lessons at the beginning of the year so that you and your teacher can assess your understanding of these previously learned skills.

You may even want to practice specific skills at home. If you need more practice than what is provided on the Skills Update page, you can use the practice pages available online at www.sadlier-oxford.com. These practice pages have an abundance of exercises for each one-page lesson.
**Hundreds**

3 hundreds 2 tens 6 ones

Standard Form: 326  
Word Name: three hundred twenty-six

<table>
<thead>
<tr>
<th>HUNDREDS</th>
<th>TENS</th>
<th>ONES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

1. The digit 6 is in the ones place. It has a value of 6 ones, or 6.  
2. The digit 2 is in the tens place. It has a value of 2 tens, or 20.  
3. The digit 3 is in the hundreds place. It has a value of 3 hundreds, or 300.

Write the number in standard form.

1. 2. HUNDREDS TENS ONES
   60 7

3. 1 hundred 8 tens 3 ones
4. five hundred sixty-two

Write the place of the red digit. Then write its value.

Compare Whole Numbers

> means “is greater than”    < means “is less than”
= means “is equal to”

To compare numbers:
- Align the digits by place value.

- Start at the left. Compare the digits in the greatest place.

- If these digits are the same, compare the next digits.

- Keep comparing digits until you find two digits that are not the same.

So 6459 > 6453. You could also say 6453 < 6459.

Study this example.

\[
\begin{array}{c}
423 \\ 2423
\end{array}
\]

Think: There are no thousands in 423.

\[
\begin{array}{c}
423 \\ 2423
\end{array}
\]

0 < 2
So 423 < 2423 or 2423 > 423.

Compare. Write <, =, or >.

1. 57 = 57  
2. 65 ? 62  
3. 48 ? 56  
4. 82 ? 28  
5. 325 ? 523  
6. 649 ? 841  
7. 127 ? 134  
8. 525 ? 522  
9. 6241 ? 9246  
10. 7983 ? 7983  
11. 9015 ? 9012  
12. 2704 ? 2714  
13. 8619 ? 8617  
14. 1844 ? 1846
Recognize and Count Money

- ten-dollar bill $10.00
- five-dollar bill $5.00
- one-dollar bill $1.00
- half-dollar 50¢ or $.50
- quarter 25¢ or $.25
- dime 10¢ or $.10
- nickel 5¢ or $.05
- penny 1¢ or $.01

To count bills and coins, arrange in order from greatest to least value. Then count on.

$10.00 $5.00 $.25 $.10 $.01

$10.00 → $15.00 → $15.25 → $15.35 → $15.36

Write each amount. Use the dollar sign and decimal point.

1. 

2. 

3. 1 five-dollar bill, 3 quarters, 1 dime, 3 nickels, 2 pennies

4. 4 dollars, 1 quarter, 2 nickels
Addition and Subtraction Facts

Add: $5 + 4 = ?$

- $5 \, △ △ △ △ △$
- $4 \, △ △ △ △ △$

$5 \, \text{addends}$

$4 \, \text{addends}$

$9 \, \text{sum}$

$9 \, \text{sum}$

Subtract: $11 - 5 = ?$

- $11 \, □ □ □ □ □$
- $5 \, □ □ □ □ □$

$11 \, \text{difference}$

$5 \, \text{difference}$

$6 \, \text{difference}$

Remember:
$5 + 4 = 9$ is a number sentence for addition.
$11 - 5 = 6$ is a number sentence for subtraction.

Add or subtract. Watch the signs.

1. $8 + 8$
2. $4 + 9$
3. $16 - 9$
4. $6 + 5$
5. $14¢ - 7¢$
6. $12¢ - 4¢$
7. $7 + 6$
8. $16 - 7$
9. $0 + 7$
10. $13 - 4$
11. $7¢ + 9¢$
12. $14¢ - 6¢$
13. $15 - 8$
14. $9 + 9$
15. $11 - 8$
16. $9 + 6$
17. $18¢ - 9¢$
18. $8¢ + 6¢$
19. $17 - 8$
20. $6 + 6$
21. $15 - 7$
22. $6¢ + 7¢$
23. $3¢ + 8¢$
Related Facts

These four facts are related facts. They all use the same numbers.

\[ 6 + 5 = 11 \quad 11 - 5 = 6 \]
\[ 5 + 6 = 11 \quad 11 - 6 = 5 \]

Study these examples.

\[ 12 = 4 + 8 \quad 3 + 3 = 6 \]
\[ 8 = 12 - 4 \quad 6 - 3 = 3 \]
\[ 4 = 12 - 8 \]

Write the related facts for each pair.

1. 4, 6

2. 2, 7

3. 3, 9

4. 5, 8

5. 4, 5

6. 3, 7

7. 9, 5

8. 2, 5

9. 8, 8

10. 6, 7

Complete each addition or subtraction fact.

11. \[ ? + 7 = 13 \quad 12. \quad ? + 9 = 17 \quad 13. \quad 15 = ? + 8 \]
\[ 7 + ? = 13 \quad 9 + ? = 17 \quad 15 = 8 + ? \]
\[ 13 - 7 = ? \quad 17 - ? = 9 \quad 8 = 15 - ? \]
\[ 13 - ? = 7 \quad 17 - 9 = ? \quad ? = 15 - 8 \]
Add and Subtract without Regrouping

Add: \(2110 + 3022 = \) ?
Align. Add. Start with the ones.

<table>
<thead>
<tr>
<th>Add ones.</th>
<th>Add tens.</th>
<th>Add hundreds.</th>
<th>Add thousands.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2110</td>
<td>2110</td>
<td>2110</td>
<td>2110</td>
</tr>
<tr>
<td>+ 3022</td>
<td>+ 3022</td>
<td>+ 3022</td>
<td>+ 3022</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>132</td>
<td>5132</td>
</tr>
</tbody>
</table>

Subtract: \(5867 - 4536 = \) ?
Align. Subtract. Start with the ones.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5867</td>
<td>5867</td>
<td>5867</td>
<td>5867</td>
</tr>
<tr>
<td>− 4536</td>
<td>− 4536</td>
<td>− 4536</td>
<td>− 4536</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
<td>331</td>
<td>1331</td>
</tr>
</tbody>
</table>

Find the sum.
1. \(42 + 33\)  
2. \(128 + 820\)  
3. \(173 + 13\)  
4. \(8317 + 1222\)  
5. \(8117 + 782\)  
6. \(6416 + 2103\)  
7. \(15 + 22 + 50 + 11\)  
8. \(23 + 11 + 34 + 21\)  
9. \(300 + 240 + 159\)

Find the difference.
10. \(53 - 21\)  
11. \(279 - 151\)  
12. \(8576 - 1423\)  
13. \(878 - 843\)  
14. \(6495 - 3122\)  
15. \(5986 - 5082\)  
16. \(67 - 5\)  
17. \(175 - 25\)  
18. \(438 - 16\)
Meaning of Multiplication

To find how many, you can add 3 groups of 7: \(7 + 7 + 7 = 21\)

Since you are joining equal groups, you can multiply:

\[
\begin{align*}
\text{number of groups} & \times \text{number in each group} = \text{total number} \\
3 & \times 7 = 21 \\
\end{align*}
\]

or

\[
\begin{align*}
7 & \text{ factor} \\
\times 3 & \text{ factor} \\
21 & \text{ product}
\end{align*}
\]

Add: \(2\text{¢} + 2\text{¢} + 2\text{¢} + 2\text{¢} = 8\text{¢}\)

Or multiply: \(4 \times 2\text{¢} = ?\)

\[
\begin{align*}
2\text{¢} & \times 4 = 8\text{¢} \\
4 \times 2\text{¢} & = 8\text{¢}
\end{align*}
\]

Remember: \(3 \times 7 = 21\) is a multiplication sentence.

Write an addition sentence and a multiplication sentence for each.

1. \[
\begin{align*}
\text{3 groups of 7} \\
3 \text{ sevens} \\
3 \times 7
\end{align*}
\]

2. \[
\begin{align*}
\text{4 groups of 2¢} \\
4 \text{ twos} \\
4 \times 2\text{¢}
\end{align*}
\]

3. \[
\begin{align*}
\text{8 Pennies}
\end{align*}
\]
Multiplication Facts

Add:
9 + 9 + 9 + 9 + 9 = 45

Or multiply:
9
×5
45
or
5 × 9 = 45

Find the product.
1. 8 × 2
2. 7 × 4
3. 6 × 3
4. 5 × 5
5. 9 × 3
6. 7 × 2
7. 2 × 5
8. 8 × 3
9. 9 × 2
10. 5 × 4
11. 7 × 3
12. 8 × 5
13. 7 × 7
14. 4 × 6
15. 7 × 8
16. 8 × 9
17. 7 × 6
18. 4 × 9
19. 4 × 6
20. 3 × 4
21. 5 × 6
22. 4 × 4
23. 9 × 5
24. 7 × 9
25. 7 × 4
26. 9 × 3

Problem Solving

Write a multiplication sentence for each.
27. One factor is 4. The product is 24. What is the other factor?
28. There are 9 mugs. On each mug, students paint 7 flowers and 5 trees. How many flowers are painted in all?
29. The factors are 3 and 7. What is the product?
Multiply with 10, 11, and 12

Multiply: $3 \times 11 = ?$

$$
\begin{array}{c}
11 \\
\times 3 \\
\hline
33
\end{array}
$$

or

$3 \times 11 = 33$

3 groups of 11
3 elevens
$3 \times 11$

Multiply.

1. 11
2. 10
3. 12
4. 12
5. 10¢
6. 12¢

$\times 6 \times 5 \times 7 \times 4 \times 9 \times 5$

7. 11
8. 12
9. 12
10. 10
11. 11¢
12. 10¢

$\times 2 \times 3 \times 8 \times 6 \times 8 \times 7$

13. 11
14. 12
15. 10
16. 11
17. 12¢
18. 10¢

$\times 4 \times 2 \times 4 \times 9 \times 6 \times 8$

Find the product.

19. $7 \times 12$
20. $1 \times 12$
21. $1 \times 11¢$
22. $2 \times 10¢$
23. $9 \times 12$
24. $3 \times 10$
25. $7 \times 11¢$
26. $3 \times 11¢$
27. $1 \times 10$
28. $4 \times 10$
29. $8 \times 12¢$
30. $5 \times 11¢$

Problem Solving

31. Ms. Black made 11 paper triangles for each of 7 mobiles. How many paper triangles did Ms. Black make in all?

32. Dawn made 4 vests. On each vest she sewed 10 buttons and 12 stars. How many buttons did she sew?
Understand Division

Pablo packs 10 apples into baskets. He puts 2 apples in each basket. How many baskets does he pack?

To find how many baskets, separate 10 into equal groups of 2. Use repeated subtraction.

Think

How many groups of 2 are in 10? Count back by 2s until you reach 0.
8, 6, 4, 2, 0

You subtracted 5 times.

Pablo packs 5 baskets.

You can also write a division sentence to show how to separate 10 into equal groups of 2.

Write: $10 \div 2 = 5$

division sentence

Read as: “Ten divided by two equals five.”

Find how many groups.

1. 16 in all
   8 in each group

2. 9 in all
   3 in each group

3. 20 in all
   5 in each group

4. 14 in all
   2 in each group

5. 18 in all
   9 in each group

6. 15 in all
   5 in each group

7. 36 in all
   4 in each group

8. 12 in all
   3 in each group

9. 10 in all
   2 in each group
Division Facts

Divide: $35 \div 5 = ?$

Think:
\[
\begin{align*}
? \times 5 &= 35 \\
7 \times 5 &= 35
\end{align*}
\]

So \[35 \div 5 = 7.\]

Remember: $35 \div 5 = 7$ is a division sentence.

Find the quotient: $27\,\text{¢} \div 3 = ?$

Think:
\[
\begin{align*}
3 \times \_\_\_\ &= 27\,\text{¢} \\
3 \times 9\,\text{¢} &= 27\,\text{¢}
\end{align*}
\]

So $27\,\text{¢} \div 3 = 9\,\text{¢}$ or $3\overline{)27\,\text{¢}}$.

Find the quotient.

1. $2\overline{)0}$  
2. $4\overline{)24}$  
3. $5\overline{)40}$  
4. $3\overline{)15}$  
5. $2\overline{)18\,\text{¢}}$  
6. $5\overline{)5\,\text{¢}}$
7. $4\overline{)16}$  
8. $3\overline{)21}$  
9. $2\overline{)16}$  
10. $4\overline{)36}$  
11. $5\overline{)25\,\text{¢}}$  
12. $2\overline{)12\,\text{¢}}$
13. $6\overline{)6}$  
14. $7\overline{)28}$  
15. $6\overline{)54}$  
16. $8\overline{)48}$  
17. $9\overline{)63\,\text{¢}}$  
18. $9\overline{)72\,\text{¢}}$
19. $45 \div 9$  
20. $32 \div 8$  
21. $42 \div 6$  
22. $64 \div 8$  
23. $20 \div 5$
24. $3\,\text{¢} \div 3$  
25. $14\,\text{¢} \div 2$  
26. $28\,\text{¢} \div 4$  
27. $30\,\text{¢} \div 5$
28. $56\,\text{¢} \div 7\,\text{¢}$  
29. $9\,\text{¢} \div 9\,\text{¢}$  
30. $18\,\text{¢} \div 6\,\text{¢}$  
31. $27\,\text{¢} \div 9\,\text{¢}$
Relate Multiplication and Division

- **Multiply** when you join equal groups to find the total number.
  
  \[ 3 \times 6 = 18 \]

  - number of groups
  - number in each group
  - total number

  18 in all
  6 in each group
  3 equal groups

- **Divide** when you want to find:
  - the number of equal groups.
  
  \[ 18 \div 6 = 3 \]

  - total number
  - number in each group
  - number of groups

  18 \div 3 = 6
  - total number
  - number of groups
  - number in each group

- **A fact family** uses the same numbers. Use the facts to help you find related facts.
  
  \[ 4 \times 5 = 20 \]
  \[ 5 \times 4 = 20 \]

  \[ 20 \div 5 = 4 \]
  \[ 20 \div 4 = 5 \]

  These four facts make up a fact family for the numbers 4, 5, and 20.

Copy and complete each fact family.

1. \[ 6 \times 5 = 30 \]
   \[ ? \times 6 = 30 \]
   \[ 30 \div 5 = ? \]
   \[ 30 \div 6 = ? \]

2. \[ 9 \times 7 = 63 \]
   \[ ? \times 9 = 63 \]
   \[ 63 \div 7 = ? \]
   \[ 63 \div 9 = ? \]

3. \[ 4 \times 4 = 16 \]
   \[ 16 \div 4 = ? \]

Write a fact family for each set of numbers.

4. 2, 4, 8
5. 3, 7, 21
6. 4, 3, 12
7. 5, 7, 35
8. 7, 6, 42
9. 9, 1, 9
10. 8, 3, 24
11. 3, 2, 6
12. 8, 7, 56
13. 9, 5, 45
14. 5, 8, 40
15. 6, 6, 36
Identify Fractions

A fraction can name one or more equal parts of a whole or of a set.

- $\frac{1}{4}$ of the circle is shaded.
- $\frac{3}{4}$ of the circle is not shaded.
- $\frac{3}{5}$ of the set of circles is shaded.
- $\frac{2}{5}$ of the set of circles is not shaded.

Write the fraction for the shaded part of each whole or set. Then write the fraction for the part that is not shaded.

1. \[
\begin{array}{c}
\framebox{1/4} \\
\framebox{3/4}
\end{array}
\]
2. \[
\begin{array}{c}
\framebox{1/4} \\
\framebox{3/4}
\end{array}
\]
3. \[
\begin{array}{c}
\framebox{1/5} \\
\framebox{4/5}
\end{array}
\]
4. \[
\begin{array}{c}
\framebox{3/5} \\
\framebox{2/5}
\end{array}
\]

Write a fraction for the red part of each set. Then write a fraction for the yellow part.

9. \[
\begin{array}{c}
\framebox{4/5} \\
\framebox{1/5}
\end{array}
\]
10. \[
\begin{array}{c}
\framebox{3/4} \\
\framebox{1/4}
\end{array}
\]
11. \[
\begin{array}{c}
\framebox{1/3} \\
\framebox{2/3}
\end{array}
\]
12. \[
\begin{array}{c}
\framebox{3/4} \\
\framebox{1/4}
\end{array}
\]
Customary Units of Length

The **inch (in.)** is a customary unit of length.

A quarter is about 1 inch wide. You can use a quarter as a benchmark for 1 inch.

A **benchmark** is an object of known measure that can be used to estimate the measure of other objects.

The **foot (ft)** and the **yard (yd)** are also customary units of length.

12 inches (in.) = 1 foot (ft)
3 feet (ft) = 1 yard (yd)
36 inches (in.) = 1 yard (yd)

A license plate is about 1 foot long. A door is about 1 yard wide.

**Write the letter of the best estimate.**

1. length of a paintbrush
   - a. 9 ft
   - b. 9 yd
   - c. 9 in.

2. length of a bus
   - a. 40 in.
   - b. 40 ft
   - c. 40 yd

3. height of a wall
   - a. 3 in.
   - b. 3 yd
   - c. 3 ft
Cup, Pint, Quart, Gallon

The cup (c), the pint (pt), the quart (qt), and the gallon (gal) are customary units of liquid capacity.

2 cups = 1 pint
2 pints = 1 quart
2 quarts = 1 half gallon
4 quarts = 1 gallon

Write c, pt, qt, or gal for the unit you would use to measure the capacity of each.

1. swimming pool
2. cereal bowl
3. can of soup
4. can of house paint
5. tanker truck
6. small container of frozen yogurt
7. large glass of juice
8. bottle of seltzer
9. family-size jar of mayonnaise
10. car’s tank of gasoline
Pound

The pound (lb) is a customary unit of weight.

Three bananas weigh about 1 pound.

Weight is measured on a balance or a scale.

Does each actual object weigh more than 1 pound, less than 1 pound, or about 1 pound?

1. 2. 3.

4. 5. 6.
Centimeter and Meter

The centimeter (cm) and the meter (m) are metric units of length.

100 centimeters (cm) = 1 meter (m)

A large paper clip is about 1 centimeter wide.  A full-size baseball bat is about 1 meter long.

Write the letter of the best estimate.

1. height of a mug
   a. 2 cm  b. 9 cm  c. 2 m

2. width of a room
   a. 4 m  b. 20 cm  c. 12 m

3. length of a soccer field
   a. 10 m  b. 100 cm  c. 100 m

4. height of a cat
   a. 99 cm  b. 1 m  c. 30 cm

5. length of a bed
   a. 2 m  b. 20 cm  c. 20 m

Write cm or m for the unit you would use to measure each.

6. width of a dollar bill

7. height of a giraffe
Liter

The liter (L) is a metric unit of liquid capacity.

Springwater is sold in bottles that hold 1 L.

Does each actual object hold more than 1 liter, less than 1 liter, or about 1 liter?

1.  2.  3.

4.  5.  6.

7.  8.  9.
Kilogram

The **kilogram (kg)** is a metric unit of mass.

A small bag of flour has a mass of about 1 kilogram.

Mass is measured on a balance.

Does each actual object have a mass of more than 1 kilogram, less than 1 kilogram, or about 1 kilogram?

1.  
2.  
3.  
4.  
5.  
6.  

- A pencil
- A dolphin
- A grasshopper
- Balloons
- A dictionary
- A fire truck
**Perimeter**

Find the perimeter of the figure below.

**Perimeter** is the distance around a figure.

To find the perimeter of a figure, add the lengths of its sides.

\[
\begin{align*}
100 \text{ ft} \\
60 \text{ ft} \\
75 \text{ ft} \\
+ 50 \text{ ft} \\
\hline
285 \text{ ft}
\end{align*}
\]

Find the perimeter of each figure.

1. \[
\begin{align*}
22 \text{ cm} \\
24 \text{ cm} \\
14 \text{ cm}
\end{align*}
\]

2. \[
\begin{align*}
7 \text{ m} \\
8 \text{ m} \\
7 \text{ m} \\
12 \text{ m}
\end{align*}
\]

3. \[
\begin{align*}
60 \text{ yd} \\
50 \text{ yd} \\
60 \text{ yd} \\
50 \text{ yd}
\end{align*}
\]

4. \[
\begin{align*}
42 \text{ ft} \\
30 \text{ ft} \\
15 \text{ ft} \\
23 \text{ ft}
\end{align*}
\]

5. \[
\begin{align*}
4 \text{ m} \\
3 \text{ m} \\
2 \text{ m} \\
4 \text{ m}
\end{align*}
\]

6. \[
\begin{align*}
9 \text{ ft} \\
13 \text{ ft} \\
9 \text{ ft}
\end{align*}
\]

7. A polygon whose sides measure 100 ft, 142 ft, 68 ft, and 127 ft

8. A polygon whose sides measure 92 m, 109 m, and 92 m
**Congruent Figures**

Each of the patterns below was made using congruent figures.

Congruent figures have exactly the same size and the same shape.

To find whether two figures are congruent:

- Carefully trace one figure onto tracing paper.
- Lay the tracing over the other figure.

If the tracing and the figure match, the two figures are congruent.

*Are the figures congruent? Write yes or no.*

You may use tracing paper.

1. 
2. 
3. 
Lines of Symmetry

If you can fold a figure in half so that the two halves exactly match, the figure is symmetrical.

The fold line is a line of symmetry.

4 lines of symmetry

A circle has more lines of symmetry than you can count.

You can also use a reflection to see if the two halves exactly match.

Is each red line a line of symmetry? Write yes or no.

1. 2. 3. 4.

5. 6. 7. 8.
Ordered Pairs on a Grid

Ordered pairs locate points on a grid.

Look at the grid. What figure is at point (4,3)?

To find out:
- Begin at 0.
- The first number tells you to move 4 spaces to the right.
- The second number tells you to move 3 spaces up.

The hexagon is located at point (4,3)

Locate the rectangle. Name the ordered pair for that point.

The rectangle is located at point (5,1)

Use the grid for exercises 1–24.
Write the letter for each ordered pair.

1. (2,3)  2. (3,4)  3. (6,4)
4. (0,6)  5. (4,2)  6. (1,4)
7. (1,1)  8. (5,3)  9. (3,5)
10. (0,0) 11. (4,1) 12. (5,5)
13. (6,0) 14. (0,3) 15. (4,6)

Write the ordered pair for each letter.

22. O  23. X  24. Q
Area

Area is the number of square units needed to cover a flat surface.

You can find the area of some figures by counting squares.

- **9 square units**
- **24 square units**
- **17 square units**

Sometimes you need to count half squares to find the area of a figure.

- **6 whole squares + 4 half squares**
- **6 + 2 = 8**
- **8 square units**

Think:

4 half squares = 2 whole squares

Find the area of each figure.

1. 
2. 
3. 
4. 
5. 
6.
Record and Organize Data

The tally chart at the right shows how many birds of different kinds came to a bird feeder one day.

Which kind of bird visited the feeder most often? least often?

Organizing information in a table from least to greatest or greatest to least makes it easier to find and compare data.

House sparrows visited the feeder most often. Nuthatches visited least often.

The table and tally chart below show the number of farm animals Alex and Rachel saw on a trip.

Complete the table and tally chart.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>?</td>
</tr>
<tr>
<td>Pigs</td>
<td>11</td>
</tr>
<tr>
<td>Goats</td>
<td>?</td>
</tr>
<tr>
<td>Horses</td>
<td>?</td>
</tr>
<tr>
<td>Sheep</td>
<td>26</td>
</tr>
<tr>
<td>Chickens</td>
<td>?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animal</th>
<th>Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>HHH</td>
</tr>
<tr>
<td>Pigs</td>
<td>HHH</td>
</tr>
<tr>
<td>Goats</td>
<td>HHH</td>
</tr>
<tr>
<td>Horses</td>
<td>HHH</td>
</tr>
<tr>
<td>Sheep</td>
<td>HHH</td>
</tr>
<tr>
<td>Chickens</td>
<td>HHH</td>
</tr>
</tbody>
</table>
Graphing Sense

**Video Sales in May**

<table>
<thead>
<tr>
<th></th>
<th>Cartoon</th>
<th>Comedy</th>
<th>Drama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartoon</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
<tr>
<td>Comedy</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
<tr>
<td>Drama</td>
<td>[]</td>
<td>[]</td>
<td>[]</td>
</tr>
</tbody>
</table>

Key: Each ■ = 100 videos.
Each □ = 50 videos.

A **pictograph** uses pictures or symbols to represent data. The **Key** tells how many each symbol stands for.

**TV Viewing Per Week**

<table>
<thead>
<tr>
<th>Student</th>
<th>Bob</th>
<th>Maya</th>
<th>Jill</th>
<th>Leo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Hours</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

A **bar graph** uses bars to represent data. The **scale** tells how much or how many each bar stands for.

**Vic’s TV Sales**

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sets</td>
<td>75</td>
<td>50</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

A **line graph** uses points and lines on a grid to show change over a period of time. A line graph also has a scale.

**TV Favorites of Ms. Lee’s Class**

- **Cartoons**: 6
- **Comedies**: 14
- **Nature**: 8
- **Movies**: 10

A **circle graph** uses sections of a circle to compare the parts of a whole.

**Choose the graph you would use in each case. Explain why.**

1. **Compare at a glance the number of books each of your friends reads in a month.**
2. **Show how the temperature changed during the course of a week.**
3. **See how the number of classmates who like the beach compares to the total number of classmates.**
Probability Experiments

Karim flips a quarter 10 times. Because the quarter has two sides, Karim predicts that it will land heads up half the time and tails up half the time. This is 5 times each.

As he flips the quarter, Karim tallies the results.

<table>
<thead>
<tr>
<th>Heads</th>
<th>Tails</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

Sometimes experiments do not come out as you predict they will. This often happens when you do the experiment a small number of times.

Try these experiments. You may work with a partner.

1. Suppose you flip a coin 10 times. Predict how many times it will land heads up and how many times it will land tails up. Flip it 10 times and tally the results. How close is the result to your prediction?

Now predict how many times the coin will land heads up and tails up if you flip it 20 times. Flip the coin and tally the results. Compare your tally with a classmate’s. Describe how your tallies are alike and how they are different.

2. Put 2 red cubes and 1 yellow cube into a paper bag. If you pick a cube without looking, what color do you think the cube you pick will be? Was your prediction correct?

Suppose you pick 6 times without looking and put the cube back into the bag after each pick. Predict how many times you would pick a red cube and how many times you would pick a yellow cube. Try the experiment. How close are the results to your predictions?
Dear Student,

Problem solvers are super sleuths. We invite you to become a super sleuth by using these four steps when solving problems.

1. **Read**
2. **Plan**
3. **Solve**
4. **Check**

Sleuths use clues to find a solution to a problem. When working together to solve a problem, you may choose to use one or more of these strategies as clues:

**Strategy File**

**Use These Strategies**
- Combine Strategies
- Make a Table or List
- Interpret the Remainder
- Write a Number Sentence
- Write an Equation
- More Than One Solution

**Strategy File**

**Use These Strategies**
- Use a Diagram/Graph
- Work Backward
- Logical Reasoning
- Use More Than One Step

**Strategy File**

**Use These Strategies**
- Choose the Operation
- Find a Pattern
- Use a Drawing or Model
- Guess and Test
- More Than One Way
- Use Simpler Numbers
**Read**

*Create a mental picture.*
*List the facts and the questions.*

As you read a problem, create a picture in your mind. Make believe you are there in the problem. This will help you think about:
- what facts you will need;
- what the problem is asking;
- how you will solve the problem.

After reading the problem, it might be helpful to sketch the picture you imagined so that you can refer to it.

Name or list all the facts given in the problem. Be aware of *extra* information not needed. Look for *hidden* information. Name the question or questions the problem asks.

**Plan**

*Choose and outline a plan.*

Plan how to solve the problem by:
- looking at the picture you drew;
- thinking about how you solved similar problems;
- choosing a strategy or strategies for solving the problem.

**Solve**

*Work the plan.*

Work with the listed facts and the strategy to find the solution. Sometimes a problem will require you to add, subtract, multiply, or divide. Multistep problems require more than one choice of operation or strategy. It is good to *estimate* the answer before you compute.

**Check**

*Test that the solution is reasonable.*

Ask yourself:
- “Have you answered the question?”
- “Is the answer reasonable?”

Check the answer by comparing it to the estimate. If the answer is not reasonable, check your computation.
Strategy: Choose the Operation

<table>
<thead>
<tr>
<th>Number Sentence</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ + □ = □</td>
<td>Join like groups or quantities.</td>
</tr>
<tr>
<td>□ − □ = □</td>
<td>Separate, or take away, from a group.</td>
</tr>
<tr>
<td>□ − □ = □</td>
<td>Compare two groups or quantities.</td>
</tr>
<tr>
<td>□ − □ = □</td>
<td>Find part of a group.</td>
</tr>
<tr>
<td>□ × □ = □</td>
<td>Find how many more are needed.</td>
</tr>
<tr>
<td>□ ÷ □ = □</td>
<td>Join only equal groups or quantities.</td>
</tr>
<tr>
<td>□ ÷ □ = □</td>
<td>Separate into equal groups.</td>
</tr>
<tr>
<td>□ ÷ □ = □</td>
<td>Share a group equally.</td>
</tr>
</tbody>
</table>

Meg collects comic books. She puts 7 comic books into each envelope. How many envelopes does she need for 42 comic books?

**Read**
Visualize yourself in the problem as you reread it. Focus on the facts and questions.

**Facts:**
- 7 comic books in each envelope
- 42 comic books

**Question:** How many envelopes does she need?

**Plan**
You are separating into equal groups.
Divide: $42 \div 7 = ?$

**Think**
$? \times 7 = 42$

**Solve**
$42 \div 7 = 6$
Meg needs 6 envelopes.

**Check**
Multiply to check division:
$6 \times 7 = 42$
**Strategy: Guess and Test**

Pat’s bank holds dimes and quarters. There are 4 more dimes than quarters in the bank. The value of all the coins is $2.85. How many quarters are in Pat’s bank?

**Read**

Visualize yourself in the problem as you reread it. Focus on the facts and questions.

**Facts:**
- Bank holds dimes and quarters
- 4 more dimes than quarters
- $2.85 in quarters and dimes

**Question:** How many quarters are in Pat’s bank?

**Plan**

First **guess** a number of quarters. 5 quarters

Add 4 to find the number of dimes. 9 dimes

Then **test** to find whether the value of the coins equals $2.85.

Make a table to record your guesses.

<table>
<thead>
<tr>
<th>Gueses</th>
<th>Quarter Value</th>
<th>Dime Value</th>
<th>Total Value</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>5 quarters = $1.25</td>
<td>9 dimes = $.90</td>
<td>$1.25 + $.90 = $2.15</td>
<td>too low</td>
</tr>
<tr>
<td>2nd</td>
<td>6 quarters = $1.50</td>
<td>10 dimes = $1.00</td>
<td>$1.50 + $1.00 = $2.50</td>
<td>too low</td>
</tr>
<tr>
<td>3rd</td>
<td>7 quarters = $1.75</td>
<td>11 dimes = $1.10</td>
<td>$1.75 + $1.10 = $2.85</td>
<td>correct</td>
</tr>
</tbody>
</table>

The third guess is correct because:

- 11 dimes is 4 coins more than 7 quarters.
- 7 quarters ($1.75) and 11 dimes ($1.10) equal $2.85.
Strategy: Use More Than One Step

Tina, Maya, and Olga need to collect 200 aluminum cans to win a recycling contest. Tina has collected 57 cans, Maya has collected 76 cans, and Olga has collected 64 cans. How many more cans do the girls still need to collect?

**Read**

Visualize yourself in the problem as you reread it. Focus on the facts and questions.

**Facts:**
- 200 cans needed.
- Tina collected 57 cans.
- Maya collected 76 cans.
- Olga collected 64 cans.

**Question:** How many more cans are still needed?

**Plan**

First find the number of cans collected. Add.

\[
\begin{align*}
57 & \quad + \quad 76 & \quad + \quad 64 & \quad = \quad ? \\
\text{Tina's} & \quad \text{cans} & \quad \text{Maya's} & \quad \text{cans} & \quad \text{Olga's} & \quad \text{cans} & \quad \text{number} & \quad \text{collected}
\end{align*}
\]

Then find the number of cans the girls still need to collect. Subtract the sum from 200.

\[
\begin{align*}
200 & \quad - \quad ? & \quad = \quad ? \\
\text{in} & \quad \text{number} & \quad \text{number} & \quad \text{number} & \quad \text{all} & \quad \text{collected} & \quad \text{still needed}
\end{align*}
\]

**Solve**

\[
57 + 76 + 64 = 197
\]

The girls collected 197 cans.

\[
200 - 197 = 3
\]

The girls need to collect 3 more cans.

**Check**

Use addition to check your answer.

\[
\begin{align*}
197 & \quad + \quad 3 & \quad = \quad 200 \\
\text{cans} & \quad \text{collected} & \quad \text{cans} & \quad \text{cans} & \quad \text{still needed} & \quad \text{in all}
\end{align*}
\]
Strategy: Write a Number Sentence

A nursery donates 36 trees to a city. The city plants 4 trees in each of its parks. At most, how many parks could there be?

Read

Visualize yourself in the problem as you reread it. Focus on the facts and questions.

Facts: 36 trees donated
       4 trees in each park

Question: How many parks could there be?

Plan

Because the 36 trees are being separated into equal groups of 4 trees each, write a number sentence for division.

\[ 36 \div 4 = \text{?} \]

Think

Number \div Number = Number in all \text{ in each} \text{ of groups} \text{ group}

Solve

Divide to find the quotient.

\[
\begin{array}{c|c}
4 & 36 \\
-36 & \hline \\
0 & \\
\end{array}
\]

Think

How many 4s are in 36? 9

There could be 9 parks.

Check

Multiply the quotient by the divisor.

\[ \frac{9}{4} \times 4 = 36 \]

The answer checks!
Applications: Mixed Review

Choose a strategy from the list or use another strategy you know to solve each problem.

1. Olivia works at a zoo gift shop. She sold 6 small, 8 medium, and 4 large T-shirts. How many T-shirts did she sell?

2. Olivia sold 16 posters. Penguins were pictured on 7 of the posters. Pandas were on the rest. How many panda posters did Olivia sell?

3. Stu packed 6 ceramic animals into each small box. How many boxes does he need for 54 ceramic animals?

4. Ryan sent 22 animal buttons to three cousins. Sue received twice as many buttons as Mike and 3 more than Jill. How many buttons did each receive?

5. Lin wants to use 7 animal beads for each of 9 necklaces he is making for the zoo gift shop. How many animal beads will he need?

Use the table for problem 6.

6. Max pays the sale price for 3 key chains, 1 toucan shirt, and 2 fish cards. How much money did he save?

Use These Strategies
Choose the Operation
Guess and Test
Write a Number Sentence
Use More Than One Step

Strategy File

Sale at the Zoo Shop

<table>
<thead>
<tr>
<th>Item</th>
<th>Regular Price</th>
<th>Sale Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polar Bear Key Chain</td>
<td>$3</td>
<td>$2</td>
</tr>
<tr>
<td>Toucan Shirt</td>
<td>$12</td>
<td>$10</td>
</tr>
<tr>
<td>Fish Cards</td>
<td>$8</td>
<td>$4</td>
</tr>
</tbody>
</table>
In this chapter you will:
Explore one million
Compare, order, and round whole numbers and money
Locate numbers on a number line
Make change
Read and write numbers through the one billions place
Solve problems by making a table or list

Critical Thinking/Finding Together
There are 10 hundreds in 1000. How many hundred miles are in a twenty-six-thousand mile trip?

Willis C. Sick
There once was a young man on a ship
Who counted each pitch and each dip,
Each roll and each yaw,
Each sea and each saw
On a twenty-six-thousand mile trip.

John Ciardi
A place-value chart makes understanding large numbers easier.

In 206,493 the value of:
- 2 is 2 hundred thousands or 200,000.
- 0 is 0 ten thousands or 0.
- 6 is 6 thousands or 6000.
- 4 is 4 hundreds or 400.
- 9 is 9 tens or 90.
- 3 is 3 ones or 3.

In numbers larger than 9999, use a comma to separate the periods.

Standard Form: 206,493

Word Name: two hundred six thousand, four hundred ninety-three

Write the place of the red digit. Then write its value.

1. 6,541
2. 7,843
3. 3,962
4. 5,034

5. 27,142
6. 46,359
7. 65,186
8. 92,170

9. 156,143
10. 983,567
11. 495,638
12. 374,826

13. 632,018
14. 275,941
15. 321,235
16. 176,404

17. 205,866
18. 652,048
19. 520,124
20. 804,397
Write the number in standard form.
21. nine hundred four  
22. twelve thousand
23. six hundred thousand  
24. eight thousand
25. five hundred twenty-one thousand, one hundred twelve  
26. sixty-four thousand, seven hundred thirty-five
27. two hundred forty thousand, three hundred ninety-two
28. ninety thousand, four hundred eight
29. one hundred fifteen thousand, five hundred sixty
30. three hundred thousand, two
31. four hundred one thousand, eighteen
32. fifty-four thousand, sixty-eight

Write the word name for each number.
33. 762  
34. 431  
35. 605  
36. 911
37. 4,918  
38. 1,265  
39. 7,016  
40. 3,402
41. 25,461  
42. 51,824  
43. 90,160  
44. 80,007
45. 169,818  
46. 748,295  
47. 300,040  
48. 809,006

CRITICAL THINKING
49. What are the least and the greatest four-digit numbers you can make using all the digits in each set only once?
   a. 1, 2, 3, 4  
   b. 0, 3, 2, 1  
   c. 1, 0, 0, 2
Chapter 138

What Is One Million?

The numbers from 1 to 999 are in the ones period. The numbers from 1000 to 999,999 are in the thousands period. Today you will discover the next counting number.

**Materials:** paper, pencil

Compute the rest of exercise 1. Record each number sentence and the answer.

1. \(10 \times 1 = 10\)
   \(10 \times 10 = 100\)
   \(10 \times 100 = 1000\)
   \(10 \times 1000 = ?\)
   \(10 \times 10,000 = ?\)
   \(10 \times 100,000 = ?\)

2. What patterns do you notice?

   The number that is \(10 \times 100,000\) is **one million**, or 1,000,000.
   One million is the next counting number after 999,999.

3. How is 1,000,000 like 1000; 10,000; and 100,000? How is it different?

   \(1,000,000 = 10\) hundred thousands
   \(1,000,000 = 100\) ten thousands

4. How many thousands is one million equal to? how many hundreds?
Suppose you counted one number per second. You would take about

- 2 minutes to count to 100.
- 16 1/2 minutes to count to 1000.
- 2 hours and 42 minutes to count to 10,000.
- 1 day to count to 100,000.
- 11 1/2 days to count to 1,000,000!

You may make a table to find the answers to questions 5–7. Explain your answers.

5. If you were 100 days old, would you be older or younger than 1 year old?

6. About how many years old would you be if you were 1000 days old? 10,000 days old? (Hint: 1 year = 365 days)

7. About how many years old would you be if you were 100,000 days old? 1,000,000 days old?

8. How did you discover how old you would be if you were 100 days old?

9. How did you discover how old you would be if you were 1000; 10,000; 100,000; and 1,000,000 days old?

10. If you were to continue the pattern from exercise 1 on page 38, what would the next three entries be?

11. Rewrite the last entry from exercise 10. Which zero do you think is in the millions place? Underline it.
Recently, the population of Brazil was 184,101,109.

In the millions period of 184,101,109, the value of:
- 1 is 1 hundred million, or 100,000,000.
- 8 is 8 ten millions, or 80,000,000.
- 4 is 4 millions, or 4,000,000.

**Standard Form:** 184,101,109

**Word Name:** one hundred eighty-four million,
one hundred one thousand,
one hundred nine

### Practice

**Write the period of the underlined digits.**

1. 45,678  
2. 59,650  
3. 26,545  
4. 456,789  
5. 567,890  
6. 148,337  
7. 9,456,789  
8. 567,890,000  
9. 617,148,337

**Write in standard form.**

10. thirty-one million  
11. three million  
12. six hundred million  
13. eighty million  
14. one hundred twenty million  
15. fifty-two million
Write the place of the red digit. Then write its value.

16. 482,165,016  
17. 904,628,153  
18. 617,465,089  
19. 38,296,145  
20. 10,692,534  
21. 4,797,123  
22. 412,076,531  
23. 217,945,310  
24. 842,005,301  
25. 920,354,876  
26. 105,643,129  
27. 732,530,481  
28. 334,091,685  
29. 2,444,656  
30. 778,322

Write the word name for each number.

31. 5,460,000  
32. 920,015,300  
33. 10,300,000  
34. 475,000  
35. 1,006,005  
36. 20,000,012  
37. 7,002,502  
38. 408,000,201  
39. 87,005

Write About It

Brazil is the largest country in South America.

40. The land area of Brazil is three million, two hundred eighty-six thousand, four hundred seventy square miles. How would you write this number in standard form?

41. In Brazil there are two million, one hundred thirty-five thousand, six hundred thirty-seven square miles of forest. Write this number in standard form.

42. The Brazilian city of Rio de Janeiro has an estimated population of 5,974,100. Write this number in words.
Understanding the place of each digit in a number can help you write the number in expanded form.

<table>
<thead>
<tr>
<th>Standard Form</th>
<th>Expanded Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>100 + 70 + 8</td>
</tr>
<tr>
<td>25,613</td>
<td>20,000 + 5,000 + 600 + 10 + 3</td>
</tr>
<tr>
<td>4,381,256</td>
<td>4,000,000 + 300,000 + 80,000 + 1000 + 200 + 50 + 6</td>
</tr>
<tr>
<td>60,070,005</td>
<td>60,000,000 + 70,000 + 5</td>
</tr>
<tr>
<td>800,500,020</td>
<td>800,000,000 + 500,000 + 20</td>
</tr>
</tbody>
</table>

Understanding the place of each digit in a number can help you count on and count back by 10, 100, or 1000.

<table>
<thead>
<tr>
<th>Count on by 10.</th>
<th>Count on by 100.</th>
<th>Count back by 1000.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25,613</td>
<td>25,623</td>
<td>25,613</td>
</tr>
<tr>
<td>25,623</td>
<td>25,633</td>
<td>25,623</td>
</tr>
<tr>
<td>25,633</td>
<td>25,643</td>
<td>25,633</td>
</tr>
<tr>
<td>25,643</td>
<td></td>
<td>25,643</td>
</tr>
</tbody>
</table>

Write each number in expanded form.

1. 65
2. 38
3. 246
4. 975
5. 352
6. 810
7. 6143
8. 7924
9. 5491
10. 4035
11. 13,827
12. 62,473
13. 90,303
14. 184,001
15. 705,060
16. 350,900
17. 6,320,079
18. 19,430,600
19. 75,260,080
20. 507,104,908
21. 800,002,100
22. 300,400,050
Write each number in standard form.

23. \[2000 + 400 + 90 + 6\]  
24. \[7000 + 100 + 80\]

25. \[30000 + 5000 + 800 + 20 + 9\]

26. \[800000 + 90000 + 4000 + 600 + 50 + 2\]

27. \[7000000 + 300000 + 50000 + 2000 + 90 + 4\]

28. \[2000000 + 70000 + 5000 + 8\]

29. \[700000000 + 300000 + 4000 + 90 + 4\]

Write the numbers that are 10 more, 100 more, and 1000 more. Then write the numbers that are 10 less, 100 less, and 1000 less.

30. 7825  
31. 92,614  
32. 365,829  
33. 482,565  
34. 7,342,675  
35. 32,489,267  
36. 107,361,072

Test Preparation

37. Which of these is the number 6,090,200?  
A six million, nine thousand, two hundred  
B six million, ninety thousand, two hundred  
C six hundred-ninety thousand, two hundred  
D six million, ninety-two thousand

38. Which of these is four million, fifty-eight thousand, twenty-one?  
F 4,580,021  
G 4,005,821  
H 4,058,021  
J 458,021

39. Which shows the expanded form of 805,034?  
A \[800,000 + 5000 + 30 + 4\]  
B \[800,000 + 50,000 + 30 + 4\]  
C \[8,000,000 + 5000 + 30 + 4\]  
D \[800,000 + 5000 + 300 + 4\]
Sometimes it is inconvenient, difficult, or even impossible to report the exact number of items in a group or set.

When you cannot report an exact number, you can use an estimate. An estimate can be a rounded number that tells about how much or about how many.

Here are some examples of estimates:

- So far, 1,000,000 different species of insects have been discovered.
- One hundred years ago the worldwide population of tigers was 100,000. Today the number of tigers is 7000.
- The age of the oldest bird on record, a cockatoo, was 80 years. It was fully grown when captured in 1902 and died in the London Zoo in 1982.

Discuss these questions with your group:

1. For each example, why is each number reported as an estimate, or rounded number, rather than an exact number?

2. How are all the estimated numbers alike? How are they different?

3. Read the examples again. Do you think estimating is the same as guessing? Why or why not?
Work with your group to estimate the number of fish in the picture below. *Do not try to count all the fish.* You may use a ruler, tracing paper, or any other tools you think might help you.

4. What is your estimate of the number of fish in the picture?

5. How did you make your estimate?

6. Compare your method of estimation with your classmates’. What do you notice?
## Compare and Order Whole Numbers

Order the numbers from greatest to least.

To order numbers, you first need to compare them.

Align the digits by place value. Begin by comparing the digits in the greatest place.

### Compare

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4,603,034</td>
<td>4,603,034</td>
<td>4,613,198</td>
</tr>
<tr>
<td>4,522,260</td>
<td>4,613,198</td>
<td>4,603,034</td>
</tr>
<tr>
<td>4,523,346</td>
<td>4,522,260</td>
<td>4,522,260</td>
</tr>
<tr>
<td>4,613,198</td>
<td>4,523,346</td>
<td>4,523,346</td>
</tr>
</tbody>
</table>

4,000,000 = 600,000 > 500,000 10,000 > 0 20,000 = 20,000

**Compare thousands. Rearrange.**

<table>
<thead>
<tr>
<th>4,613,198</th>
<th>4,603,034</th>
<th>4,522,260</th>
<th>4,523,346</th>
</tr>
</thead>
</table>

The order from greatest to least: 4,613,198; 4,603,034; 4,523,346; 4,522,260

The order from least to greatest: 4,522,260; 4,523,346; 4,603,034; 4,613,198

3000 > 2000

### Practice

Compare. Write <, =, or >.

1. 3705 ? 992
   - **Think**
   - **No thousands.**
2. 584,783 ? 584,378
3. 98,050 ? 98,305
4. 1,063,582 ? 1,062,975
5. 36,758 ? 36,721
Write in order from least to greatest.

6. 671; 680; 707; 679; 702
7. 426; 505; 431; 424
8. 4515; 3204; 7661; 1139; 4500
9. 843; 839; 87; 841; 836
10. 6714; 6783; 6756; 679; 6744
11. 24,316; 34,316; 24,416; 34,416; 24,404
12. 57,554; 558,641; 5784; 557,590; 579
13. 8,940,505; 840,505; 8,945,405; 894,505

Write in order from greatest to least.

14. 343; 349; 434; 352
15. 295; 32; 289; 27; 281
16. 526; 642; 589; 538; 658
17. 6028; 628; 686; 6204; 862
18. 8451; 8468; 8450; 8464; 8445
19. 3605; 3679; 369; 3610; 3600
20. 46,824; 46,785; 46,804; 46,815; 46,790
21. 944,747; 9547; 995,754; 959; 94,763
22. 766,094; 7,766,094; 7,766,049; 776,094

Write a number that can replace the unknown number.

23. 578 < ? < 596
24. 6593 > ? > 6589
25. 71,321 > ? > 71,318
26. 165,279 > ? > 165,267
27. 8,098,516 < ? < 8,098,520
28. 32,984,021 < ? < 32,984,028
Number Sense: Use a Number Line

Halfway points can help you to find numbers on a number line.

About where on each number line is 75?

- 75 is exactly halfway between 70 and 80.
- 50 is the halfway point. 75 is exactly halfway between 50 and 100.

About where on each number line is 142?

- 145 is the halfway point. 142 is between 140 and 145. 142 is closer to 140.
- 150 is the halfway point. 142 is between 100 and 150. 142 is much closer to 150.

Write the number that is halfway between the two numbers.

1. 20; 30  2. 0; 50  3. 600; 700  4. 0; 200
5. 0; 500  6. 0; 80  7. 10; 70  8. 150; 200

Draw a number line to show the halfway point between the two numbers.

9. 0; 10  10. 40; 50  11. 0; 60  12. 800; 900
13. 0; 1000  14. 510; 520  15. 1000; 2000  16. 0; 2000
About what number is each arrow pointing toward?

17. 18.

19. 20.

21. 22.

23. 24.


Draw each number line.

27. Draw a number line from 50 to 60. Show the halfway point. Draw an arrow that points toward 53.

28. Draw a number line from 0 to 100. Show the halfway point. Draw an arrow that points toward 40.

29. Draw a number line from 0 to 500. Draw an arrow that points toward 300.

30. Draw a number line from 2000 to 4000. Show the halfway point. Draw an arrow that points toward 3750.

31. About what number is the arrow pointing toward?

A 2250  B 2550  C 2625  D 225

32. About what number is the arrow pointing toward?

F 53  G 55  H 57  J 59
Imagine that you are working in a music store. A customer wants to buy a CD that costs $13.88 and gives you a twenty-dollar bill. What coins and bills would you give the customer as change? What would be the value of the change?

To make change:

• Count up from the cost to the amount given.
• Start with the coins that have the least value.
• Use the fewest possible coins and bills.

<table>
<thead>
<tr>
<th>cost</th>
<th>amount given</th>
</tr>
</thead>
<tbody>
<tr>
<td>$13.88</td>
<td>$20.00</td>
</tr>
<tr>
<td>$13.89</td>
<td></td>
</tr>
<tr>
<td>$13.90</td>
<td></td>
</tr>
<tr>
<td>$14.00</td>
<td></td>
</tr>
<tr>
<td>$15.00</td>
<td></td>
</tr>
</tbody>
</table>

Arrange the money in order.
Count the change: 
$5.00 + $1.00 + $0.10 + $0.01 + $0.01

You would give the customer 2 pennies, 1 dime, 1 one-dollar bill, and 1 five-dollar bill as change. The value of the change is $6.12.

Use money. Write the fewest coins and bills you would give as change. Then write the value of the change.

1. Cost: $0.81
   Amount given: $1.00
2. Cost: $2.54
   Amount given: $3.00
Use money. Write the fewest coins and bills you would receive as change. Then write the value of the change.

3. 
Amount given: $10.00

4. 
Amount given: $20.00

5. Cost: $3.16
   Amount given: $5.00

6. Cost: $4.22
   Amount given: $10.00

7. Cost: $12.99
   Amount given: $15.00

8. Cost: $13.08
   Amount given: $14.00

9. Cost: $13.70
   Amount given: $20.00

10. Cost: $14.10
    Amount given: $20.00

11. Cost: $15.46
    Amount given: $20.00

12. Cost: $19.55
    Amount given: $20.00

13. Cost: $10.60
    Amount given: $20.00

14. Cost: $2.67
    Amount given: $20.00

---

**CHALLENGE**

Use nickels, dimes, and quarters. List all the ways you can make each amount.

<table>
<thead>
<tr>
<th></th>
<th>.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>nickels</td>
<td>dimes</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

15. $0.15
16. $0.30
17. $0.25
18. $0.35
19. $0.50
20. $0.40
21. $0.60
22. $0.75
Chuck earned $25.35.
Evan earned $24.50.
Who earned more?

To find who earned more, compare $25.35 and $24.50.

Convert the amounts to whole numbers by ignoring the pennies:
- $25.35 becomes $25.00
- $24.50 becomes $24.50

Compare the whole numbers:
- $25.00 > $24.50

So $25.35 > $24.50. Chuck earned more.

Order $7.49, $7.43, and $6.43 from least to greatest.

Convert the amounts to whole numbers by ignoring the pennies and dimes:
- $7.49 becomes $7.00
- $7.43 becomes $7.00
- $6.43 becomes $6.00

Order the amounts by comparing the dollars:
- $6.00 < $7.00

The order from least to greatest: $6.43, $7.43, $7.49

The order from greatest to least: $7.49, $7.43, $6.43
Compare. Write <, =, or >.

1. $0.07 \ ? \ $0.09
2. $0.76 \ ? \ $0.73
3. $0.52 \ ? \ $0.52
4. $3.49 \ ? \ $4.69
5. $8.03 \ ? \ $8.50
6. $2.81 \ ? \ $2.80
7. $5.38 \ ? \ $5.36
8. $9.75 \ ? \ $9.75
9. $7.63 \ ? \ $7.66
10. $10.30 \ ? \ $10.70
11. $42.25 \ ? \ $25.42
12. $87.95 \ ? \ $87.75
13. $36.99 \ ? \ $36.98
14. $77.07 \ ? \ $77.70
15. $61.18 \ ? \ $61.18
16. $1.95 \ ? \ $0.19
17. $2.67 \ ? \ $26.07
18. $74.50 \ ? \ $7.85

Write in order from least to greatest.

19. $0.76, $0.35, $0.57, $0.83
20. $0.18, $0.15, $0.19, $0.12, $0.17
21. $4.65, $4.62, $4.26, $5.24, $5.42
22. $75.39, $78.36, $7.48, $74.48, $75.93

Write in order from greatest to least.

23. $1.11, $1.10, $1.01, $1.17, $1.71
24. $24.42, $24.48, $24.24, $2.48, $2.84
25. $9.91, $9.19, $91.19, $91.91, $99.11
26. $68.50, $65.80, $68.05, $6.85, $65.08

Problem Solving

27. Jill saved $32.40. Ed saved $34.20. Lynn saved $34.40. Who saved the most money? Who saved the least money?

28. Adam has saved $85.25. Can he buy a jacket that costs $58.82? Explain.
1-10 Rounding

Round 26,322 to the nearest ten thousand.
To round a number to a given place, look at the digit to its right.
If the digit is less than 5, round down.
If the digit is 5 or more, round up.

Study the following examples.

Round $752.98 to the nearest hundred dollars.
$752.98
$800.00 5 = 5
Round up to $800.00.

Round 23,754,961 to the nearest million.
23,754,961
24,000,000 7 > 5
Round up to 24,000,000.

Round each number to its greatest place.
1. 85,990 2. $94.20 3. 549,218 4. $651.99

Round each number to the place of the underlined digit.
5. 56,843 6. $429.28 7. 825,053 8. $10.56
9. 742 10. 36,987,301 11. 12,634,087 12. 221,034
13. $6.42 14. 3198 15. $54.04 16. 10,286
Round each number to the place of the underlined digit.

22. 1250  23. 7314  24. 2693  25. $1.44  26. $6.70
27. $3.95  28. $7.56  29. $8.39  30. $55.20  31. $38.98
32. $27.49  33. $18.88  34. $71.53  35. 9437  36. 1878
37. 8564  38. 2946  39. 74,806  40. 32,521  41. 60,719
42. 45,133  43. $53.68  44. $15.89  45. $94.87  46. $27.95
47. $836.42  48. $351.25  49. $708.50  50. $484.62
51. 36,455  52. 52,630  53. $654.70  54. $895.99
55. 743,299  56. 250,343  57. 571,320
58. 1,462,135  59. 325,523,607  60. 62,704,810
61. $31,797.60  62. 104,279,851  63. $97,874.69

Problem Solving

64. Springfield Elementary School has seven thousand, three hundred forty-one students. An article in the school newspaper rounded this number to the nearest thousand. What number appeared in the article?

65. Over the past 20 years, 28,514 fifth-grade students have graduated from Springfield Elementary School and moved on to sixth grade at Springfield Middle School. To the nearest ten thousand, how many students have graduated from Springfield Elementary School?
Work with Money

Use the skills and strategies you have learned to solve each problem.

1. Dan buys school supplies for $8.47. He gives the cashier a twenty-dollar bill. The cashier makes change with the fewest possible coins and bills. What coins and bills does Dan receive as change?

2. A sweater is on sale for $18.89. Elena says the sweater costs about $18.00. Rita says it costs about $19.00. Who do you think is right? Why?

3. Juwon receives a total of $75.00 for his birthday. He wants to buy a pair of sneakers that costs $79.95, including tax. Will his birthday money be enough to pay for the sneakers?

4. Neither Mei nor Jaycie has pennies, but they both have $0.45. Mei has 3 coins. Jaycie has 6 coins. Which coins does each girl have?

5. The cost of Ms. Johnson’s purchases at the drugstore is $7.82. She gives the clerk a ten-dollar bill and 2 pennies. Since the ten-dollar bill is more than enough to pay for Ms. Johnson’s purchases, why might she give the clerk the extra 2 pennies?

6. Would you rather have 5 quarters, 15 dimes, or a one-dollar bill? Why?

7. The table at the right shows how many pennies different classes in Glenn School have collected for charity. Which class collected the fewest pennies? Which class collected the most? How much money did each class collect?

<table>
<thead>
<tr>
<th>Class</th>
<th>Number of Pennies</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td>1430</td>
</tr>
<tr>
<td>4B</td>
<td>1432</td>
</tr>
<tr>
<td>4C</td>
<td>1342</td>
</tr>
<tr>
<td>3A</td>
<td>1324</td>
</tr>
<tr>
<td>3B</td>
<td>1483</td>
</tr>
<tr>
<td>3C</td>
<td>1384</td>
</tr>
</tbody>
</table>
Solve each problem. Then explain how you found each answer.

8. Trucker Bob’s check at the diner comes to $8.55. He pays with a ten-dollar bill. The cashier has run out of quarters. How can she give Bob change using the fewest possible coins and bills?

9. Dominique has saved $15.00 for a birthday present for her mother. She spends $12.76 for earrings and a pin. Does she have enough money left over to buy a gift bag that costs $2.98?

10. Is $6.53 closer to $6.00 or closer to $7.00? How do you know?

11. Mr. Mackintosh hires students to pick apples in his orchard. The more apples a student picks, the more money he or she earns. Jessie earns $125.75. Zach earns $127.25. Tommy earns $125.27. Sara earns $127.17. Which student earns the most? the least? Does Jessie pick more or fewer apples than Sara?

12. Manny has 9 coins that have a value of $0.88. What coins does Manny have?

13. Alonzo buys a dog collar and a leash at a pet supply store. The dog collar and leash cost $11.56. Alonzo pays with a twenty-dollar bill. If he receives the fewest possible coins and bills as his change, what coins and bills does he receive? What is the value of his change?

14. Tom has 1 quarter, 6 dimes, 3 nickels, and 4 pennies. Rick has 2 quarters, 3 dimes, 2 nickels, and 7 pennies. Harry has 1 half dollar, 1 quarter, and 5 nickels. Whose coins have the greatest value? What is the value of these coins?
Problem-Solving Strategy:  
Make a Table or List

Steve has 24 marbles.  
Each marble is green or red.  
For every green marble, Steve has 3 red marbles. How many red marbles does Steve have?

### Read
Visualize the facts of the problem as you reread it.

**Facts:** Steve has 24 marbles.  
For 1 green marble, there are 3 red marbles.

**Question:** How many red marbles does Steve have?

### Plan
Make a table.  
If Steve has 1 green marble, he would have 3 red marbles.  
Write those numbers in the table.

If Steve has 2 green marbles, he would have $2 \times 3$ red marbles.

### Solve
Complete the table.  
Multiply each number of green marbles by 3.  
Then add to find a column that shows 24 marbles.

<table>
<thead>
<tr>
<th>Color</th>
<th>Number of Marbles</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>1 2 ? ? ?</td>
</tr>
<tr>
<td>red</td>
<td>3 ? ? ?</td>
</tr>
<tr>
<td>total</td>
<td>4 ? ? ?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color</th>
<th>Number of Marbles</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>red</td>
<td>3 6 9 12 15 18</td>
</tr>
<tr>
<td>total</td>
<td>4 8 12 16 20 24</td>
</tr>
</tbody>
</table>

18 red
18 red

Steve has 18 red marbles.

### Check
Check your computation, or act out the problem.
Make a table or list to solve each problem.

1. Mr. Hoody bought 3 shirts and 4 ties. The shirts are blue, gray, and white. The ties are red, brown, green, and yellow. How many ways can he wear the shirts and ties together?

   **Facts:**
   - 3 shirts: blue, gray, white
   - 4 ties: red, brown, green, yellow

   **Question:** How many ways can the shirts and ties be worn?

   **Plan**
   - Make an organized list.
   - List each shirt color.
   - Write the ties that can be worn with each shirt.
   - Count the total number of combinations.

2. Apple juice costs 50¢. The juice machine accepts quarters, dimes, and nickels. Make a list of coin combinations that can be used to buy juice.

3. Adam and Ashlee use three 1–6 number cubes. They look for different ways to roll the sum of 12. How many ways will they find?

4. Calvin has 90 stamps. For every Mexican stamp, Calvin has 8 U.S. stamps. How many Mexican stamps does Calvin have?

5. Write a problem that uses a table or list. Ask a classmate to solve the problem.
Solve each problem and explain the method you used.

1. The school book fair wanted to raise $1500. It raised $2500. What is the difference in the amounts?

2. Abigail bought a garden book for $17.89. How much change did she receive from a twenty-dollar bill? What coins and bills could she have received as change?

3. Max sold a science fiction novel that describes life one hundred thousand years from now. What will the date be one hundred thousand years from today?

4. Paperbacks sold for 50¢ each. Hardcover books sold for $1.25 each. Was it more expensive to buy 3 paperbacks or 1 hardcover book?

5. Ray sold handmade bookmarks for 75¢ each. What five coins could be used to pay for 1 bookmark?

6. One book at the sale was printed 100 years ago. In what year was that book printed?

7. The book fair sold 437 books this year. Last year it sold 327 books. In which year were more books sold? how many more?

8. Zena brought 10 dollars to the book fair. She bought 2 books about mountain climbing for $4.20 each. How much change did she get?
Choose a strategy from the list or use another strategy to solve each problem.

9. There were 428 people at the book fair. Three hundred eighteen of them bought books. How many people did not buy a book?

10. Stella made a triangular book display. She put 9 books in the first row, 8 books in the second row, 7 books in the third row, and so on. How many books did Stella use in her display?

11. Hank wrote 14 poems. Julio wrote 5 more poems than Hank. How many poems did Julio write?

12. Ray’s bookmarks were made of red or blue plastic with purple, white, or yellow fringe. How many different bookmarks could Ray make?

13. Sue reads adventure books. There are 11 books on her desk. She has read 7 books. How many books does Sue have left to read?

14. The book fair charged 30¢ admission. How many different ways could people give the exact amount if no pennies were allowed?

Write About It

15. In your Math Journal, write the name of the strategy you think is the most fun to use. Explain why you think it is fun. Then write the numbers of the problems you solved by using that strategy.
Check Your Progress
Lessons 1–13

Write the number in standard form and expanded form.  

(See pp. 36–43.)

1. eight million, forty-three thousand, twelve

2. six hundred thousand, five

Write the place of the red digit. Then write its value.

3. 56,651,020

4. 205,640,311

5. 67,451

Compare. Write <, =, or >.

(See pp. 46–47, 52–53.)

6. $77.45 ? $74.75

7. 1450 ? 1450

8. 161,905 ? 161,950

Write in order from greatest to least.

9. $25.10; $52.10; $51.20

10. 6215; 5217; 5451; 5332

11. 31,542; 31,320; 41,310; 51,403

12. 446,532; 446,503; 446,330

About what number is each arrow pointing toward?  

(See pp. 48–49.)

13.

14.

Round each number.  

(See pp. 54–55.)

To the nearest 100,000:

15. 448,631

16. 682,472

To the nearest 1,000,000:

17. 7,653,447

18. 2,153,462

To the nearest 10 dollars:

19. $12.75

20. $57.45

Write the change you would receive.  

Then write the value of the change.  

(See pp. 50–51, 56–57.)

21. Cost: $10.72

Amount given: $20.00

22. Cost: $.93

Amount given: $5.00

(See Still More Practice, p. 461.)
Billions

Standard Form: 2,821,700,000

Expanded Form: 2,000,000,000 + 800,000,000 + 20,000,000 + 1,000,000 + 700,000

Word Name: two billion,
eight hundred twenty-one million,
seven hundred thousand

Write in standard form.

1. one billion, three hundred fifty million, four hundred twenty-nine thousand, sixty-five
2. eight billion, one hundred thirty-one million, six hundred seventy-six thousand, four hundred fifteen
3. four billion, nine hundred three million, seven hundred twelve thousand, five hundred eight
4. 5,000,000,000 + 70,000,000 + 3,000,000 + 500,000 + 8,000
5. 1,000,000,000 + 300,000,000 + 40,000,000 + 30,000 + 900 + 2

Write the word name for each number.

6. 3,480,207,455
7. 8,016,525,719
8. 7,190,402,000
Chapter 1 Test

Write in standard form.
1. five hundred eight
2. two hundred four thousand
3. fourteen million, fifteen
4. 700 thousands + 60 tens + 8 ones

Write in expanded form.
5. 420,635,010
6. 56,431
7. 7,532,060

Write in order from least to greatest.
8. $56.20; $50.62; $52.60
9. 72,310; 72,130; 73,303

About what number is each arrow pointing toward?
10.
11.

Round each number.
To the nearest ten dollars: 12. $24.31
To the nearest 100,000: 13. 732,916
To the nearest 1,000,000: 14. 6,854,197

Problem Solving

Use a strategy you have learned.
15. Jared has 49 fish. For every carp, Jared has 6 guppies. How many guppies does Jared have?

Tell About It

Explain how you find your answer.
16. Estimate the number of students in your school.

Performance Assessment

17. Robert buys a sandwich and milk. With tax the total is $2.84. He pays with a ten-dollar bill. What bills and coins could he receive in change? What would be the value of the change?
### Test Preparation

**Choose the best answer.**

1. In 576,239 which digit is in the ten thousands place?
   - a. 5  
   - b. 7  
   - c. 6  
   - d. 3  

2. What is the period of the underlined digits?
   - 87,952,310  
     - a. thousands  
     - b. millions  
     - c. ones  
     - d. not given

3. Which shows the expanded form of 12,082?
   - a. 12 + 82  
   - b. 1000 + 200 + 80 + 2  
   - c. 12,000 + 80 + 2  
   - d. 10,000 + 2000 + 80 + 2

   - 282,794 ? 282,749  
     - a. <  
     - b. =  
     - c. >

5. Which number is halfway between the numbers?
   - 1500; 2000  
     - a. 1800  
     - b. 1750  
     - c. 1700  
     - d. 1600

6. Which is ordered greatest to least?
   - a. $79.29, $79.92, $79.79  
   - b. $79.79, $79.92, $79.29  
   - c. $79.29, $79.79, $79.92  
   - d. none of these

7. Which shows $37.49 rounded to the nearest dollar?
   - a. $37.00  
   - b. $40.00  
   - c. $38.00  
   - d. $30.00

8. How much change will you receive?
   - Cost: $2.18  
   - Amount given: $10.00  
     - a. $6.82  
     - b. $7.82  
     - c. $7.92  
     - d. $8.82

9. About what number is the arrow pointing toward?
   - 210  
   - 290  
     - a. 250  
     - b. 235  
     - c. 225  
     - d. 215

10. Compare. Choose <, =, or >.
    - $31.18 ? $31.81  
      - a. <  
      - b. =  
      - c. >

11. In 342,961,070 what is the place of the 4?
    - a. millions  
    - b. ten millions  
    - c. hundred millions  
    - d. not given

12. Which is ordered least to greatest?
    - a. 618,561; 618,561; 618,516  
    - b. 618,516; 618,561; 618,561  
    - c. 618,516; 618,561; 618,651  
    - d. none of these
13. Choose the fewest coins and bills you would receive as change.
Cost: $9.34
Amount given: $20.00

   a. 1 penny, 1 nickel, 1 dime, 2 quarters, 1 ten-dollar bill
   b. 6 pennies, 6 dimes, 1 ten-dollar bill
   c. 1 penny, 1 nickel, 1 dime, 1 half-dollar, 1 ten-dollar bill
   d. not given

14. Which shows 618,383 rounded to the nearest ten thousand?
   a. 500,000  b. 600,000  c. 620,000  d. 618,000

15. Which is ordered greatest to least?
   a. 84,873; 848,732; 8487  
   b. 848,732; 848,732; 8487  
   c. 8487; 848,732; 8487,32  
   d. none of these

16. Max has 5 T-shirts: red, blue, green, purple, and yellow. He has 3 pairs of shorts: black, tan, and white. How many ways can Max wear the T-shirts and shorts together?
   a. 15  b. 12  c. 10  d. 8

17. Meg buys art supplies for $13.83. She pays with a twenty-dollar bill. Which shows the fewest coins and bills she can receive as change?
   a. 7 pennies, 1 dime, 1 one-dollar bill, 1 five-dollar bill
   b. 2 pennies, 1 nickel, 1 dime, 1 one-dollar bill, 1 five-dollar bill
   c. 2 pennies, 3 nickels, 1 one-dollar bill, 1 five-dollar bill
   d. not given

18. In 29,706 what is the value of the 9?
   a. 9  b. 90  c. 900  d. 9000

19. Choose the standard form of the number.
   \[100,000 + 1000 + 800 + 50 + 3\]
   a. 101,853  b. 110,853  c. 1,101,853  d. 111,853

20. Toni has 24 flowers in a bouquet. Each flower is a daffodil or a tulip. For every daffodil, Toni has 5 tulips. How many tulips does Toni have?
   a. 24  b. 15  c. 20  d. 30

**Tell About It**

Explain how you solved the problem. Show all your work.

21. Cesar has $11.00 to buy the following items for a project: 1 sea sponge, for $2.97; 1 battery, for $3.39; 1 roll of wire, for $2.98; and 1 bottle of vinegar, for $2.14.

If Cesar rounds the cost of each item to the nearest dollar and adds them together, will he know whether he has enough money for his purchases? Why or why not?
In this chapter you will:

- Use addition properties and strategies
- Learn about subtraction concepts
- Estimate sums and differences
- Check addition and subtraction
- Add and subtract whole numbers and money
- Learn about expressions with variables
- Solve problems using logical reasoning

Critical Thinking/Finding Together

Suppose you are the person in the poem. When your brother is 28 years old, how old will you be?

MATH MAKES ME FEEL SAFE

Math isn’t just adding and subtracting. Not for me.

Math makes me feel safe knowing that my brother will always be three years younger than I am, and every day of the year will have twenty-four hours. That a snowflake landing on my mitten will have exactly six points, and that I can make new shapes from my Tangram pieces whenever I feel lonely.

Math isn’t just adding and subtracting. Not for me.

Math makes me feel safe.

Betsy Franco
Addition Properties

The properties of addition can help you to add quickly and correctly.

**Commutative Property of Addition**
- Changing the order of addends does not change the sum.

\[
\begin{align*}
5 + 6 &= 11 \quad 6 + 5 &= 11 \\
9 + 2 &= 11 \\
&= 11
\end{align*}
\]

\[\text{Think} \quad \text{“order”}\]

**Identity Property of Addition**
- The sum of zero and a number is the same as that number.

\[
\begin{align*}
7 + 0 &= 7 \quad 0 + 7 &= 7 \\
7 + 0 &= 7 \quad 0 + 7 &= 7
\end{align*}
\]

\[\text{Think} \quad \text{“same number”}\]

**Associative Property of Addition**
- Changing the grouping of the addends does not change the sum.

\[
(4 + 5) + 2 = 4 + (5 + 2)
\]

\[
9 + 2 = 4 + 7
\]

\[= 11 = 11\]

\[\text{Think} \quad \text{“grouping”}\]

Always do the computation in parentheses first.

Use the properties to make adding easier.

<table>
<thead>
<tr>
<th>Change the order.</th>
<th>Add down.</th>
<th>Add up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change the order and the grouping.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 ( (3 + 7) + 2 + 0 + 5 = 17 )</th>
<th>10 ( 0 + 2 + 0 + 5 = 17 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>
Add. Name the addition property you used.

1. \[3 + 0 = 3\] 2. \[6 + 3 = 9\] 3. \[3 + 6 = 9\] 4. \[8 + 7 = 15\] 5. \[7 + 8 = 15\] 6. \[8 + 0 = 8\] 7. \[0 + 5 = 5\] 8. \[7 + 3 = 10\] 9. \[2 + 6 = 8\] 10. \[5 + 4 = 9\] 11. \[1 + 0 = 1\] 12. \[2 + 9 = 11\] 13. \[1 + 3 = 4\] 14. \[3 + 8 = 11\]

Add the number in the center to each number around it.

15. \[0 + 6 = 6\] 16. \[(6 + 4) + 2 + 5 = 17\] 17. \[9 + 3 + (4 + 4) = 16\]

CRITICAL THINKING

Use the scoreboard to answer the questions.

<table>
<thead>
<tr>
<th>Inning</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluebirds</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Robins</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

21. Who won the game?  
22. What was the final score?  
23. After which inning was the score 11 to 9?  
24. After which inning was there a tie score?  
25. What was the score after 2 innings? 6 innings? 8 innings?  
26. How many runs did the Bluebirds and Robins score in the 5th inning?
Addition Strategies

Tyrone and Maria use doubles to find $6 + 7$.

Tyrone thinks: $6 + 6 = 12$
$6 + 7 = 13$

Maria thinks: $7 + 7 = 14$
$6 + 7 = 13$

1 more than $6 + 6$
1 less than $7 + 7$

James uses 10 to find $9 + 4$.

James thinks: $10 + 4 = 14$
1 less than $10 + 4$
So, $9 + 4 = 13$.

Tania looks for sums of 10 and doubles when she adds more than two numbers.

Find the sum. Use addition strategies.

1. $3 + 4$
2. $5 + 6$
3. $8 + 7$
4. $6 + 7$
5. $5 + 4$
6. $8 + 8$
7. $9 + 5$
8. $7 + 9$
9. $4 + 9$
10. $9 + 9$
11. $3 + 9$
12. $9 + 2$
13. $3 + 2$
14. $4 + 4$
15. $8 + 9$
16. $9 + 6$
Add mentally. Use addition strategies.

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<td>17</td>
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<td>3</td>
<td></td>
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<td>2</td>
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<td></td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>+9</td>
<td>+8</td>
<td></td>
<td>+8</td>
<td></td>
<td>+4</td>
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<td>+2</td>
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<td>+3</td>
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</tbody>
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</thead>
<tbody>
<tr>
<td>29</td>
<td>10 + 5</td>
<td>30</td>
<td>9 + 5</td>
</tr>
<tr>
<td>33</td>
<td>8 + 10</td>
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<td>8 + 9</td>
</tr>
<tr>
<td>37</td>
<td>3 + 10</td>
<td>38</td>
<td>3 + 4</td>
</tr>
</tbody>
</table>

**Problem Solving**

41. Tara has 6 letters and 5 postcards to mail. Then she loses 3 of the postcards. How many stamps does Tara need?

42. Kim has 4 Canadian stamps, 5 English stamps, and 6 French stamps in his collection. How many stamps does he have altogether?

**Challenge**

Find the first sum. Predict the second sum and explain your reasoning.

<p>| | | | | | | |</p>
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</thead>
<tbody>
<tr>
<td>43</td>
<td>42 + 42</td>
<td>44</td>
<td>16 + 16</td>
<td>45</td>
<td>35 + 35</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>42 + 41</td>
<td></td>
<td>17 + 16</td>
<td></td>
<td>45 + 35</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>50 + 50</td>
<td>48</td>
<td>20 + 20</td>
<td>49</td>
<td>26 + 26</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>50 + 65</td>
<td></td>
<td>20 + 25</td>
<td></td>
<td>27 + 27</td>
<td></td>
</tr>
</tbody>
</table>
Subtraction has four different meanings.

► **Take Away**

Mr. Wu displayed 12 Planet Search videogames. He sold 9 of the games. How many Planet Search games does he have left?

\[12 - 9 = 3\]

He has 3 Planet Search games left.

► **Compare**

Jenny had 4 dolls. Inez had 8 dolls. How many more dolls did Inez have than Jenny?

\[8 - 4 = 4\]

Inez had 4 more dolls.

► **Part of a Whole Set**

Lisa packed 15 cartons of model trucks. She shipped 8 of the cartons to Ohio. How many cartons were not shipped to Ohio?

\[15 - 8 = 7\]

Seven cartons were not shipped to Ohio.

► **How Many More Are Needed**

Manny had 6 bull’s-eyes in a board game. He needed 10 bull’s-eyes to win. How many more bull’s-eyes did Manny need?

\[10 - 6 = 4\]

Manny needed 4 more bull’s-eyes.
Problem Solving

1. Bobby had 10 action figures. He gave 2 of them away. How many action figures does Bobby have left?

2. Mr. Wu put 5 puppets on a shelf that can hold 14 puppets. How many more puppets can fit on the shelf?

3. Cara had 12 dolls. Three of them were from Russia. How many were from other countries?

4. Mr. Wu sold 8 soft bears and 14 soft rabbits. How many more rabbits did he sell?

Rules for Subtraction

Use these rules to help you subtract quickly and correctly.

- When zero is subtracted from a number, the difference is that same number.

\[
\begin{align*}
4 - 0 &= 4 \\
0 - 0 &= 0 \\
9 - 9 &= 0
\end{align*}
\]

- When a number is subtracted from itself, the difference is zero.

Subtract.

5. \[7 - 0 = 7\]  
6. \[5 - 5 = 0\]  
7. \[9 - 0 = 9\]  
8. \[6 - 6 = 0\]  
9. \[4 - 4 = 0\]  
10. \[1 - 1 = 0\]  

11. \[13\text{¢} - 6\text{¢} = 7\text{¢}\]  
12. \[8\text{¢} - 5\text{¢} = 3\text{¢}\]  
13. \[3\text{¢} - 3\text{¢} = 0\text{¢}\]  
14. \[9\text{¢} - 9\text{¢} = 0\text{¢}\]  
15. \[10\text{¢} - 5\text{¢} = 5\text{¢}\]  
16. \[12\text{¢} - 3\text{¢} = 9\text{¢}\]

Write Your Own

17. Use 15 and 8 and use 13 and 5. Make up two different kinds of subtraction problems for your friends to solve.
A mathematical expression is a name for a number. It does not have an equals sign. It may involve addition or subtraction.

\[
10 + 14 \quad 12 + 12 \text{ addition expressions}
\]

\[
30 - 6 \quad 28 - 4 \text{ subtraction expressions}
\]

You can write an expression based on information in a problem.

Mel has 7 bananas. He eats 3 of them.

What expression shows how many bananas Mel has left?

\[
\text{total number of bananas} - \text{number of bananas Mel eats}
\]

\[
\frac{7}{3}
\]

So, 7 - 3 shows how many bananas Mel has left.

You can use a letter, or a variable, to stand for an unknown number in an expression.

Sara has 11 apples. She uses some to bake a pie.

What expression shows how many apples Sara has left?

\[
\text{total number of apples} - \text{unknown number of apples used}
\]

\[
\frac{11}{a}
\]

So, 11 - a shows how many apples Sara has left.

You can find the value of an expression with a variable.

• Substitute a number for the variable:
  \[11 + n, \text{ when } n = 8\]

• Compute:
  \[11 + 8\]

Value of the expression: \[19\]
Choose your own variable to answer each.

1. Alex makes several catches in the first inning of the ball game. He makes two more catches in the last inning. What expression shows how many catches Alex makes in all?

2. Liz correctly answers 93 questions on the quiz. She also correctly answers some extra credit questions. What expression shows how many questions Liz correctly answers altogether?

3. There are 15 booths at the fair. Some of them sell food. What expression shows how many booths at the fair do not sell food?

4. Ann gets some letters in the mail on Monday. She gets 4 more letters on Tuesday. What expression shows how many letters Ann gets in all?

5. Jan swims for several minutes each day. For 8 minutes she does the sidestroke. What expression shows how many minutes Jan does not do the sidestroke?

6. At the zoo, some penguins are in the water. Twelve other penguins are on the rocks. What expression shows how many penguins altogether are at the zoo?

7. Beth has 2 pages of math homework. She also writes some pages for science class. What expression shows how many pages Beth writes in all?

8. Pam’s scrapbook has 42 pages. Some of the pages are still blank. What expression shows how many pages in Pam’s scrapbook are not blank?

Find the value of each expression.

9. $x + 5$, when $x = 14$

10. $y + 7$, when $y = 15$

11. $15 - c$, when $c = 9$

12. $24 - r$, when $r = 8$

13. $n + 6$, when $n = 11$

14. $s - 9$, when $s = 18$
Addition and Subtraction Sentences

Meg has 5 out of 12 books in a series. How many books will complete her set?

To find how many books, write an addition sentence. Use a variable for the missing addend:

$$5 + n = 12$$

To find a missing addend in an addition sentence, think of a related subtraction fact.

$$12 - 5 = 7$$

To find a missing minuend or subtrahend in a subtraction sentence, think of a related addition or subtraction fact.

Find the missing minuend:

$$n - 3 = 8$$
$$8 + 3 = 11$$
$$n = 11$$

So, $$11 - 3 = 8$$.

Find the missing subtrahend:

$$15 - n = 9$$
$$15 - 9 = 6$$
$$n = 6$$

So, $$15 - 6 = 9$$.
Write the related fact to find the value of the variable.

1. \( h + 7 = 10 \) 2. \( y - 8 = 4 \) 3. \( 14 - a = 9 \)
4. \( 8 + s = 9 \) 5. \( 16 - u = 5 \) 6. \( t - 4 = 11 \)

Find the missing addend, minuend, or subtrahend.

7. \( 13 - f = 6 \) 8. \( 8 = 5 + p \)
9. \( c + 4 = 10 \) 10. \( b - 7 = 4 \) 11. \( d + 5 = 13 \)
12. \( r - 8 = 5 \) 13. \( 3 = t - 8 \) 14. \( 8 + y = 15 \)
15. \( 1 = f - 9 \) 16. \( 18 - c = 9 \) 17. \( p - 3 = 9 \)
18. \( 2 = 9 - x \) 19. \( b + 3 = 6 \) 20. \( 7 = n - 6 \)
21. \( 4 + r = 12 \) 22. \( m - 6 = 4 \) 23. \( a + 2 = 6 \)
24. \( 7 = c + 5 \) 25. \( 13 - v = 5 \) 26. \( 8 + s = 16 \)

Remember: You can write \( 5 + p = 8 \) as \( 8 = 5 + p \).

Write an addition or subtraction sentence using a variable. Then find the value of the variable.

27. Nadia is a dog walker. Each week she walks 18 dogs. She walks 10 dogs on the weekend. How many dogs does she walk on weekdays?
28. Mel is a cat sitter. This week he fed 3 fewer cats than last week. This week he fed 9 cats. How many cats did he feed last week?

TEST PREPARATION

29. Find the value of the variable.
\( 8 + n = 17 \)

A 10   B 6   C 8   D 9

30. Find the value of the variable.
\( p + 9 = 18 \)

F 11   G 9   H 10   J 8

Chapter 2 77
Mental Math

Here are some methods to help you add and subtract mentally.

► Think of tens or hundreds.

Add: \(120 + 30 = n\)

Think: \(120 = 12 \text{ tens}\)

\[
\begin{array}{c}
12 \text{ tens} \\
+ 3 \text{ tens} \\
15 \text{ tens} = 150
\end{array}
\]

Subtract: \(6500 - 400 = x\)

Think: \(6500 = 65 \text{ hundreds}\)

\[
\begin{array}{c}
65 \text{ hundreds} \\
- 4 \text{ hundreds} \\
61 \text{ hundreds} = 6100
\end{array}
\]

► Look for numbers that are close to a ten or a hundred, and use compensation.

\[
\begin{array}{c}
29 + 1 \to 30 \\
+ 33 - 1 \to 32 \\
62
\end{array}
\]

Add 1 to 29 to make 30. Subtract 1 from 33 to compensate.

► Break apart numbers to find tens and hundreds.

\[
\begin{array}{c}
38 + 14 = a \\
(30 + 8) + (10 + 4) \\
(30 + 10) + (8 + 4) \\
40 + 12 = 52
\end{array}
\]

Think: Use the associative property of addition.

\[
\begin{array}{c}
8 + 4 = 10 + 2
\end{array}
\]

Study these examples.

\[
\begin{array}{c}
197 + 3 \to 200 \\
+ 118 - 3 \to 115 \\
315
\end{array}
\]

Think: \((100 + 44) + (50 + 6)\)

\[
\begin{array}{c}
150 + 50 = 200
\end{array}
\]

Think: \((100 + 50) + (44 + 6)\)

\[
\begin{array}{c}
144 + 56 = n
\end{array}
\]
Add or subtract mentally. Think of tens or hundreds.

1. $40 + 50$  
2. $60 - 10$  
3. $80 - 80$  
4. $50 + 70$

5. $690 - 80$  
6. $250 + 20$  
7. $160 + 30$  
8. $5700 - 200$

Add mentally. Use compensation.

9. $98 + 62$  
10. $47 + 19$  
11. $89 + 31$  
12. $38 + 23$  
13. $76 + 57$  
14. $59 + 34$

15. $196 + 78$  
16. $288 + 99$  
17. $293 + 18$  
18. $395 + 277$  
19. $349 + 194$  
20. $597 + 224$

Add mentally. Break apart numbers.

21. $64 + 27$  
22. $53 + 24$  
23. $48 + 36$  
24. $72 + 25$  
25. $87 + 11$  
26. $39 + 42$

27. $155 + 74$  
28. $136 + 83$  
29. $249 + 51$  
30. $343 + 75$  
31. $411 + 88$  
32. $527 + 71$

Add mentally.

33. $50 + 50$  
34. $76 + 60$  
35. $20 + 80$  
36. $70 + 62$  
37. $20 + 28$  
38. $10 + 90$

39. $6789$  
40. $62.43$  
41. $25.20$  
42. $35,032$  
43. $41,863$

44. $213,609$  
45. $332.09$  
46. $547,028$  
47. $680.34$

DO YOU REMEMBER?

Round each number to the place of the underlined digit.

39. $6789$  
40. $62.43$  
41. $25.20$  
42. $35,032$  
43. $41,863$

44. $213,609$  
45. $332.09$  
46. $547,028$  
47. $680.34$
Estimate Sums and Differences

Rounding is one way to estimate sums and differences.

- Round each number to the greatest place of the least number.
- Add or subtract the rounded numbers.

Estimate: \(4360 + 654 + 1207\)

Add or subtract the rounded numbers.

Round to hundreds.

- \(4360 \rightarrow 4400\)
- \(654 \rightarrow 700\)
- \(+ 1207 \rightarrow + 1200\)
  about \(6300\)

Estimate: \(186,491 - 44,786\)

Subtract the rounded numbers.

Round to ten thousands.

- \(186,491 \rightarrow 190,000\)
- \(- 44,786 \rightarrow - 40,000\)
  about \(150,000\)

Study these examples.

Round to dollars.

- \$56.39 \rightarrow \$56.00\n- \(- 4.25 \rightarrow - 4.00\)
  about \$52.00

Round to hundred thousands.

- \(208,124 \rightarrow 200,000\)
- \(+ 632,575 \rightarrow + 600,000\)
  about \(800,000\)

Estimate each sum by rounding.

1. \$0.25 + 0.14
   about \$0.40

2. 53 + 76

3. 632 + 149

4. \$5.25 + 2.30

5. \$37.47 + 42.58

6. 1432 + 4290 + 3671

7. 7859 + 523 + 1324

8. \$17.89 + 4.56 + 10.32

9. 22,165 + 56,972 + 4,065

10. 426,031 + 109,764 + 362,801

11. 314,402 + 23,067

12. 534 + 2414 + 876

13. 642,118 + 153,062
Estimate each difference by rounding.

14. \( 54 - 23 \)
15. \( \$ .38 - .16 \)
16. \( 932 - 629 \)
17. \( 8.57 - 5.08 \)
18. \( 42.34 - 15.75 \)
19. \( 6152 - 2830 \)
20. \( 4819 - 592 \)
21. \( 43,038 - 3,671 \)
22. \( 241,701 - 45,089 \)
23. \( \$29.13 - 6.58 \)

Use Estimation to Check
Use estimation to check addition or subtraction to see if your answer is reasonable. Use rounding.

<table>
<thead>
<tr>
<th>Estimated Sum</th>
<th>Estimated Difference</th>
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<tbody>
<tr>
<td>3516</td>
<td>3500</td>
</tr>
<tr>
<td>+ 430</td>
<td>+ 400</td>
</tr>
<tr>
<td>3946</td>
<td>3900</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>67,148</td>
<td>70,000</td>
</tr>
<tr>
<td>- 45,031</td>
<td>- 50,000</td>
</tr>
<tr>
<td>22,117</td>
<td>20,000</td>
</tr>
</tbody>
</table>

3946 is close to 3900. The answer is reasonable. 22,117 is close to 20,000. The answer is reasonable.

Is the answer reasonable? Estimate to check. Use rounding. Then write yes or no.

24. \( 34 + 15 = 49 \)
25. \( 61 + 30 = 201 \)
26. \( 56 - 22 = 34 \)

27. \( 43 - 21 = 22 \)
28. \( 121 + 405 = 426 \)
29. \( \$2.61 + \$3.28 = \$5.89 \)

30. \( 3021 + 56,078 = 59,099 \)
31. \( \$49.95 - \$36.20 = \$13.75 \)

32. \( 75,379 - 15,267 = 60,112 \)
33. \( 31,714 + 215 = 33,129 \)

34. \( 546,397 - 42,064 = 504,333 \)
35. \( 784,412 + 13,561 = 797,973 \)

36. \( \$21.46 + \$3.98 + \$32.54 = \$87.98 \)
Chapter 282

Add and Subtract Money

Suppose you bought a racquet for $54.59 and a pair of tennis shoes for $42.40. How much money would you spend in all? How much more would you pay for the racquet than the shoes?

Round to estimate the sum: $50.00 + $40.00 = $90.00

To find how much in all, add: $54.59 + $42.40 = n

$54.59
+ 42.40
$96.99

You would spend $96.99 in all.

Adding and subtracting money is like adding and subtracting whole numbers. Just write the $ and . in the answer.

Round to estimate the difference: $50.00 − $40.00 = $10.00

To find how much more, subtract: $54.59 − $42.40 = x

$54.59
− 42.40
$12.19

You would pay $12.19 more for the racquet.

$96.99 is close to $90.00. The answer is reasonable.

$12.19 is close to $10.00. The answer is reasonable.

Study these examples.

$304.98 + 632.01 = $936.99
$32.50 + 6.27 = $38.77
$9.98 − .41 = $9.57
$7.24 + .05 = $7.29
$.65 − .62 = $.03

This 0 must be written.
Use rounding to estimate. Then add.

1. $.18
   + .20

2. $.24
   + .34

3. $.50
   + .38

4. $.51
   + .25

5. $7.23
   + 2.55

6. $4.21
   + 1.75

7. $2.22
   + 6.37

8. $17.26
   + 12.73

9. $50.62
   + 24.15

10. $71.40
    + 26.48

11. $324.16
    + 613.41

12. $711.90
    + 130.06

13. $244.87
    + 35.12

14. $516.45
    + 73.23

15. $471.05 + $315.62
16. $523.43 + $56.45

Use rounding to estimate. Then subtract.

17. $.84
   − .62

18. $.66
   − .44

19. $.39
   − .19

20. $8.95
    − 4.51

21. $7.55
    − 2.10

22. $4.67
    − 2.64

23. $3.95
    − 1.85

24. $78.89
    − 74.13

25. $56.39
    − 15.25

26. $678.54
    − 435.32

27. $783.66
    − 572.55

28. $445.78
    − 33.65

29. $976.85
    − 56.44

30. $885.64 − $763.51
31. $594.57 − $63.32

Problem Solving

32. Lauren had $15.95. She bought a pedometer for $4.75. How much money did she have left?

33. Ana bought a bike helmet for $32.25 and elbow pads for $15.60. How much did she spend in all?
Check Addition and Subtraction

To check addition with more than two addends, add up.

\[
\begin{align*}
1899 \\
1427 &+ 352 \\
&+ 120 \\
\hline 
1899 &
\end{align*}
\]

The answer checks.

To check addition with two addends, subtract one addend from the sum. The answer is the other addend.

\[
\begin{align*}
$2.36 &+ 3.02 \\
\hline 
$5.38 &
\end{align*}
\]

\[
\begin{align*}
\frac{5.38}{+ 3.02} &- 2.36 \\
\hline 
&
\end{align*}
\]

The answer checks.

To check subtraction, add the difference and the subtrahend. The answer is the minuend.

\[
\begin{align*}
$8.37 &- 2.12 \\
\hline 
$6.25 &+ 2.12 \\
\hline 
&$8.37
\end{align*}
\]

The answer checks.

Add or subtract. Then check the answer.

1. \(153 + 516\)  
2. \($4.95 - 1.74\)  
3. \(762 - 250\)  
4. \(2301 + 5090\)  
5. \(7799 - 626\)  
6. \($24.41 + 11.44\)
Add or subtract. Then check the answer.

7. $5.06 + 4.91 = 9.97$
8. 2413 + 5062 = 7475
9. $8.17 + .62 = 8.79$
10. $6.22 + 3.56 = 9.78$
11. 8251 + 543 = 8794

12. $.99 - .36 = .63$
13. $7.95 - 2.62 = 5.33$
14. 9388 - 8072 = 1316
15. 6975 - 733 = 6242
16. $38.46 - 16.25 = 22.21$

17. $11.46 + 3.21 + 24.30 = 43.97$
18. 252 + 314 + 321 = 887
19. $42.01 + 10.25 + 4.52 = 56.78$
20. 6040 + 122 + 36 = 6198

21. 7411 + 1505 = 8916
22. 6359 - 144 = 6215
23. $75.59 - 13.25 = 62.34$
24. $8.88 - 7.37 = 1.51$

Problem Solving

25. A scientist discovered 147 fossilized dinosaur eggs in May. From June to December he found 542 more dinosaur eggs. Did he discover at least 600 dinosaur eggs?

26. Trevor bought a fossil shell for $2.30, a fossil field guide for $4.15, and a package of stones for $1.42. He said that he spent $7.75. Was Trevor correct? How do you know?

Mental Math

Add or subtract mentally. Look for patterns.

27. 8912 - 701 = 8211
28. 1042 + 111 = 1153
29. 1042 - 601 = 441
30. 1042 + 212 = 1254
31. 1042 - 501 = 541
32. 1042 + 313 = 1355
33. 1042 - 401 = 641
34. 1042 + 414 = 1456
35. 1042 - 301 = 741
36. 1042 + 515 = 1557
Problem-Solving Strategy: Logical Reasoning

Lee, Hoshi, and Yori have their hats and scarves mixed up. Each boy puts on another boy’s cap and a different boy’s scarf. Hoshi wears Yori’s cap. Whose cap and scarf does each boy wear?

Read
Visualize the facts of the problem as you reread it.
Facts: Hoshi wears Yori’s cap.
Each wears another boy’s cap and a different boy’s scarf.
Question: Whose cap and scarf is each boy wearing?

Plan
Draw and label a table.
Fill in the facts you know.
Consider the possible answers.

<table>
<thead>
<tr>
<th></th>
<th>Lee</th>
<th>Hoshi</th>
<th>Yori</th>
</tr>
</thead>
<tbody>
<tr>
<td>cap</td>
<td>Hoshi’s</td>
<td>Yori’s</td>
<td>Lee’s</td>
</tr>
<tr>
<td>scarf</td>
<td>Yori’s</td>
<td>Lee’s</td>
<td>Hoshi’s</td>
</tr>
</tbody>
</table>

Solve
Hoshi wears Yori’s cap, so he must wear Lee’s scarf.
Lee didn’t wear his own cap, so he must wear Hoshi’s cap and Yori’s scarf.
That means that Yori wears Lee’s cap and Hoshi’s scarf.

Check
Are the answers reasonable?
Is each boy wearing another boy’s cap and a different boy’s scarf? Yes.
Use logical reasoning to solve each problem.

1. Mimi, Pedro, and Martin live in three houses in a row on Mountain Lane. Mimi does not live next to Pedro. Pedro lives on a corner. Who lives in the middle house?

   **Read**
   Visualize the facts of the problem as you reread it.
   
   **Facts:** Mimi, Pedro, and Martin live on Mountain Lane. Mimi does not live next to Pedro. Pedro lives on a corner.
   
   **Question:** Who lives in the middle house?

   **Plan**
   Pedro cannot live in the middle house.

   **Solve**

   **Check**

2. What one number could you move from one box to another to make the sums in each box equal?

3. Van has six coins that are worth 57¢ in all. Only one coin is a quarter. What are the other coins?

4. Rudy was born in the month whose name has the most letters. The date is an even 2-digit number. The sum of the digits is 5. What is Rudy’s birthday?

5. Mary, Anne, and Rose spent $43.51, $47.46, and $50.44. Rose spent the least and did not buy a blazer. Anne’s skirt did not cost the most. How much money did each girl spend? Who bought a sweater?

6. Write a problem modeled on problem 3 above. Have a classmate solve it.
Problem-Solving Applications: Mixed Review

Solve each problem and explain the method you used.

1. Deirdre needs 140 yards of white fabric to make costumes for a play. She has 30 yards. How many yards of fabric does she need to buy?

2. Glenn brought home 58 tickets to sell for the school play. He sold 27 tickets. How many does he have left to sell?

3. The theater has 100 seats on the first level and 55 seats in the balcony. How many seats does the theater have?

4. The first act of the play is 69 minutes long. The second act is 54 minutes long. How much longer is the first act?

5. Gini plays the ice queen. She buys a plastic crown for $5.78 and a jar of silver glitter for $1.20. How much does she spend?

6. The director bought 112 boxes of plastic snowflakes and has 37 boxes left. How many boxes has he already used?

7. Bill paints the ice castle door, which is 70 inches tall. The top of the castle is 80 inches higher. How tall is the ice castle?

8. There are 58 penguin puppets in the last scene of the play. Ida has finished making 42 of them. How many does she still have to make?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. The two-act play is 104 pages long. The first act is 53 pages long. How long is the second act?

10. The play was performed on Thursday, Friday, and Saturday. Ben, Sue, and Dana went on different nights. Sue went after Dana. Ben missed the first night, so he went the next night. When did Sue and Dana see the play?

11. The cast received 3 curtain calls on Thursday and double that on Friday. On Saturday there were 2 more than on Thursday. What was the total number of curtain calls?

12. There were 142 people in the audience on Thursday night. Forty of them were adults. How many were children?

13. There are 3 bears and 2 penguins in the animal dance line. In how many different ways can the animals be arranged?

14. Jake, Kyle, and Lou play the jester, the king, and the leopard. No one plays a part that begins with the same letter as his name. Kyle decided not to play the jester. Who plays the king?

Use the table for problems 15 and 16.

15. Mr. Mendez bought tickets for 2 adults and 2 children. How much more than ten dollars did he spend?

16. Ms. Shapiro spent $14.40 on tickets. What tickets did she buy?
Check Your Progress
Lessons 1–11

Find the sum. Name the addition property or strategy you used.

1. $8 + 0$
2. $9 + 6$
3. $7 + 8$
4. $6 + 5$
5. $6 + 7 + 4$
6. $8 + 0 + 3 + 8$
7. $3 + 7 + 8$

Choose your own variable to write your answer.

8. Tim called some friends before lunch. After lunch he called 6 more friends. What expression shows how many friends Tim called altogether?

Add or subtract. Then check the answer.

9. $153 + 412$
10. $205 + 381$
11. $3051 + 1738$
12. $23.74 + 1.12$
13. $42.04 + 3.41$
14. $56 - 16$
15. $549 - 427$
16. $798 - 55$
17. $94.36 - 40.13$
18. $6759 - 542$

Round to estimate.

19. $42 + 38$
20. $54.92 + 23.26$
21. $568 - 399$
22. $4327 + 631$
23. $65,571 - 4,497$

Find the value of the variable.

24. $3 + n = 11$
25. $a + 7 = 15$
26. $7 = x + 0$
27. $12 - y = 7$
28. $h - 9 = 8$
29. $9 - c = 0$

30. The Madison Arts and Crafts Fair had 33 art exhibits and 49 craft exhibits. About how many exhibits were at the Fair?

31. At the City Zoo there are more zebras than lions and more monkeys than zebras. Are there more monkeys or lions?
The Abacus

The ancient Greeks and Romans used an abacus to make computations. The abacus is still used today in Asian cultures.

Each black bead stands for 5 units.
Each white bead stands for 1 unit.

A number is shown by moving the appropriate beads to the crossbar.

5 ones  5 tens  2 hundreds
3 ones  3 tens 5 tens
4 ones

\[ 5 + 3 = 8 \] \[ 50 + 30 + 4 = 84 \] \[ 200 + 50 + 10 + 5 + 2 = 267 \]

Make your own abacus. Use buttons, beads, or counters.

Show each number on your abacus.

1. 39  2. 326  3. 26  4. 681  5. 78  6. 589
Chapter 2 Test

Add. Name the addition property or strategy you used.
1. 5 + 9  
2. 0 + 7  
3. 9 + 8  
4. 7 + 1 + 7 + 3

Find the sum or difference. Then check.
5. 172 + 205 + 22
6. 1583 + 112 + 204
7. $42.63 + 5.12 + .14$
8. $58.49 - 22.41$

Round to estimate.
9. 846 - 230
10. 497 + 43
11. $24.98 - 3.05$
12. $32.71 + 46.28$

Find the value of the variable.
13. 5 + x = 13  
14. n - 9 = 8  
15. 16 = y + 8

Problem Solving
Use a strategy you have learned.
16. Mike, Bob, and Jeff are 12, 13, and 14 years old. Jeff is the youngest and does not have blond hair. Bob is not the oldest and has brown hair. Mike does not have red hair. How old is each boy? Who has blond hair?

Tell About It
17. Maria went to the grocery store. She bought items that cost $3.09, $1.39, $.20, and $4.15. Did Maria pay more than $10 for the items? Explain how you can use rounding to estimate to find the answer.

Performance Assessment
Write a problem to match the expression.
18. 9 + n  
19. 17 - x
### Test Preparation

Choose the best answer.

1. In 439,587 which digit is in the hundred thousands place?
   - a. 4
   - b. 9
   - c. 3
   - d. 5

2. Which period is underlined?
   - a. thousands period
   - b. millions period
   - c. ones period
   - d. not given

3. Which shows the expanded form of 23,401?
   - a. \(23 + 401\)
   - b. \(2000 + 300 + 40 + 1\)
   - c. \(23,000 + 400 + 1\)
   - d. \(20,000 + 3000 + 400 + 1\)

4. \(\$18.89 + 11.26\)
   - a. \$20.15
   - b. \$30.63
   - c. \$29.25
   - d. \$30.15

5. Which number is halfway between 25 and 75?
   - a. 35
   - b. 50
   - c. 45
   - d. 55

6. Estimate the sum by rounding.
   - a. \$3.00
   - b. \$3.30
   - c. \$3.50
   - d. \$4.30

7. Find the value of the expression. \(n - 37\), when \(n = 41\)
   - a. 78
   - b. 41
   - c. 14
   - d. 4

8. Which addition property involves the grouping of addends?
   - a. commutative
   - b. identity
   - c. associative
   - d. not given

9. Which is not a subtraction concept?
   - a. take away
   - b. zero identity
   - c. how many more are needed
   - d. compare

10. About what number is the arrow pointing toward?
    - a. 1100
    - b. 1400
    - c. 1500
    - d. 1600

11. \(4 + (3 + 6) + 0 + 2\)
    - a. 9
    - b. 13
    - c. 10
    - d. 15

12. In 831,746,053 what is the place of the 1?
    - a. millions
    - b. ten millions
    - c. hundred millions
    - d. not given

13. Which is ordered greatest to least?
    - a. 43,341; 43,413; 43,431
    - b. 43,431; 43,413; 43,341
    - c. 43,431; 43,341; 43,413
    - d. none of these

14. Which shows the best way to check the answer?
    - a. \(194 + 318 = 512\)
    - b. \(318 - 194 = 124\)
    - c. \(512 - 318 = 194\)
    - d. \(512 - 300 = 212\)
15. Choose the fewest coins and bills you would receive as change.
   Cost: $13.27
   Amount given: $20.00
   a. 3 pennies, 2 dimes, 2 quarters, 1 one-dollar bill, 1 five-dollar bill
   b. 3 pennies, 2 dimes, 1 half-dollar, 1 one-dollar bill, 1 five-dollar bill
   c. 3 pennies, 7 dimes, 1 one-dollar bill, 1 five-dollar bill
   d. not given

16. Which shows 1,541,917 rounded to the nearest hundred thousand?
   a. 1,500,000  b. 1,540,000  c. 2,000,000  d. 1,600,000

17. Choose the value of the variable.
   \[13 = y + 4\]
   a. 8  b. 9  c. 13  d. 14

18. A red car, a blue car, and a green car are parked in a row. The blue car is not next to the green car. The green car is at the beginning of the row. Which car is in the second spot?
   a. red  b. blue  c. green

19. Gus buys a fish tank filter for $4.52. He pays with a ten-dollar bill. Which shows the fewest coins and bills he can receive as change?
   a. 8 pennies, 1 nickel, 1 dime, 1 quarter, 1 five-dollar bill
   b. 3 pennies, 2 nickels, 1 dime, 1 quarter, 1 five-dollar bill
   c. 3 pennies, 1 nickel, 4 dimes, 1 five-dollar bill
   d. 3 pennies, 2 dimes, 1 quarter, 1 five-dollar bill

20. In 64,823 what is the value of the 6?
   a. 600  b. 6000  c. 60,000  d. 600,000

21. Choose the standard form of the number.
   \[300,000 + 70,000 + 400 + 90 + 7\]
   a. 307,497  b. 3,070,497  c. 370,497  d. 37,497

22. Sam has 63 model train track pieces. For every curved piece of track, Sam has 8 straight pieces. How many straight pieces of model train track does Sam have?
   a. 7  b. 48  c. 55  d. 56

Tell About It

Explain how you solved the problem. Show all your work.

23. Ms. Applegate tutors three groups containing 2, 3, and 4 students. Mr. Kirsch tutors three groups of 4, 5, and 6 students. Mrs. Levin tutors three groups of 6, 7, and 8 students. If each teacher wants to tutor the same number of students, then which group should be moved from one teacher to another?
A LOT OF KIDS

There are a lot of kids
Living in my apartment building
And a lot of apartment buildings on my street
And a lot of streets in this city
And cities in this country
And a lot of countries in the world.
So I wonder if somewhere there’s a kid I’ve never met
Living in some building on some street
In some city and country I’ll never know—
And I wonder if that kid and I might be best friends
If we ever met.

Jeff Moss

In this chapter you will:
Learn about front-end estimation
Add and subtract larger numbers with regrouping
Add three or more addends
Choose the operation to solve a problem

Critical Thinking/Finding Together
Mary visited a friend. She drove 126 miles from New York to New Jersey and 140 miles from New Jersey to Pennsylvania. If she traveled a total distance of 425 miles, how far is it from Pennsylvania to New York?
Students in the Hilldale elementary schools held a Read-a-Thon in October. About how many books did they read altogether?

To find about how many, use front-end estimation:

\[
\begin{align*}
2534 & \quad 2534 \\
2496 & \quad 2496 \\
+3875 & \quad +3875 \\
\underline{7} & \quad \text{about 7000}
\end{align*}
\]

Rough estimate: 7000

To get a closer estimate, make groups of about 1000 from the other digits.

\[
\begin{align*}
2534 & \quad 2496 & \quad 3875 \\
\text{about 1000} & \quad \text{about 1000} \\
\end{align*}
\]

Adjusted estimate: 9000

Altogether, the students read about 9000 books.

Study these examples.

\[
\begin{align*}
\$5.26 & \quad \text{about $1} \\
1.52 & \quad \text{about $1} \\
3.78 & \quad \text{about $1} \\
+2.45 & \quad +569 \\
\text{about $11.00} & \quad \text{about 1400}
\end{align*}
\]

\[
\begin{align*}
\$11 & + \$1 + \$1 = \$13 \\
\text{Rough estimate: $11} \\
\text{Adjusted estimate: $13} \\
1400 & + 100 = 1500 \\
\text{Rough estimate: 1400} \\
\text{Adjusted estimate: 1500}
\end{align*}
\]
Use front-end digits to make a rough estimate. Then adjust.

Use the table on page 96.

15. Students in Hilldale West School read 4073 books. About how many books did the students in all Hilldale schools read?
Add with Regrouping

Find the sum of \(258 + 177\).

First, use rounding to estimate: \(258 + 177 \rightarrow 300 + 200 = 500\)

Then add: \(258 + 177\).

Remember:

- 10 ones = 1 ten
- 10 tens = 1 hundred

Add the ones. Add the tens. Add the hundreds.

<table>
<thead>
<tr>
<th>h</th>
<th>t</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>+</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

15 ones = 1 ten 5 ones

13 tens = 1 hundred 3 tens

The sum is 435.

Study these examples.

<table>
<thead>
<tr>
<th>h</th>
<th>t</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.4</td>
<td>7</td>
</tr>
<tr>
<td>+</td>
<td>.2</td>
<td>9</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>.7</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>h</th>
<th>t</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>+</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>h</th>
<th>t</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.7</td>
<td>3</td>
</tr>
<tr>
<td>+</td>
<td>6.5</td>
<td>4</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8.2</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

435 is close to 500. The answer is reasonable.
Choose a method to estimate. Then add.

Remember: You can use rounding or front-end estimation.

1. 48 + 46
2. 37 + 16
3. 58 + 22
4. 85 + 8
5. 73 + 9

6. 329 + 543
7. 480 + 253
8. 675 + 162
9. 781 + 47
10. 909 + 64

11. 168 + 743
12. 643 + 259
13. 345 + 469
14. 877 + 95
15. 768 + 99

16. $.78 + .06
17. $.46 + .28
18. $1.75 + 3.61
19. $5.28 + 2.49
20. $4.65 + 4.99

21. 75 + 18
22. 389 + 276
23. 581 + 229

24. $.19 + $.66
25. $6.19 + $2.32
26. $3.97 + $4.33

Problem Solving

27. There were 156 Democrats and 137 Republicans in the U.S. House of Representatives in 1878. How many members of the House were there?

28. In 1925 the U.S. Congress was made up of 435 Representatives and 96 Senators. How many members of Congress were there in 1925?

Challenge

29. Find two 3-digit addends with the same digits in each number whose sum is 404.

30. What are the greatest and the least possible addends of two 3-digit numbers whose sum is 555? 999?
Chapter 3-3

Four-Digit Addition

Find the sum of 1279 + 2355.
First, estimate: 1279 + 2355
1000 + 2000 = 3000
Then add: 1279 + 2355.

Add the ones. Add the tens. Add the hundreds. Add the thousands.

\[
\begin{array}{cccc}
\text{th} & \text{h} & \text{t} & \text{o} \\
1 & 2 & 7 & 9 \\
+2 & 3 & 5 & 5 \\
\hline
4 \\
\end{array}
\quad \begin{array}{cccc}
\text{th} & \text{h} & \text{t} & \text{o} \\
1 & 2 & 7 & 9 \\
+2 & 3 & 5 & 5 \\
\hline
3 & 4 \\
\end{array}
\quad \begin{array}{cccc}
\text{th} & \text{h} & \text{t} & \text{o} \\
1 & 2 & 7 & 9 \\
+2 & 3 & 5 & 5 \\
\hline
6 & 3 & 4 \\
\end{array}
\quad \begin{array}{cccc}
\text{th} & \text{h} & \text{t} & \text{o} \\
1 & 2 & 7 & 9 \\
+2 & 3 & 5 & 5 \\
\hline
3 & 6 & 3 & 4 \\
\end{array}
\]

14 ones = 1 ten 4 ones
13 tens = 1 hundred 3 tens

The sum is 3634.

Study these examples.

\[
\begin{array}{cccc}
4 & 7 & 8 & 0 \\
+2 & 9 & 5 & 6 \\
\hline
7 & 7 & 3 & 6 \\
\end{array}
\quad \begin{array}{cccc}
6 & 4 & 3 & 8 \\
+1 & 7 & 2 & 5 \\
\hline
8 & 1 & 6 & 3 \\
\end{array}
\quad \begin{array}{cccc}
5 & 0 & 6 & 7 \\
+5 & 4 & 5 \\
\hline
5 & 6 & 1 & 2 \\
\end{array}
\]

Think
3634 is close to 3000.
The answer is reasonable.

Choose a method to estimate. Then add.

1. 3165 + 2917
2. 4227 + 1905
3. 2774 + 6407
4. 5538 + 614
5. 4168 + 3454
6. 6075 + 2845
7. 8264 + 1349
8. 9438 + 395

100 | Chapter 3
Choose a method to estimate. Then find the sum.

9. \(3670 + 3458\)  
10. \(5891 + 2768\)  
11. \(6655 + 1563\)  
12. \(8492 + 945\)  

13. \(5329 + 1398\)  
14. \(4921 + 3486\)  
15. \(6482 + 1843\)  
16. \(7560 + 488\)  

17. \(34.27 + 46.17\)  
18. \(65.05 + 13.98\)  
19. \(87.98 + 10.75\)  
20. \(51.75 + 9.15\)  

Align and add.

21. \(6414 + 979\)  
22. \(495 + 1272\)  
23. \(8067 + 86\)  

24. \$28.95 + $56.60\)  
25. \$69.75 + $8.94\)  
26. \$4.35 + $24.89\)  
27. \$6.08 + $44.56\)  

**Problem Solving**

28. Ms. Davis and Mr. Brown ran for mayor of Newton. Ms. Davis received 2365 votes and Mr. Brown received 4915 votes. How many people voted in the election?

29. A campaign worker spent $23.96 on phone calls and $57.32 for posters. How much did she spend?

30. Three people ran for town manager. Mr. Miller received 4286 votes. Mr. Rush received 3907 votes. Ms. Adams received 7454 votes. Did Mr. Miller and Mr. Rush together receive more or fewer votes than Ms. Adams?

31. Mr. Jones received 2487 votes for sheriff. Mr. Long received double that number. How many votes did Mr. Long receive?
Chapter 3102

3-4

Add Larger Numbers

The Botanical Gardens held a two-day open house. What was the total attendance at the open house?

First, use rounding to estimate: $17,465 + 16,592$

Then add: $17,465 + 16,592$.

<table>
<thead>
<tr>
<th>Add the ones.</th>
<th>Add the tens.</th>
<th>Add the hundreds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$17,465$</td>
<td>$17,465$</td>
<td>$17,465$</td>
</tr>
<tr>
<td>$+ 16,592$</td>
<td>$+ 16,592$</td>
<td>$+ 16,592$</td>
</tr>
<tr>
<td>$7$</td>
<td>$57$</td>
<td>$057$</td>
</tr>
</tbody>
</table>

15 tens = 1 hundred 5 tens

10 hundreds = 1 thousand 0 hundreds

Add the thousands. Add the ten thousands.

<table>
<thead>
<tr>
<th>Add the thousands.</th>
<th>Add the ten thousands.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$111$</td>
<td>$111$</td>
</tr>
<tr>
<td>$17,465$</td>
<td>$17,465$</td>
</tr>
<tr>
<td>$+ 16,592$</td>
<td>$+ 16,592$</td>
</tr>
<tr>
<td>$4057$</td>
<td>$34,057$</td>
</tr>
</tbody>
</table>

14 thousands = 1 ten thousand 4 thousands

Think

34,057 is close to 40,000. The answer is reasonable.

The total attendance was 34,057.

### Attendance

<table>
<thead>
<tr>
<th>Day</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday</td>
<td>17,465</td>
</tr>
<tr>
<td>Sunday</td>
<td>16,592</td>
</tr>
</tbody>
</table>

The total attendance was 34,057.
Add.

1. \[ \$8.79 + 4.46 = \$13.25 \]
2. \[ \$6.39 + 6.21 = \$12.60 \]
3. \[ \$41.75 + 54.50 = \$96.25 \]
4. \[ \$65.49 + 82.90 = \$148.39 \]

Choose a method to estimate. Then find the sum.

5. \[ 951 + 735 = 1686 \]
6. \[ 1873 + 2456 = 4329 \]
7. \[ 3298 + 7169 = 10467 \]
8. \[ 24,167 + 31,078 = 55,245 \]

9. \[ \$6.75 + 4.37 = \$11.12 \]
10. \[ \$39.06 + 44.85 = \$83.91 \]
11. \[ \$57.36 + 28.84 = \$86.20 \]
12. \[ \$238.91 + 764.07 = \$1003.08 \]

13. \[ 42,615 + 19,218 = 61,833 \]
14. \[ 433,099 + 551,908 = 985,007 \]
15. \[ 3,612,056 + 8,046,217 = 11,658,273 \]
16. \[ 12,321,566 + 4,878,442 = 17,199,008 \]

17. \[ \$4257.35 + 6152.72 = \$10,410.07 \]
18. \[ \$5121.09 + 7028.75 = \$12,150.84 \]
19. \[ \$21,564.52 + 5,095.31 = \$26,660.83 \]
20. \[ \$34,798.33 + 84,056.82 = \$119,855.15 \]

Align and add.

21. \[ 6344 + 5812 = 12,156 \]
22. \[ 14,023 + 91,182 = 105,205 \]
23. \[ 720,279 + 507,090 = 1227,369 \]
24. \[ \$2.89 + \$7.56 = \$10.45 \]
25. \[ \$28.25 + \$66.96 = \$95.21 \]
26. \[ \$398.99 + \$739.62 = \$1138.61 \]

27. Visitors to the Botanical Gardens bought 8429 flowering plants and 4872 vegetable plants. How many plants did they buy?

28. Add.

28. \[ 4 + 2 + 6 + 7 + 2 = 19 \]
29. \[ 3 + 9 + 3 + 4 = 19 \]
30. \[ 8 + 2 + 4 + 4 = 18 \]
31. \[ 9 + 0 + 1 + 6 = 16 \]
32. \[ 5 + 4 + 3 + 4 = 16 \]
33. \[ 9 + 8 = 17 \]
Ms. Pei drove from Chicago to Kansas City. Then she drove to Indianapolis and Pittsburgh before returning to Chicago. How many miles did she travel?

To find how many miles, add:

499 + 485 + 353 + 452.

First, use front-end digits to estimate and adjust your estimate. Then add.

\[
\begin{align*}
499 & + 485 & + 353 & + 452 \\
400 & + 400 & + 300 & + 400 & + 100 & + 100 & + 100 &= 1800
\end{align*}
\]

Add the ones. Add the tens. Add the hundreds.

19 ones = 1 ten 9 ones
28 tens = 2 hundreds 8 tens
17 hundreds = 1 thousand 7 hundreds

Ms. Pei traveled 1789 miles.

Study these examples.

\[
\begin{align*}
1.27 & + 0.05 & + 0.97 & = 2.29 \\
34161 & + 3728 & + 7562 & = 45451 \\
657 & + 8 & + 124 & = 823
\end{align*}
\]
Choose a method to estimate. Then find the sum.

1. 27, 34
   93, 9
   .33, .12
   + 58

2. 247
   27, 34

3. $ .84
   $.33
   .07
   +.71

4. 191
   .84
   .55
   +.06

5. 322
   247

6. 316
   875
   5.17
   + 6

7. $ 7.32
   $7.32
   5.17
   + 3.28

8. $17.05
   $17.05
   21.87
   + 31.32

9. 2411
   2411
   4312
   + 3442

10. 709
    709
    3327
    + 647

11. 13,219
    28,604
    + 26,154

12. 29,002
    12,756
    + 14,321

13. 35,806
    4,275
    + 71,888

14. $241.55
    897.60
    + 43.28

Align and add.

15. 163 + 147 + 735 + 28

16. 2905 + 1324 + 655 + 218

17. $17.51 + $32.76 + $14.29

18. $518.87 + $421.08 + $87.99

19. One month, Mr. Mills made business trips of 163 miles, 429 miles, 59 miles, and 242 miles. How many miles did he travel?

20. Ms. Sims spent $13.48, $19.76, and $9.88 on gasoline last month. How much money did she spend on gasoline?

CRITICAL THINKING

Three of the four addends have a sum of 1000. Write the addend that does not belong.

21. 421, 391, 198, 381

22. 510, 237, 253, 233

23. 173, 125, 225, 602

24. 345, 352, 303, 355
How much taller is the Aon Center than the Gas Company Tower?

To find how much taller, subtract: \( 858 - 749 \).

First, use rounding to estimate: \( 900 - 700 = 200 \). Then subtract.

See if there are enough ones to subtract.

<table>
<thead>
<tr>
<th>h</th>
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<tbody>
<tr>
<td>8</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>− 7</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

More ones are needed. Regroup the tens to get more ones.

\[
58 = 5 \text{ tens} 8 \text{ ones} = 4 \text{ tens} 18 \text{ ones}
\]

Subtract the ones.

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<tbody>
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<td>4</td>
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<tr>
<td>− 7</td>
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Subtract the tens.

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<tbody>
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<td>4</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>− 7</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

Subtract the hundreds.

<table>
<thead>
<tr>
<th>h</th>
<th>t</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 7</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

Check by adding.

\[
1 \text{ 0 9} + 8 \text{ 5 8} = 1 \text{ 9 4 8}
\]

The Aon Center is 109 feet taller.

Study these examples.

\[
\begin{array}{ccc}
6 & 14 & 7 & 13 & 5 & 11 \\
7 & 4 & $88 & .3 & 8 & 6 & .1 \\
4 & 6 & − 7 & .9 & 5 & − 9 & 1 \\
2 & 8 & $ .4 & 3 & 5 & 2 & 1
\end{array}
\]

Think

109 is close to 200. The answer is reasonable.
Estimate mentally. Then find the difference.

1.  82   2.  60   3.  72   4.  $.94   5.  $.43
   -17   -34   -25   - .58   - .29

6.  572   7.  720   8.  886   9.  $3.61   10.  $6.84
   -143   -418   -249   -2.25   -4.19

11. 927   12. 435   13. 228   14.  $5.43   15.  $9.69
    -692   -172   -147   -2.83   -5.90

16. 23   17. 132   18. 429   19.  $.52   20.  $2.75
    - 9   -28   -75   - .06   - .08

Align and subtract.

21. 75 – 9
22. 32 – 8
23. 480 – 36

24. $6.21 – $.16
25. $8.19 – $.54
26. $5.33 – $.07

Use the table on page 106.

27. How much shorter is United California Bank Plaza than the Arco Center?

28. How much taller is Wells Fargo Tower than the United California Bank Plaza?

29. The Aon Center has 62 stories. The Arco Center has 55 stories. How many more stories does the Aon Center have?

30. 777 Tower in Los Angeles is 725 feet tall. Is it taller or shorter than United California Bank Plaza? by how much?
How many more home runs did Babe Ruth hit than Frank Robinson?

Subtract: \(714 - 586\).

Estimate by rounding: \(700 - 600 = 100\)

Then subtract.

More ones are needed. Regroup. Subtract ones.

More tens are needed. Regroup. Subtract tens.

Subtract hundreds.

Think

\(128\) is close to \(100\).
The answer is reasonable.

Babe Ruth hit \(128\) more home runs than Frank Robinson.

Choose a method to estimate. Then subtract.

1. \(8.8 \ldots 1\) \(- \ 7.8 \ldots 4\) \[\$8.37\]
   \[\$ .47\]

2. \(4.17\) \(- \ 2.38\) \[\$1.79\]

3. \(6.24\) \(- \ 5.75\) \[\$ .49\]

4. \(7.36\) \(- \ 4.88\) \[\$2.48\]

5. \(624\) \(- \ 137\) \[\(487\)\]

6. \(930\) \(- \ 452\) \[\(478\)\]

7. \(846\) \(- \ 669\) \[\(177\)\]

8. \(561\) \(- \ 265\) \[\(296\)\]

9. \(734\) \(- \ 587\) \[\(147\)\]
Choose a method to estimate. Then find the difference.

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<tbody>
<tr>
<td>10.</td>
<td>3 11</td>
<td>16</td>
<td>11</td>
<td>3 2</td>
<td>6</td>
<td></td>
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</tr>
<tr>
<td>11.</td>
<td>3</td>
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</tr>
<tr>
<td>12.</td>
<td>-185</td>
<td>-734</td>
<td>-499</td>
<td>-578</td>
<td></td>
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</tr>
<tr>
<td>13.</td>
<td>712</td>
<td></td>
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</tr>
<tr>
<td>14.</td>
<td>653</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Align and subtract.

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 20. | $3.25 - 1.58 |
| 21. | $5.37 - 2.49 |
| 22. | $8.64 - 4.87 |
| 23. | $9.52 - .99 |

Problem Solving

Use the table on page 108.

30. How many more home runs did Hank Aaron hit than Frank Robinson?

31. How many fewer home runs did Mark McGwire hit than Willie Mays?

32. Did Babe Ruth and Reggie Jackson combined hit more or fewer home runs than Hank Aaron and Mickey Mantle combined? How many more or fewer?

33. Which is the greater difference: between the number of home runs hit by Willie Mays and Mike Schmidt or between the number of home runs hit by Hank Aaron and Willie Mays?

34. What is the combined home run total for Babe Ruth, Mickey Mantle, and Reggie Jackson?
Subtract Larger Numbers

The Mississippi is the second longest river in the United States. How much longer is it than the Colorado River?

To find how much longer, subtract: 2348 \(-\) 862.

\[
\begin{array}{c}
\text{2} \quad \text{3} \quad \text{4} \quad \text{8} \\
\hline
\text{8} \quad \text{6} \quad \text{2} \\
\hline
\text{1} \quad \text{4} \quad \text{8} \quad \text{6}
\end{array}
\]

3 hundreds 4 tens = 2 hundreds 14 tens

\[
\begin{array}{c}
\text{2} \quad \text{3} \quad \text{4} \quad \text{8} \\
\hline
\text{8} \quad \text{6} \quad \text{2} \\
\hline
\text{3} \quad \text{1} \quad \text{4} \quad \text{8} \quad \text{6}
\end{array}
\]

2 thousands 2 hundreds = 1 thousand 12 hundreds

\[
\begin{array}{c}
\text{1} \quad \text{2} \quad \text{14} \\
\hline
\text{8} \quad \text{6} \quad \text{2} \\
\hline
\text{2} \quad \text{3} \quad \text{4} \quad \text{8} \quad \text{6}
\end{array}
\]

\[
\begin{array}{c}
\text{1} \quad \text{2} \quad \text{14} \\
\hline
\text{8} \quad \text{6} \quad \text{2} \\
\hline
\text{1} \quad \text{4} \quad \text{8} \quad \text{6}
\end{array}
\]

1486 + 862 = 2348

or

2300 − 900 = 1400

The Mississippi is 1486 miles longer than the Colorado River.

Study these examples.

\[
\begin{array}{c}
\text{7} \quad \text{6} \quad \text{4} \quad \text{0} \\
\hline
\text{4} \quad \text{1} \quad \text{9} \quad \text{5} \\
\hline
\text{3} \quad \text{4} \quad \text{4} \quad \text{5}
\end{array}
\quad \quad
\begin{array}{c}
\text{1} \quad \text{3} \quad \text{5} \\
\hline
\text{8} \quad \text{9} \\
\hline
\text{4} \quad \text{6}
\end{array}
\quad \quad
\begin{array}{c}
\text{6} \quad \text{2} \quad \text{9} \quad \text{3} \\
\hline
\text{3} \quad \text{9} \quad \text{0} \quad \text{5} \\
\hline
\text{1} \quad \text{0} \quad \text{9} \quad \text{6}
\end{array}
\]
Estimate mentally. Then find the difference.

1. \( \begin{array}{c}
521 \\
- 347 \\
\end{array} \)
2. \( \begin{array}{c}
825 \\
- 169 \\
\end{array} \)
3. \( \begin{array}{c}
6218 \\
- 5354 \\
\end{array} \)
4. \( \begin{array}{c}
9743 \\
- 4467 \\
\end{array} \)

5. \( \begin{array}{c}
74.36 \\
- 46.72 \\
\end{array} \)
6. \( \begin{array}{c}
63.35 \\
- 8.16 \\
\end{array} \)
7. \( \begin{array}{c}
23,879 \\
- 16,054 \\
\end{array} \)
8. \( \begin{array}{c}
167,537 \\
- 48,553 \\
\end{array} \)

9. \( \begin{array}{c}
774.93 \\
- 567.06 \\
\end{array} \)
10. \( \begin{array}{c}
4355.91 \\
- 2687.89 \\
\end{array} \)
11. \( \begin{array}{c}
6,211,058 \\
- 4,944,532 \\
\end{array} \)
12. \( \begin{array}{c}
9,715,663 \\
- 7,567,774 \\
\end{array} \)

Align and subtract.

13. \( 360 - 74 \)
14. \( 7218 - 533 \)
15. \( $4.21 - $1.38 \)

16. \( $672.95 - $48.77 \)
17. \( 942,118 - 883,264 \)

18. \( 7,721,341 - 5,044,964 \)
19. \( $3127.94 - $1993.67 \)

Problem Solving

20. Is the difference in length of the Missouri and Rio Grande rivers greater or less than the length of the Porcupine River?

21. How much shorter is the Tennessee River than the Missouri River?

Test Preparation

22. Find the difference.

\( \begin{array}{c}
77,349 \\
- 75,682 \\
\end{array} \)

23. Find the difference.

\( \begin{array}{c}
$351.09 \\
- 79.53 \\
\end{array} \)
3-9

Zeros in Subtraction

Amy guesses that the number of marbles in a big glass jar at the fair is 1957. The jar has 3000 marbles. How many more marbles are there than Amy’s guess?

First, use rounding to estimate: \(3000 - 1957\)

\[
\begin{align*}
3000 & - 2000 = 1000 \\
\end{align*}
\]

Then subtract: \(3000 - 1957\).

To subtract when the minuend has zeros:
• Align the minuend and the subtrahend by place value.
• Regroup as many times as needed before starting to subtract.
• Subtract.

More hundreds, tens, and ones are needed. Regroup all.

Subtract.

Check.

3 thousands =
2 thousands 10 hundreds 0 tens 0 ones
2 thousands 9 hundreds 10 tens 0 ones
2 thousands 9 hundreds 9 tens 10 ones

There are 1043 more marbles than Amy’s guess.

Study these examples.

\[
\begin{align*}
9 & \quad 9 \\
7 & \quad 10 \\
\frac{9}{8.0} & \quad \frac{9}{9} \\
\frac{2.4}{5.0} & \quad \frac{2.4}{6} \\
\frac{2.4}{5.0} & \quad \frac{5.5}{4} \\
\end{align*}
\]

\[
\begin{align*}
9 & \quad 9 \\
4 & \quad 10 \\
\frac{9}{4.8} & \quad \frac{9}{13} \\
\frac{4.8}{9.9} & \quad \frac{4.8}{7} \\
\frac{4.8}{9.9} & \quad \frac{5.0}{6} \\
\end{align*}
\]

Think

1043 is close to the estimate of 1000.
Estimate mentally. Then find the difference.

1. \( 500 - 374 \)  
2. \( 8070 - 691 \)  
3. \( 400 - 281 \)  
4. \( 700 - 659 \)  
5. \( 900 - 527 \)  
6. \( 6000 - 5783 \)  
7. \( 3050 - 659 \)  
8. \( 7000 - 6291 \)  
9. \( 2000 - 79 \)  
10. \( 300 - 37 \)  
11. \( 4000 - 998 \)  
12. \( $6.04 - 4.73 \)  
13. \( $50.00 - 9.64 \)  

Align and subtract.

14. \( 100 - 69 \)  
15. \( 400 - 184 \)  
16. \( $5.00 - $2.38 \)  
17. \( 8000 - 788 \)  
18. \( 6000 - 4893 \)  
19. \( $70.00 - $19.45 \)  
20. \( 806 - 447 \)  
21. \( $9.00 - $5.41 \)  
22. \( $1.05 - $.88 \)  
23. \( 9002 - 7865 \)  
24. \( 5000 - 718 \)  
25. \( $40.00 - $16.95 \)  

26. At camp, Mel logged 2005 minutes on the computer. Pam logged 978 minutes the first week and twice as many minutes the second week. Who logged more minutes? How many more?

27. The camp director bought a new laptop for $875.69. She also bought a case of blank CDs for $29.95. She gave the cashier one thousand dollars. How much change did she get?

28. In the first month of camp, 1006 e-mails were sent and received by the campers. In the second month of camp, 677 e-mails were sent and received. About how many fewer e-mails were sent and received the second month of camp?

Addition and Subtraction Practice

To add or subtract larger numbers:
• Align the addends or align the minuend and subtrahend.
• Start by adding or subtracting at the right.
• Regroup as necessary.


\[
\begin{array}{ccc}
1 & 6 & 7 \\
+ & 3 & 4 \\
\hline
9 & 0 & 9.81
\end{array}
\]

\[
\begin{array}{ccc}
8 & 7,731 \\
- & 6 & 5,954 \\
\hline
2 & 1,777
\end{array}
\]


\[
\begin{array}{ccc}
1 & 2 & 1 \\
3 & 6,428 \\
8 & 3,985 \\
+ & 7 & 59 \\
\hline
12,172
\end{array}
\]

\[
\begin{array}{ccc}
8 & 9,000 \\
- & 4 & 788.1 \\
\hline
$1,111.9
\end{array}
\]

Choose a method to estimate. Then add or subtract. Watch for + or –.

1. 42,937 + 11,426
2. 32,864 + 94,828
3. 85,963 + 28,279
4. $562.43 + 680.79

5. 94,361 – 22,087
6. 75,937 – 12,649
7. 82,616 – 51,499
8. $262.71 – 140.99

9. 13,584 + 41,592 + 26,437
10. 64,205 + 39,811 + 52,406
11. 82,099 + 4,157 + 79,862
12. $902.67 + 51.81 + 235.27

Remember to estimate the sum or difference first. Then use your estimate to check whether your answer is reasonable.
Choose a method to estimate. Then find the sum or the difference.

13. \[53,007 - 21,979\] 14. \[70,064 - 19,155\] 15. \[80,102 - 9,516\] 16. \[\$600.08 - 59.99\]
17. \[98,694 + 5,148\] 18. \[675 + 67\] 19. \[75,628 + 8,073\] 20. \[\$4.97 + 826.13\]
21. \[81,000 - 19,625\] 22. \[94,000 - 67,887\] 23. \[70,000 - 36,678\] 24. \[\$600.00 - 47.89\]

Align and add or subtract.

25. \[21,863 + 2,684 + 1,326\] 26. \[82,010 + 395 + 13,692\]
27. \[65,600 - 1,592\] 28. \[\$200.00 - \$126.74\]
29. \[90,506 - 3,729\] 30. \[\$645.16 + \$8.88 + \$0.56\]

31. When it was built, a college stadium had 56,976 seats. Later, 3813 more seats were added. How many people can that stadium seat today?

32. A university stadium has 75,339 seats. A rival university stadium has 69,082 seats. How many more people can be seated in the first stadium than in the rival stadium?

Find the missing digits.

33. \[923 - 14\square\] 34. \[629 - 8\square\] 35. \[231 - \square\square\] 36. \[856 - 4\square\square\]
The Keep Fit Shop ordered 487 pairs of high-tops. The factory has 1000 pairs in stock. The prices range from $30 to $85. How many pairs of high-tops will the factory have after they fill the order?

**Visualize the facts of the problem as you reread it.**

**Facts:**
- 487 pairs ordered
- 1000 pairs in stock at the factory
- Pairs cost $30 to $85.

**Question:** How many pairs will be left after the order is filled?

**Plan**

You are separating, or taking away, from a set.
Subtract the number of pairs ordered from the number of pairs in stock: 1000 − 487.

You do not need to know the price range to solve the problem.

**Solve**

Round to estimate the difference.
1000 − 500 = 500
Then subtract.

```
  1000
-  487
  ----
   513
```

The factory will have 513 pairs of high-tops left.

**Check**

The answer is close to the estimate.
It is reasonable.
Add to check subtraction. 513 + 487 = 1000
Choose the operation to solve each problem.

1. Running shoes are on sale for $62.79. The regular price is $8.55 more. What is the regular price for the running shoes?

   Visualize the facts of the problem as you reread it.

   Facts: $62.79 running shoes on sale
          Regular price is $8.55 more.

   Question: What is the regular price for running shoes?

   You are joining sets or quantities. Add the price of running shoes on sale to the additional cost of running shoes at regular price.

   Solve

   2. The Keep Fit Catalog contains 376 clothing items, 29 books, and 107 trail maps. There are 6 order clerks and 2 managers. How many different items are in the catalog?

   3. Shipping costs $3 for orders under $10 and $5.50 for orders over $10. What is the total cost of a $14.98 order?

   4. The company received 853 orders in April and 118 more than that in May. How many orders did they receive in May?

   5. The Keep Fit Shop has sponsored a charity bike race for 15 years. It is 35 miles long. There are rest stops every 5 miles, including at the finish line. How many rest stops are there?
Problem-Solving Applications: Mixed Review

Solve each problem and explain the method you used.

1. Jan and Kelly built a giant chain of 1378 plastic dominoes and 2267 wood dominoes. How many dominoes did they use?

2. The chain was 300 feet long. The first 127 feet were plastic dominoes. How many feet of chain were wood dominoes?

3. They set up the chain on the gym floor, which is 10,000 square feet in area. The chain took up 6341 square feet. How much of the gym floor was not covered?

4. Jan and Kelly spent 192 minutes on Friday setting up the dominoes. They worked for 218 minutes on Saturday. How long did it take them to set up the chain?

5. Their project raised $1070. They paid $318 for the dominoes. They gave the rest to charity. How much money did Jan and Kelly donate?

6. Use the graph at the right. How many people were in the audience that saw the domino chain?

7. The plastic dominoes fell in 109 seconds. Then the wood dominoes fell in 189 seconds. How long did it take the entire chain to fall down?

8. Jan and Kelly are planning next year’s chain. They will use 2567 plastic dominoes and 3271 wood dominoes. How many dominoes will they use?
Choose a strategy from the list or use another strategy to solve each problem.

9. A class held a jump rope contest for charity. The winner jumped 9278 times without missing. The second prize went to someone who jumped 8765 times. How many more times did the winner jump?

10. There were 108 people in the contest. They each paid $2 to enter. The winner won $25. Only 27 jumpers made it to the second round. How many jumpers were eliminated after round one?

11. Paula hopped on her right foot 876 times and then on her left foot 954 times. Then she switched back to her right foot and hopped 212 times before tripping. How many times did she hop in all?

12. Paul, Maria, Gail, and Leroy play Double Dutch. Two people hold ropes and 2 jump. How many different ways could the friends play?

13. Marcia jumped for 47 minutes. How many minutes less than an hour did Marcia jump?

14. Asa, Max, and Jemma came in first, second, and third in the jump rope contest. Max did not win, but he jumped more times than Asa. Who came in first, second, and third?

15. Of the 108 contestants, the number of girls was double the number of boys. How many girls were there? how many boys?

## Check Your Progress

### Lessons 1–12

Use front-end digits to make a rough estimate. Then adjust. *(See pp. 96–97.)*

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<tbody>
<tr>
<td>1</td>
<td>382</td>
<td>2</td>
<td>4648</td>
<td>3</td>
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<tr>
<td></td>
<td>+216</td>
<td></td>
<td>+3175</td>
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### Add.

*(See pp. 98–105, 114–115.)*

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<tbody>
<tr>
<td>5</td>
<td>392 + 26</td>
<td>6</td>
<td>276 + 477</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>8312 + 568 + 39</td>
<td>9</td>
<td>6178 + 1311 + 452</td>
<td>10</td>
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<tr>
<td>11</td>
<td>2527</td>
<td>12</td>
<td>$32.38</td>
<td>13</td>
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<tr>
<td></td>
<td>1198</td>
<td></td>
<td>4.43</td>
<td></td>
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<tr>
<td></td>
<td>+456</td>
<td></td>
<td>+20.37</td>
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### Subtract.

*(See pp. 106–115.)*

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<tbody>
<tr>
<td>15</td>
<td>982 − 54</td>
<td>16</td>
<td>2816 − 129</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>23,881 − 12,134</td>
<td>19</td>
<td>117,923 − 98,277</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>6000</td>
<td>22</td>
<td>2603</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>−1406</td>
<td></td>
<td>−186</td>
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### Problem Solving

25. Memorial School has 630 students. If 437 students are girls, how many are boys?

26. There are 127 roses, 416 daisies, and 216 lilies in the flower shop. How many flowers are in the flower shop?

27. The new stadium has 60,000 seats. The old stadium had 45,500 seats. How many more seats than the old stadium does the new stadium have?

28. There were 224 people at the first showing of a new movie. Forty-one people bought popcorn. The second showing had 219 people. How many people went to the new movie today?

(See Still More Practice, p. 463.)
Roman Numerals

The ancient Romans used letters to write numbers.

1 = I    4 = IV    7 = VII    10 = X    40 = XL    70 = LXX
2 = II   5 = V     8 = VIII   20 = XX   50 = L     80 = LXXX
3 = III  6 = VI    9 = IX     30 = XXX  60 = LX    90 = XC

Use these rules to read and write Roman numerals:

• When letters that stand for lesser numerals come after letters that stand for greater numerals, add.
  III → 1 + 1 + 1 = 3
  VIII → 5 + 3 = 8
  LVIII → 50 + 8 = 58

• When a letter that stands for a lesser numeral comes before a letter that stands for a greater numeral, subtract.
  IV → 5 − 1 = 4
  IX → 10 − 1 = 9
  XL → 50 − 10 = 40

CXLVII = ?
C
XL
VII

100 + 40 + 7 = 147

Write the Roman numeral in standard form.
1. LXIV    2. XXXIX    3. LXIX    4. CXXVI    5. CCVII

Write each as a Roman numeral.
6. 17    7. 48    8. 300    9. 89    10. 56    11. 234
Chapter 3 Test

Choose a method to estimate. Then add.
1. 509 + 45  
2. 283 + 179  
3. 8059 + 397
4. 151,209 + 348,964  
5. 902,651 + 48,376
6. 176 + 205 + 387  
7. 374 + 162 + 51  
8. $78.50 + .99 + 5.38  
9. 23,154 + 96 + 4,129

Choose a method to estimate. Then subtract.
10. 750 − 29  
11. 5123 − 99  
12. 56,150 − 3777
13. 8,731,402 − 5,062,974  
14. 9,532,486 − 983,723
15. 5430 − 298  
16. 3000 − 2951  
17. $29.39 − 18.42  
18. 29,126 − 8,437

Problem Solving

Use a strategy you have learned.
19. Mrs. Lee bought 4 items for $29.99, $17.59, $35.79, and $49.99. How much did she pay? If she gave the cashier $135.00, how much change did she receive?

Tell About It

Use front-end digits and rounding to estimate the sum. Explain which method of estimation gives an answer closer to the actual sum and why.
20. 659 + 251

Performance Assessment

21. List which three money amounts in the boxes have a sum of about $73. Use estimation to help.

$63.50 $1.35 $3.75 $8.25 $58.50
### Test Preparation

**Choose the best answer.**

1. Choose the standard form of the number.
   - **ninety-one thousand, four hundred sixty**
     - a. 9146
     - b. 91,046
     - c. 91,460
     - d. 91,460,000

2. Which is ordered greatest to least?
   - a. 5718; 57,180; 56,032; 57,099
   - b. 57,099; 57,180; 56,032; 5718
   - c. 57,180; 57,099; 56,032; 5718
   - d. 57,180; 57,099; 56,032; 5718

3. About what number is the arrow pointing toward?
   - a. 225
   - b. 250
   - c. 255
   - d. 270

4. Find the missing addend.
   - **12 = x + 4**
     - a. 5
     - b. 8
     - c. 12
     - d. 16

5. **8502 − 647**
   - a. 7865
   - b. 7855
   - c. 9149
   - d. not given

6. Which is more than 20,000 but less than 28,000?
   - a. 15,987 + 13,162
   - b. 29,000 − 900
   - c. 30,255 − 11,065
   - d. 23,154 + 96 + 4129

7. Choose the standard form of the number.
   - a. 30,085,006
   - b. 30,085,060
   - c. 30,805,006
   - d. 30,850,006

8. Round 5638 to the nearest thousand.
   - a. 5000
   - b. 5600
   - c. 5700
   - d. 6000

9. What is the value of the change?
   - Cost: $14.52
   - Amount given: $20.00
     - a. $5.48
     - b. $6.48
     - c. $6.52
     - d. $6.58

10. Find the missing subtrahend.
    - **17 − n = 9**
      - a. 6
      - b. 7
      - c. 8
      - d. 9

11. **$89.60 + 0.88 + 6.49**
    - a. $95.97
    - b. $96.87
    - c. $150.48
    - d. not given

12. Which statement is true?
    - a. 6 + (3 + 4) = (6 + 3) + 1
    - b. (6 + 3) + 4 = 6 + (3 + 4)
    - c. (4 + 3) + 1 = (6 + 3) + 1
    - d. none of these
13. Which is ordered least to greatest?

a. $43.14, $43.41, $44.13, $43.44
b. $43.14, $43.41, $43.44, $44.13
c. $44.13, $43.44, $43.41, $43.14
d. $43.14, $43.44, $44.13, $44.13

17. Subtract.

\[
\begin{array}{r}
787,842 \\
- 634,367 \\
\end{array}
\]

a. 153,475
b. 153,485
c. 153,575
d. 153,585

14. What is the period of the underlined digits?

423,578,109

a. thousands period
b. millions period
c. ones period
d. not given

18. Find the value of the expression.

26 + n, when n = 17

a. 9
b. 43
c. 33
d. 42

15. Add.

$62.73

+ 6.94

a. $68.57
b. $68.67
c. $69.57
d. $69.67

19. Which shows the best way to check the answer?

\[
\begin{array}{r}
484 \\
- 253 \\
\end{array}
\]

a. 484 - 253 = 231
b. 484 + 231 = 715
c. 231 + 253 = 484
d. 242 + 242 = 484

16. Lynette found 224 clams. She sold 195 clams to a fish store and kept the rest. How many clams did Lynette keep?

a. 195
b. 129
c. 109
d. 29

20. Ty has 45 posters. Some of the posters are of cars and the others are of trains. For each train poster, he has 8 car posters. How many train posters does Ty have?

a. 40
b. 32
c. 8
d. 5

Tell About It

Explain how you solved the problem. Show all your work.

21. Which statement below is not true? Explain why.

- The sum of two odd numbers is always even.
- The difference between an even number and an odd number is always even.
Is Six Times One a Lot of Fun?

Is six times one a lot of fun?
Or eight times two?
Perhaps for you.
But five times three
Unhinges me,
While six and seven and eight times eight
Put me in an awful state
And four and six and nine times nine
Make me want to cry and whine
So when I get to twelve times ten
I begin to wonder when
I can take a vacation from multiplication
And go out
And start playing again.

Karla Kuskin

In this chapter you will:
Use multiplication properties
Learn about special factors and patterns
Explore multiplication models
Estimate and multiply whole numbers and money
Solve problems by working backward

Critical Thinking/Finding Together
Use base ten blocks to model and find the product for each multiplication the girl is thinking of.
The properties of multiplication can help you to multiply quickly and correctly.

**Commutative Property of Multiplication**
- Changing the *order* of the factors does not change the product.

\[
\begin{align*}
4 \times 5 &= 20 \\
5 \times 4 &= 20 
\end{align*}
\]

**Associative Property of Multiplication**
- Changing the *grouping* of the factors does not change the product.

\[
\begin{align*}
(1 \times 4) \times 2 &= 1 \times (4 \times 2) \\
4 \times 2 &= 1 \times 8 \\
8 &= 8
\end{align*}
\]

**Identity Property of Multiplication**
- The product of *one* and a number is the same as that number.

\[
\begin{align*}
1 \times 6 &= 6 \\
6 \times 1 &= 6 
\end{align*}
\]

**Zero Property of Multiplication**
- The product of *zero* and a number is 0.

\[
\begin{align*}
0 \times 3 &= 0 \\
3 \times 0 &= 0
\end{align*}
\]

Find the products. Name the multiplication property you used.

1. \(1 \times 8\) 2. \(9 \times 4\) 3. \(2 \times 6\) 4. \(7 \times 5\)
5. \(6 \times 7\) 6. \(8 \times 5\) 7. \(6 \times 0\) 8. \(9 \times 1\)
Use multiplication properties to complete.

9. \(2 \times (3 \times 1) = (2 \times 3) \times 1\)  
\[2 \times \frac{?}{?} = \frac{?}{?} \times 1\]  
\[\frac{?}{?} = \frac{?}{?}\]

10. \((3 \times 2) \times 2 = 3 \times (2 \times 2)\)  
\[? \times ? = ? \times ? \]  
\[? = ?\]

11. \(2 \times (5 \times 0) = (2 \times 5) \times ?\)  
\[? \times ? = ? \times ? \]  
\[? = ?\]

12. \((1 \times 6) \times 2 = ? \times (\frac{?}{?} \times ?)\)  
\[? \times ? = ? \times ? \]  
\[? = ?\]

Use the properties of multiplication to solve.

13. The product is 8. One factor is 8. What is the other factor?  
14. If \(8 \times 12 = 96\), what is the product of \(12 \times 8\)?

**Distributive Property**

**Distributive Property of Multiplication over Addition**

Multiplying a number by a sum is the same as multiplying the number by each addend of the sum and then adding the products.

\[5 \times (2 + 1) = (5 \times 2) + (5 \times 1)\]

\[5 \times 3 = 10 + 5\]

\[15 = 15\]

Use the distributive property to complete.

15. \(4 \times (3 + 2) = (4 \times 3) + (4 \times 2)\)  
\[4 \times \frac{?}{?} = \frac{?}{?} + \frac{?}{?}\]

16. \(3 \times (5 + 4) = (3 \times ?) + (3 \times ?)\)  
\[3 \times \frac{?}{?} = \frac{?}{?} + \frac{?}{?}\]

17. \(5 \times (6 + 3) = (\frac{?}{?} \times \frac{?}{?}) + (\frac{?}{?} \times \frac{?}{?})\)  
\[\frac{?}{?} \times \frac{?}{?} = \frac{?}{?} + \frac{?}{?}\]
Sharon uses 16 paper clips to make a necklace. How many paper clips will she need to make 2 necklaces?
Multiply: \(2 \times 16\)

\[
\begin{array}{c}
16 \\
\downarrow \\
16 \\
\rightarrow \text{2 tens} \\
16 \\
\rightarrow \text{3 tens} \\
2 \text{ tens} \\
12 \text{ ones} \\
3 \text{ tens} \\
2 \text{ ones} \\
30 \\
+ \\
2 \\
\rightarrow 32 \\
\end{array}
\]

\[2 \times 16 = 32\]
Sharon needs 32 paper clips.

Holly makes a bracelet with 3 rows of beads. Each row has 15 beads. How many beads are in the bracelet?

\[
\begin{array}{c}
3 \\
\uparrow \\
10 \\
\downarrow \\
5 \\
\end{array}
\]

There are 45 beads in the bracelet.

Ito wants to make 4 headbands. Each headband uses 34 elastic bands. How many elastic bands does he need?
Multiply: \(4 \times 34\)

\[
\begin{array}{c}
4 \times 3 \text{ tens} = 12 \text{ tens} = 120 \\
4 \times 4 \text{ ones} = 16 \text{ ones} = 16 \\
\end{array}
\]

\[
\begin{array}{c}
120 \\
+ \\
16 \\
\rightarrow 136 \\
\end{array}
\]

\[4 \times 34 = 136\]
Ito needs 136 elastic bands.
Write a multiplication sentence for each model.

1. 2.

3. 4.

You may use models.

7. Raul has 3 paper-clip chains. Each one is 55 paper clips long. He connects them. How long is the new chain?

8. Monica paints T-shirts. She paints 17 dots on each T-shirt. How many dots does she paint on 9 T-shirts?

9. Marva makes stained-glass designs. One design has 5 rows of squares. There are 10 squares in each row. How many squares does Marva use?

10. Paul and Emma build model boats. Paul uses 25 craft sticks to build a rowboat. Emma uses 20 craft sticks to build a rowboat. How many craft sticks will Paul and Emma each need to build 4 rowboats?

11. Peter uses 52 toothpicks to build a model house. How many toothpicks does he need for 6 model houses?
Look for a pattern when you multiply tens.

\[
\begin{align*}
4 \times 1 \text{ ten} &= 4 \text{ tens} \\
4 \times 10 &= 40 \\
7 \times 1 \text{ ten} &= 7 \text{ tens} \\
7 \times 10 &= 70 \\
2 \times 3 \text{ tens} &= 6 \text{ tens} \\
2 \times 30 &= 60 \\
2 \times 5 \text{ tens} &= 10 \text{ tens} \\
2 \times 50 &= 100
\end{align*}
\]

To multiply tens, hundreds, or thousands:
- Multiply the nonzero digits.
- Count the number of zeros in the factors.
- Then write the same number of zeros in the product.

\[
\begin{align*}
50 \times 9 &= 450 \\
700 \times 4 &= 2800 \\
5000 \times 6 &= 30,000
\end{align*}
\]

Write a multiplication sentence for each.

1. \(8 \times 10 = 80\)

2. 

3. 

4. 

5. 

6. 

Copy and complete each multiplication.
7. \(6 \times 3 \text{ tens} = 6 \times 30 = 180\)
8. \(5 \times 4 \text{ tens} = 5 \times 40 = ?\)
9. \(9 \times 1 \text{ hundred} = 9 \times 100 = ?\)
10. \(4 \times 1 \text{ thousand} = 4 \times 1000 = ?\)
11. \(7 \times 3 \text{ thousands} = ? \times ? = ?\)

Find the product.
12. \(4 \times 1 \text{ ten}\)
13. \(7 \times 3 \text{ tens}\)
14. \(8 \times 1 \text{ hundred}\)
15. \(9 \times 6 \text{ tens}\)
16. \(2 \times 5 \text{ hundreds}\)
17. \(4 \times 7 \text{ hundreds}\)
18. \(7 \times 1 \text{ thousand}\)
19. \(6 \times 3 \text{ thousands}\)
20. \(5 \times 8 \text{ thousands}\)

Use mental math to multiply. Explain how you got your answer.
21. \(90 \times 3\)
22. \(70 \times 2\)
23. \(80 \times 4\)
24. \(50 \times 5\)
25. \(500 \times 3\)
26. \(900 \times 9\)
27. \(400 \times 5\)
28. \(300 \times 8\)
29. \(1000 \times 6\)
30. \(6000 \times 4\)
31. \(5000 \times 7\)
32. \(9000 \times 6\)

Problem Solving
33. There are 5000 seats at Carver Stadium. Baseball games are played there 4 nights a week. How many tickets can the stadium sell each week?
34. Glen runs the 50-yard dash 8 times. How many yards does he run in all?
35. Ms. Spero swims 8 laps every day. How many laps does she swim in September?
Multiply by One-Digit Numbers

Each of 2 fish tanks holds 24 fish. How many fish are there?

To find how many, join 2 sets of 24.

Think

\[24 = 2 \text{ tens } 4 \text{ ones}\]

\[
\begin{align*}
2 \text{ tens } 4 \text{ ones} \\
+ 2 \text{ tens } 4 \text{ ones} \\
\hline
4 \text{ tens } 8 \text{ ones} = 40 + 8 = 48
\end{align*}
\]

You can join 2 sets of 24 by using the distributive property.

2 sets of 24 = \(2 \times 24\)
\[= 2 \times (20 + 4)\]
\[= (2 \times 20) + (2 \times 4)\]
\[= 40 + 8\]
\[= 48\]

You can multiply: \(2 \times 24\)

Multiply the ones.

\[
\begin{align*}
24 \\
\times 2 \\
\hline
8
\end{align*}
\]

\[2 \times 4 \text{ ones } = 8 \text{ ones}\]

Multiply the tens.

\[
\begin{align*}
24 \\
\times 2 \\
\hline
48
\end{align*}
\]

\[2 \times 2 \text{ tens } = 4 \text{ tens}\]

There are 48 fish.

Multiply.

1. \(12\) \(\times 2\)  
2. \(22\) \(\times 3\)  
3. \(13\) \(\times 3\)  
4. \(11\) \(\times 5\)  
5. \(14\) \(\times 2\)  
6. \(12\) \(\times 4\)
Find the product. Use mental math or paper and pencil.

7. \( \times 9 \)
8. \( \times 2 \)
9. \( \times 4 \)
10. \( \times 2 \)
11. \( \times 3 \)
12. \( \times 3 \)
13. \( \times 3 \)
14. \( \times 2 \)
15. \( \times 2 \)
16. \( \times 3 \)
17. \( \times 1 \)
18. \( \times 2 \)
19. \( 2 \times 23 \)
20. \( 4 \times 22 \)
21. \( 2 \times 33 \)
22. \( 3 \times 31 \)
23. \( 2 \times 42 \)
24. \( 3 \times 21 \)
25. \( 4 \times 21 \)
26. \( 8 \times 11 \)
27. \( 2 \times 14 \)
28. \( 2 \times 31 \)
29. \( 7 \times 11 \)
30. \( 2 \times 32 \)

31. Fish World received 3 cartons of fish food. There were 12 boxes of food in each carton. How many boxes of fish food did Fish World receive?

32. Niqui displayed 22 fish care booklets on each of 4 shelves. How many fish care booklets did Niqui display on the shelves?

33. Greg filled each of 2 fish tanks with 14 gallons of water. How much water did Greg use to fill the tanks?

34. There were 2 shipments of 42 goldfish each to Fish World. How many goldfish were there in both shipments?

35. Use each of the three methods on page 132 to find the product of \( 23 \times 3 \). Which method do you find easiest? Why?

36. How is multiplication like addition? How is it different?
Products: Front-End Estimation

Will 5 games cost more or less than $100?

To find if the games will cost more or less than $100, use \textit{front-end estimation}.

Multiply the front digit of each factor. Write 0s for the other digits.

\[
\begin{align*}
25.95 & \quad \times \quad 5 \\
20.00 & \quad \times \quad 5 \\
25.95 & \quad \times \quad 5 \\
\end{align*}
\]

Write $ and . in the product.

\[
\begin{align*}
$100.00 & \\
\end{align*}
\]

Since $25.95 is greater than $20, the actual cost is close to but greater than $100.

The 5 games will cost more than $100.

Study these examples.

\[
\begin{align*}
62 & \quad \times \quad 6 \\
5.28 & \quad \times \quad 7 \\
8406 & \quad \times \quad 8 \\
.71 & \quad \times \quad 3 \\
\end{align*}
\]

\[
\begin{align*}
\text{about 360} & \\
\text{about$35.00} & \\
\text{about 64,000} & \\
\text{about$2.10} & \\
\end{align*}
\]

Use front-end digits to estimate the product.

1. \quad 82 \quad \times \quad 6
2. \quad 98 \quad \times \quad 7
3. \quad 46 \quad \times \quad 5
4. \quad .73 \quad \times \quad 3
5. \quad .57 \quad \times \quad 2

6. \quad 473 \quad \times \quad 8
7. \quad .91 \quad \times \quad 4
8. \quad 5125 \quad \times \quad 9
9. \quad 1070 \quad \times \quad 6
10. \quad .3295 \quad \times \quad 7

11. \quad 849 \quad \times \quad 4
12. \quad .653 \quad \times \quad 3
13. \quad 4673 \quad \times \quad 8
14. \quad 7211 \quad \times \quad 5
15. \quad .3224 \quad \times \quad 9
Use front-end digits to estimate the product.

16. 55 × 2
17. 49 × 9
18. 31 × 7
19. 64 × 6
20. 78 × 3
21. 437 × 9
22. 622 × 5
23. 145 × 4
24. 744 × 7
25. 609 × 8
26. 7832 × 6
27. 8209 × 5
28. 9848 × 4
29. 4633 × 2
30. $.65 × 9
31. $8.33 × 7
32. $34.72 × 5
33. $21.24 × 6
34. 4 × $7.10
35. 2 × $9.67
36. 9 × $37.55

Problem Solving

37. Will 3 controls cost more or less than $60? Explain why.

38. About how much would a set of 2 speakers cost?

39. Will 7 controls cost more than 2 game systems? Explain why.

40. Jenique wants to buy 1 game system, 2 speakers, and 3 controls. About how much will she spend?

TEST PREPARATION

41. Choose the estimated product.

6 × 4863
A 28,800
B 24,000
C 20,000
D 2400
Cody needs 102 pushpins. There are 35 pushpins in each packet. Will Cody have enough if he buys 3 packets?

To find whether Cody will have enough pushpins, find the product: \(3 \times 35\)

First, estimate using front-end digits: \(3 \times 30 = 90\)

Then, multiply. The actual product will be greater than 90.

Multiply the ones. Regroup.

\[
\begin{array}{c}
\times 3 \\
35 \\
\hline
5 \\
\end{array}
\]

Multiply the tens. Add the regrouped tens.

\[
\begin{array}{c}
\times 3 \\
35 \\
\hline
105 \\
\end{array}
\]

Cody will have enough pushpins.

Practice

1. \(18 \times 3\)  
2. \(16 \times 5\)  
3. \(38 \times 2\)  
4. \(24 \times 3\)  
5. \(16 \times 4\)  
6. \(25 \times 2\)  
7. \(15 \times 7\)  
8. \(29 \times 3\)  
9. \(44 \times 8\)  
10. \(32 \times 6\)  
11. \(22 \times 7\)  
12. \(58 \times 5\)
Find the pattern rule. Complete the pattern.

37. 10, 15, 25, 30, 40, ?, ?, ?
38. 1, 3, 2, 4, 3, 5, ?, ?, ?
39. 24, 30, 28, 34, 32, ?, ?, ?
40. 1, 1, 3, 5, 5, 7, ?, ?, ?
41. 1, 2, 3, 6, 7, 14, ?, ?, ?
42. 2, 4, 6, 12, 14, ?, ?, ?

Use front-end digits to estimate. Then multiply.

13. 24 \times 6
14. 46 \times 4
15. 68 \times 5
16. 78 \times 2
17. 36 \times 3
18. 86 \times 9
19. 3 \times 27
20. 4 \times 63
21. 5 \times 84
22. 6 \times 77
23. 9 \times 58
24. 7 \times 45
25. 8 \times 67
26. 9 \times 99
27. 5 \times 59
28. 2 \times 89
29. 3 \times 88
30. 4 \times 96

Problem Solving

31. The school play has 4 acts. Each act is 23 minutes long. How long is the school play?

32. The school cafeteria serves salad 5 times a week. In 22 weeks, how many times is salad served?

33. Hunter Grade School has 6 grades. Each grade has 98 students. How many students go to Hunter?

34. Each row in the school parking lot holds 28 cars. There are 6 rows. How many cars can park in the lot?

35. Ms. Shaw assigns one chapter of a book as homework every week. Each chapter has 87 pages. How many pages will Ms. Shaw’s students have read in 7 weeks?

36. Each student in Mr. Klein’s class can work at the class computer for 15 minutes at a time. Nine students have worked at the computer today. How many minutes were spent at the computer altogether?
Multiply Three-Digit Numbers

Each of the 8 families on Pine Road receives a newspaper delivery each day of the year. How many newspapers are delivered on Pine Road each year?

To find how many, multiply: \(8 \times 365\)

First, estimate using front-end digits:

\[
\begin{align*}
8 \times 365 &= 8 \\
&\quad \downarrow \\
&\quad 8 \\
&\quad 300 = 2400
\end{align*}
\]

Then multiply.

**Multiply the ones.**

Regroup.

\[
\begin{array}{c}
365 \\
\times 8 \\
\hline
0
\end{array}
\]

\[
8 \times 5 \text{ ones} = 40 \text{ ones} \\
40 \text{ ones} = 4 \text{ tens} 0 \text{ ones}
\]

**Multiply the tens. Add the regrouped tens. Regroup.**

\[
\begin{array}{c}
365 \\
\times 8 \\
\hline
20
\end{array}
\]

\[
8 \times 6 \text{ tens} = 48 \text{ tens} \\
48 \text{ tens} + 4 \text{ tens} = 52 \text{ tens} \\
52 \text{ tens} = 5 \text{ hundreds} 2 \text{ tens}
\]

**Multiply the hundreds. Add the regrouped hundreds.**

\[
\begin{array}{c}
365 \\
\times 8 \\
\hline
2920
\end{array}
\]

\[
8 \times 3 \text{ hundreds} = 24 \text{ hundreds} \\
24 \text{ hundreds} + 5 \text{ hundreds} = 29 \text{ hundreds} \\
29 \text{ hundreds} = 2 \text{ thousands} 9 \text{ hundreds}
\]

Each year, 2920 newspapers are delivered on Pine Road.

**Think**

2920 is close to 2400.
The answer is reasonable.
Use front-end digits to estimate. Then multiply.

1. \( \frac{1}{4} \times 504 \)  
2. \( \frac{1}{3} \times 101 \)  
3. \( \frac{1}{4} \times 210 \)  
4. \( \frac{1}{2} \times 323 \)  
5. \( \frac{1}{3} \times 223 \)  

\[ \begin{array}{c}
\times 4 \\
\times 3 \\
\times 4 \\
\times 2 \\
\times 3 \\
\end{array} \]

\[ \begin{array}{c}
2016 \\
\end{array} \]

6. \( \frac{1}{5} \times 308 \)  
7. \( \frac{1}{8} \times 410 \)  
8. \( \frac{1}{7} \times 271 \)  
9. \( \frac{1}{9} \times 505 \)  
10. \( \frac{1}{4} \times 192 \)  

\[ \begin{array}{c}
\times 5 \\
\times 8 \\
\times 7 \\
\times 9 \\
\times 4 \\
\end{array} \]

11. \( \frac{1}{6} \times 634 \)  
12. \( \frac{1}{9} \times 279 \)  
13. \( \frac{1}{7} \times 844 \)  
14. \( \frac{1}{8} \times 575 \)  
15. \( \frac{1}{5} \times 397 \)  

\[ \begin{array}{c}
\times 6 \\
\times 9 \\
\times 7 \\
\times 8 \\
\times 5 \\
\end{array} \]

Find the product. Use mental math or paper and pencil.

16. \( 2 \times 304 \)  
17. \( 3 \times 131 \)  
18. \( 2 \times 642 \)  
19. \( 5 \times 160 \)  
20. \( 6 \times 702 \)  
21. \( 4 \times 261 \)  
22. \( 8 \times 625 \)  
23. \( 7 \times 444 \)  
24. \( 9 \times 368 \)  

25. Show how you could use the distributive property to find the product for exercise 16.

26. The Ecology Club brought 6 bundles of junk mail to the recycling center. Each bundle weighed 275 pounds. How many pounds of junk mail did the Ecology Club recycle?

27. Troop 42 collected 8 bins of cardboard for recycling. Four of the bins held 325 pounds of cardboard each. The other 4 bins held 450 pounds of cardboard each. How many pounds of cardboard did Troop 42 collect?

28. Six of the families on Pine Road each recycled at least 8 aluminum cans each week last year. There are 52 weeks in a year. Altogether, did these families recycle more or less than 2000 aluminum cans last year? Explain.
Cesar buys 8 notebooks for the Detective Club. Each notebook costs $3.39. What is the total cost?

To find the total cost, multiply: $8 \times \$3.39$

First, estimate using front-end digits: $\frac{\$3.39}{8}$

about $\$24.00$

Then multiply.

To multiply money:

- Multiply the same way you multiply whole numbers.
- Write a decimal point in the product two places from the right.
- Write the dollar sign.

The total cost is $27.12.

Study these examples.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$.64</td>
<td>$2.07</td>
</tr>
<tr>
<td></td>
<td>× 3</td>
<td>× 4</td>
</tr>
<tr>
<td></td>
<td>$1.92</td>
<td>$8.28</td>
</tr>
</tbody>
</table>

Use front-end digits to estimate. Then multiply.

1. $\$0.46 \times 6$
2. $\$0.38 \times 8$
3. $\$0.52 \times 7$
4. $\$0.74 \times 9$
5. $\$0.25 \times 3$
6. $\$1.05 \times 2$
7. $\$5.73 \times 5$
8. $\$6.26 \times 4$
9. $\$8.30 \times 7$
10. $\$4.52 \times 9$

Think: $\$27.12$ is close to $\$24.00$. The answer is reasonable.
Use front-end digits to estimate. Then find the product.

11. \(\frac{.42}{8}\)  
12. \(\frac{.95}{2}\)  
13. \(\frac{.79}{3}\)  
14. \(\frac{.12}{5}\)  
15. \(\frac{8.31}{4}\)  
16. \(\frac{7.95}{9}\)  
17. \(\frac{4.36}{2}\)  
18. \(\frac{8.95}{6}\)  
19. \(\frac{7.50}{8}\)  
20. \(\frac{4.31}{7}\)  
21. \(\frac{6.08}{5}\)  
22. \(\frac{9.49}{3}\)  
23. \(4 \times .53\)  
24. \(6 \times .87\)  
25. \(8 \times .19\)  
26. \(7 \times 4.03\)  
27. \(9 \times 1.71\)  
28. \(3 \times 7.47\)  
29. \(2 \times 9.76\)  
30. \(5 \times 5.98\)  
31. \(4 \times 6.61\)

**Problem Solving**

Use the sign on page 140.

32. How much more would 5 periscopes cost than 2 walkie-talkies?

33. How much would 2 periscopes and 3 pairs of walkie-talkies cost?

34. What is the cost of 4 walkie-talkies and 6 invisible ink markers?

**DO YOU REMEMBER?**

Complete the sentences. Use the words in the box.

35. Any letter can be used as a _variable_.

36. The _expression_ \(14 + 7\) is another way to write 21.

37. Addition is the _inverse operation_ of subtraction.
Mr. Carter built houses on 6 neighboring plots of land. Each plot is 6,875 square feet. On how many square feet of land did he build the houses?

To find how many square feet, multiply: $6 \times 6875$

First, estimate using front-end digits:

\[
\begin{array}{c}
6875 \\
\times \quad 6 \\
\hline
36,000
\end{array}
\]

Think $6875 \times 6 > 6000$, so the answer is greater than 36,000.

Then multiply.

\[
\begin{array}{c}
543 \\
\times \quad 6875 \\
\hline
41,250
\end{array}
\]

Think $41,250 > 36,000$. The answer is reasonable.

Mr. Carter built the houses on 41,250 square feet of land.

Study these examples.

\[
\begin{array}{c}
1231 \\
\times \quad 1406 \\
\hline
2520
\end{array}
\]

\[
\begin{array}{c}
4123 \\
\times \quad 2547 \\
\hline
7640
\end{array}
\]

Use front-end digits to estimate. Then multiply. Use mental math when you can.

1. $2221 \times 3$
2. $1022 \times 4$
3. $2432 \times 2$
4. $3123 \times 3$
5. $1035 \times 7$
6. $2164 \times 4$
7. $1146 \times 6$
8. $3257 \times 3$
Use front-end digits to estimate. Then find the product.

9. \( \times 9 \)  
10. \( \times 7 \)  
11. \( \times 5 \)  
12. \( \times 8 \)

13. \( \times 6 \)  
14. \( \times 4 \)  
15. \( \times 9 \)  
16. \( \times 9 \)

17. \( \times 7 \)  
18. \( \times 5 \)  
19. \( \times 6 \)  
20. \( \times 3 \)

21. \( 2 \times 9455 \)  
22. \( 5 \times 3408 \)  
23. \( 4 \times 6472 \)

24. \( 6 \times $36.75 \)  
25. \( 8 \times $42.56 \)  
26. \( 7 \times $22.95 \)

27. Each ranch house in Shady Acres has 1256 square feet of floor space. How many square feet of flooring were used for the 8 ranch houses in Shady Acres?

28. There are 4 miles of roads through Shady Acres. One mile is equal to 5280 feet. How many feet long are all the roads through Shady Acres?

29. In Shady Acres, 2841 houses have 5 people living in them. How many people live in those houses altogether?

Write About It

Predict which product is greater. Multiply to check.

30. \( 7 \times 6321 \) or \( 6 \times 7321 \)  
31. \( 5 \times 3451 \) or \( 3 \times 5451 \)

32. \( 8 \times 9310 \) or \( 9 \times 8310 \)  
33. \( 4 \times 9999 \) or \( 9 \times 4999 \)

34. In your Math Journal, write how you made your predictions.
Patterns in Multiplication

Look for patterns to help you multiply by 10.

\[
\begin{array}{llll}
1 \times 35 &= 35 & 1 \times 50 &= 50 & 1 \times 457 &= 457 \\
10 \times 35 &= 350 & 10 \times 50 &= 500 & 10 \times 457 &= 4570 \\
10 \times 350 &= 3500 & 10 \times 500 &= 5000 &
\end{array}
\]

Look for patterns or basic facts to help you multiply by tens.

\[
\begin{array}{llll}
8 \times 40 &= 320 & 9 \times 31 &= 279 \\
80 \times 40 &= 3200 & 90 \times 31 &= 2790 \\
80 \times 400 &= 32,000 & 90 \times 310 &= 27,900 \\
\end{array}
\]

To multiply a number by 10 or by tens:

- Multiply the nonzero digits.
- Count the number of zeros in the factors.
- Then write the same number of zeros in the product.

\[
\begin{array}{llll}
35 \times 10 &= 350 & 500 \times 10 &= 5000 & 457 \times 10 &= 4570 \\
350 \times 10 &= 3500 & 5000 \times 10 &= 50000 &
\end{array}
\]

\[
\begin{array}{llll}
40 \times 80 &= 3200 & 400 \times 80 &= 32000 & 31 \times 90 &= 2790 & 310 \times 90 &= 27900 \\
3200 \times 80 &= 256000 & 32000 \times 90 &= 2880000 &
\end{array}
\]

Hint: The number of zeros in the product should be the same as the number of zeros in both the factors.

Multiply mentally.

1. 18 \times 10 
2. 24 \times 10 
3. 57 \times 10 
4. 61 \times 10 
5. 50 \times 10 
6. 345 \times 10 
7. 638 \times 10 
8. 999 \times 10 
9. 450 \times 10 
10. 690 \times 10
Find the product.

11. \(23 \times 20\)  
12. \(42 \times 60\)  
13. \(61 \times 30\)  
14. \(70 \times 40\)  
15. \(60 \times 50\)

16. \(230 \times 20\)  
17. \(420 \times 60\)  
18. \(610 \times 30\)  
19. \(700 \times 40\)  
20. \(600 \times 50\)

21. \(52 \times 80\)  
22. \(25 \times 90\)  
23. \(19 \times 70\)  
24. \(80 \times 80\)  
25. \(40 \times 90\)

26. \(520 \times 80\)  
27. \(250 \times 90\)  
28. \(190 \times 70\)  
29. \(800 \times 80\)  
30. \(400 \times 90\)

Look for a pattern to find each product.

31. \(1 \times 78\)  
32. \(9 \times 60\)  
33. \(2 \times 78\)

10 \(\times 78\)  
90 \(\times 60\)  
20 \(\times 78\)

10 \(\times 780\)  
90 \(\times 600\)  
20 \(\times 780\)

34. \(7 \times 60\)  
35. \(8 \times 50\)  
36. \(6 \times 35\)

70 \(\times 60\)  
80 \(\times 50\)  
60 \(\times 35\)

70 \(\times 600\)  
80 \(\times 500\)  
60 \(\times 350\)

Compute mentally. Explain how you found your answer.

37. How many zeros are in the product when you multiply \(10 \times 670\)?

38. How many zeros are in the product when you multiply \(40 \times 500\)?

Find the products mentally.

39. \(1 \times 56\)  
40. \(7 \times 41\)  
41. \(3 \times 63\)

10 \(\times 56\)  
70 \(\times 41\)  
30 \(\times 63\)

100 \(\times 56\)  
700 \(\times 41\)  
300 \(\times 63\)

100 \(\times 560\)  
700 \(\times 410\)  
300 \(\times 630\)

100 \(\times 5600\)  
700 \(\times 4100\)  
300 \(\times 6300\)
A school bought 28 cans of paint for a special school project. The school bought the paint at a discounted price of $5.25 per can. About how much money did the school spend on paint?

To find about how much the school spent, estimate: \(28 \times 5.25\)

Rounding is one way to estimate products:
- Round each factor to its greatest place.
- Multiply.

\[
\begin{align*}
5.25 \quad &\rightarrow \quad 5.00 \\
\times 28 \quad &\rightarrow \quad \times 30 \\
\text{about} \quad &\quad \text{about} \quad \text{You can write 150.00 as 150.}
\end{align*}
\]

The school spent about $150 on 28 cans of paint.

### Study these examples.

\[
\begin{align*}
43 \rightarrow 40 & \quad 586 \rightarrow 600 & \quad 91 \rightarrow 60 & \quad .48 \rightarrow 50 \\
\times 62 \rightarrow \times 60 & \quad \times 55 \rightarrow \times 60 & \quad \times 32 \rightarrow \times 30 & \quad \text{about 2400} \quad \text{about 36,000} \quad \text{about 15.00}
\end{align*}
\]

### Estimate each product by rounding.

1. \(52 \times 75\)  
2. \(68 \times 41\)  
3. \(91 \times 22\)  
4. \(86 \times 57\)  
5. \(47 \times 33\)  

6. \(19 \times 62\)  
7. \(78 \times 53\)  
8. \(29 \times 58\)  
9. \(34 \times 92\)  
10. \(85 \times 38\)  

11. \$.17 \times 27\)  
12. \$.36 \times 81\)  
13. \$.42 \times 74\)  
14. \$.66 \times 65\)  
15. \$.26 \times 57\)
Estimate each product by rounding.

16. 348 × 23
17. 551 × 66
18. 619 × 72
19. 809 × 94
20. 748 × 88

21. 315 × 38
22. 754 × 24
23. 449 × 57
24. 938 × 46
25. 656 × 53

26. $4.59 × 34
27. $6.53 × 76
28. $7.24 × 83
29. $5.39 × 24
30. $8.57 × 79

31. 27 × 426
32. 14 × 643
33. 36 × 338

34. 27 × $2.04
35. 54 × $7.15
36. 68 × $7.46

Problem Solving

37. There were 24 gallons of blue paint in each of 17 cartons in the storeroom. About how many gallons of blue paint were in the storeroom?

38. Each sheet of maple wall paneling covers 48 square feet. Mr. Troc sold 22 sheets of the paneling. About how many square feet of paneling did he sell?

39. Each sheet of maple paneling sells for $152. Were the total sales of the 22 sheets of paneling between $2000 and $3000, between $3000 and $4000, or between $4000 and $5000?

DO YOU REMEMBER?

Align and add.

40. 94 + 360
41. 78 + 645
42. 65 + 940
43. 26 + 392
James baked 24 dozen crescent rolls. How many rolls did James bake?

**Think**

1 dozen = 12

To find how many rolls, multiply: \(24 \times 12\)

First, use rounding to estimate:

\[
20 \times 10 = 200
\]

Then multiply.

**Here is one way to multiply 24 \(\times 12\).**

\[
\begin{array}{c}
12 \\
\times 24 \\
\hline
48 \\
\end{array}
\begin{array}{c}
12 \\
\times 4 \\
\hline
48 \\
\end{array}
\begin{array}{c}
12 \\
\times 24 \\
\hline
288 \\
\end{array}
\]

\[
48 + 240 = 288
\]

**Here is another way to multiply 24 \(\times 12\).**

\[
\begin{array}{c}
12 \\
\times 24 \\
\hline
48 \\
\end{array}
\begin{array}{c}
12 \\
\times 24 \\
\hline
240 \\
\end{array}
\]

James baked 288 crescent rolls.
Use rounding to estimate. Then multiply.

1. \( \times 22 \)  
2. \( \times 11 \)  
3. \( \times 12 \)  
4. \( \times 21 \)  
5. \( \times 13 \)  
6. \( \times 44 \)  
7. \( \times 24 \)  
8. \( \times 32 \)  
9. \( \times 12 \)  
10. \( \times 21 \)  

Multiply Money

To multiply money by a 2-digit number:
- Multiply the same way you multiply whole numbers.
- Write a decimal point in the product two places from the right.
- Write the dollar sign in the product.

Multiply.

11. \( \times 10 \)  
12. \( \times 50 \)  
13. \( \times 23 \)  
14. \( \times 21 \)  
15. \( \times 20 \)  
16. \( \times 30 \)  
17. \( \times 85 \)  
18. \( \times 14 \)  
19. \( 40 \times \$ .21 \)  
20. \( 12 \times \$ .43 \)  
21. \( 32 \times \$ 3.00 \)  
22. \( \$ 1.00 \times 39 \)  
23. \( \$ .69 \times 40 \)  
24. \( \$ .16 \times 17 \)  

25. James makes 12 batches of crescent rolls. Each batch takes 11 minutes to bake. How much baking time in all will he need?

26. James baked crescent rolls for a bake sale. He charged fifty cents per roll and sold 68 rolls. How much money did he earn?
More Multiplying by Two-Digit Numbers

Kara packed 24 pieces of fruit into each of 58 fruit baskets. How many pieces of fruit did Kara pack into the baskets?

To find how many, multiply: $58 \times 24$

First, use rounding to estimate:

\[
\begin{align*}
24 & \rightarrow 20 \\
\times 58 & \rightarrow \times 60 \\
\rightarrow & \text{about } 1200
\end{align*}
\]

Then multiply.

Multiply by the ones. Multiply by the tens. Add the partial products.

\[
\begin{align*}
3 & \quad 2 \\
2 & \quad 4 \\
4 & \quad 2 \\
\times 5 & \quad \times 5 \\
8 & \quad 19 \\
192 & \quad 192 \\
1200 & + 1200 \\
\rightarrow & 1392
\end{align*}
\]

Kara packed 1392 pieces of fruit.

Study these examples.

\[
\begin{align*}
1 & \quad 3 \\
2 & \quad .3 \\
2 & \quad 5 \\
\times 4 & \quad \times 6 \\
6 & \quad \times \quad 7 \\
132 & \quad 245 \\
\rightarrow & 735
\end{align*}
\]

This zero does not have to be written.
Use rounding to estimate. Then multiply.

1. \(21 \times 46\)  
2. \(36 \times 18\)  
3. \(42 \times 62\)  
4. \(57 \times 19\)  
5. \(73 \times 31\)  

6. \(64 \times 39\)  
7. \(83 \times 44\)  
8. \(56 \times 92\)  
9. \(29 \times 75\)  
10. \(48 \times 99\)  

11. \(.49 \times 32\)  
12. \(.67 \times 58\)  
13. \(.99 \times 64\)  
14. \(.53 \times 28\)  
15. \(.35 \times 76\)  

16. \(95 \times 76\)  
17. \(39 \times 55\)  
18. \(47 \times 63\)  
19. \(25 \times 92\)  

20. \(16 \times 52\)  
21. \(28 \times 82\)  
22. \(34 \times 93\)  
23. \(71 \times 37\)  

24. \(15 \times .94\)  
25. \(34 \times .92\)  
26. \(85 \times .55\)  
27. \(26 \times .78\)  

Find each product. Describe any pattern you see.

28. \(12 \times 6\)  
29. \(12 \times 7\)  
30. \(12 \times 8\)  
31. \(12 \times 9\)  
32. \(12 \times 10\)  
33. \(12 \times 11\)  
34. \(12 \times 12\)  

29. Tyrone put together 62 boxes of canned food. There were 45 cans in each box. How many cans of food were there?

30. Mill Farms donated 85 turkeys to soup kitchens. Each turkey weighed 25 pounds. How many pounds of turkey were donated?

31. How does knowing how to multiply by tens help you multiply a 2-digit number by another 2-digit number? Write your answer in your Math Journal.
Multiply with Three-Digit Numbers

Letisha, Marc, Robin, and Tim all made beaded wall hangings. How many beads did Robin use?

To find how many, multiply: $64 \times 225$

First, use rounding to estimate: $64 \times 225$

$$\begin{array}{c|c}
225 & 200 \\
\times 64 & \times 60 \\
\hline
\text{about 12,000}
\end{array}$$

Then multiply.

Multiply by the ones. Multiply by the tens. Add the partial products.

$$\begin{array}{c|c|c|c}
1 & 2 & \times 64 & \times 64 \\
2 & 2 & 5 & 2 & 2 & 5 \\
\times & 6 & 4 & \times & 6 & 4 \\
9 & 0 & 0 & 9 & 0 & 0 \\
\hline
4 & \times 225 & 60 \times 225 & 13500 + 13500 \\
\hline
14400 & & & 14400
\end{array}$$

Robin used 14,400 beads.

Study these examples.

$$\begin{array}{c|c|c|c|c}
\times & 309 & 132 & 84 \\
7 & 5 & 31 & 4 \\
1545 & 132 & 2604 \\
\hline
21630 & 3960 & 52080 \\
23175 & 4092 & 54684
\end{array}$$

Think

14,400 is close to 12,000. The answer is reasonable.
Estimate mentally. Then find the product.

1. 201 \times 44
2. 132 \times 23
3. 312 \times 11
4. 402 \times 31
5. 611 \times 43

6. 242 \times 33
7. 404 \times 32
8. 723 \times 24
9. 312 \times 42
10. 841 \times 56

11. 492 \times 67
12. 387 \times 75
13. 525 \times 98
14. 906 \times 86
15. 759 \times 52

16. \$2.37 \times 45
17. \$4.99 \times 68
18. \$8.17 \times 39
19. \$6.30 \times 53
20. \$7.88 \times 47

Multiply.

21. 84 \times 634
22. 52 \times 928
23. 79 \times 837

24. 24 \times \$5.09
25. 59 \times \$3.25
26. 46 \times \$9.72

**CRITICAL THINKING**

When you do not need an exact answer, you may be able to estimate to solve a problem.

Use the table on page 152 to solve each problem. Estimate or find an exact answer. Then explain how you solved each.

27. How many beads did Tim use?
28. Did Letisha use more or fewer beads than Tim?

29. Did Marc and Robin use about the same number of beads?
30. Who used the most beads? How many beads did that person use?
Karl bought some guppies in March. He had four times as many guppies by the end of May. He had 46 guppies by the end of June, which was 10 more than at the end of May. How many guppies did he buy in March?

### Visualize the facts of the problem as you reread it.

**Facts:** Karl bought guppies in March.  
- 4 times as many in May  
- 10 more than that in June  
- 46 guppies in June

**Question:** How many guppies did Karl buy in March?

### Plan

Work backward. Use the inverse operation.

- First, find the number of guppies at the end of May:  
  Subtract 10 from the number of guppies he had in June.

  \[46 - 10 = \text{number in May}\]

- Then find the number of guppies he had in March:  
  Divide the number of guppies in May by 4.

  \[\text{number in May} \div 4 = \text{number in March}\]

### Solve

\[46 - 10 = 36 \quad \text{number in May}\]
\[36 \div 4 = 9 \quad \text{number in March}\]
Karl bought 9 guppies in March.

### Check

Start with 9. Use the inverse operation.

- 9 guppies in March
  - \[9 \times 4 = 36 \text{ in May}\]
  - \[36 + 10 = 46 \text{ in June}\]

The answer checks.
Work backward to solve each problem.

1. The Torres family came home from the movies at 5:00 P.M. The trip to and from the movie theater was 15 minutes each way. They spent 1 hour and 45 minutes at the theater. What time did they leave home?

Facts: 5:00 P.M. arrived home
15 minutes travel time to the movies
15 minutes travel time from the movies
1 hour 45 minutes at the movie theater

Question: What time did they leave home?

Count back each time that was added.
5:00 – 15 minutes – 15 minutes – 1 hour 45 minutes

time to time from at the movie theater

Solve

2. Kari had $4.25 left after shopping. She spent $11.80 for party favors and $22.55 for a giant party pizza. How much money did Kari have when she began shopping?

3. Bev, Ruth, and Lisa are sisters. Bev is 8 years older than Ruth. Ruth is 5 years older than Lisa, who is 16 years old. How old is Bev?

4. Don bought two vases for $36 and a lamp for $78. He received $10 change. How much money did he give the cashier?

5. After lunch there were 2 pizzas left over. Grades 1, 2, and 3 each finished 6 pizzas. Grades 4 and 5 each finished 7 pizzas. If the teachers finished 2 pizzas, how many pizzas had been ordered?
Solve each problem and explain the method you used.

1. Oscar’s Orchard has 28 McIntosh apple trees. A tree produces about 115 pounds of fruit each year. About how many pounds of apples do the trees produce each year?

2. The orchard has 17 rows of peach trees. There are 16 trees in each row. Does the orchard have more than 300 peach trees?

3. Sonal works for 5 hours every day during harvest. How many hours does she work in thirty days?

4. A fence around the orchard is 894 feet long. Every foot of fencing has three posts. How many posts are in the fence?

5. Customers can pick raspberries for $1.75 per quart. How much would one dozen quarts of berries cost?

6. The pick-your-own price at Oscar’s Orchard is $3.25 per bushel of apples. Mr. Ennis picked 8 bushels. How much did he spend?

7. Mr. Ennis uses 3 pounds of apples to make 1 pint of apple butter. How many pounds of apples does he need to make 14 pints of apple butter?

8. Each pot of strawberry plants produces about 8 dozen berries. There are 58 pots of plants. About how many strawberries do 58 pots of plants produce?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. Emily picked 34 apples. Half of the apples were Golden Delicious. How many were not Golden Delicious?

10. Mia, Nate, and Rob each picked either apples, pears, or grapes. Mia did not pick pears, and Rob did not pick grapes. Nate shared his apples. Which fruit did each person pick?

11. Tia gave 5 apples to Ms. Lu and half of what she had left to her grandmother. She used the remaining 6 apples in a pie. How many apples had she brought home?

12. Liam picked 124 apples and Cleo picked 152. The pick-your-own apples cost about 4 cents each. Did Cleo spend more than $5?

13. Chad stopped picking fruit at 2:30 P.M. He had picked pears for 1 hour and apples for 45 minutes. When did he start picking?

14. One apple has about 25 seeds. There are about 160 apples in a bushel. About how many seeds are in a bushel of apples?

Use the graph for problems 15 and 16.

15. How many more peach than plum trees were planted in Oscar’s Orchard?

16. What kind of trees are double the number of pear trees?
### Check Your Progress Lessons 1–16

#### Find the product.  
(See pp. 128–133, 136–145, 148–153.)

<p>| | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>$2 \times 34$</td>
<td>2.</td>
<td>$6 \times 30$</td>
<td>3.</td>
</tr>
<tr>
<td>5.</td>
<td>$3 \times 34.23$</td>
<td>6.</td>
<td>$3 \times 450$</td>
<td>7.</td>
</tr>
<tr>
<td>9.</td>
<td>$10 \times 43$</td>
<td>10.</td>
<td>$50 \times 30$</td>
<td>11.</td>
</tr>
<tr>
<td>13.</td>
<td>$53 \times 55$</td>
<td>14.</td>
<td>$74 \times 38$</td>
<td>15.</td>
</tr>
<tr>
<td>17.</td>
<td>$524 \times 5$</td>
<td>18.</td>
<td>$608 \times 54$</td>
<td>19.</td>
</tr>
<tr>
<td>21.</td>
<td>$6.30 \times 26$</td>
<td>22.</td>
<td>$42.50 \times 6$</td>
<td>23.</td>
</tr>
</tbody>
</table>

#### Choose a method to estimate the product.  
(See pp. 134–135, 146–147.)

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<tbody>
<tr>
<td>25.</td>
<td>$8 \times 35$</td>
<td>26.</td>
<td>$6 \times 736$</td>
<td>27.</td>
</tr>
<tr>
<td>29.</td>
<td>$61 \times 54$</td>
<td>30.</td>
<td>$86 \times 91$</td>
<td>31.</td>
</tr>
</tbody>
</table>

#### Problem Solving  
(See pp. 126–127, 156–157.)

33. The product is zero. One factor is 8. What is the other factor? What multiplication property does this use?

34. Jamal bicycles 18 kilometers each day. How far does he bicycle in 12 days?

35. Sharon has tiles that are 1 inch square. If she uses them to make a rectangle that is 14 inches long and 5 inches wide, how many tiles will she use?

36. If $9 \times 13 = 117$, what is the product of $13 \times 9$? What multiplication property does this use?

(See Still More Practice, p. 464.)
Clustering

Tommy kept a record of his family’s daily mileage on a car trip to Mexico. About how many miles long was the trip?

When a number of addends “cluster” around a certain number, an estimate for the sum may be obtained by multiplying that number by the number of addends.

\[
\text{Estimate: } 432 + 396 + 394 + 402 \\
\downarrow \\
400 + 400 + 400 + 400 \\
\downarrow \\
4 \times 400 = 1600
\]

The trip was about 1600 miles long.

Estimate the total by clustering.

1. \(37 + 41 + 43 + 35\)
2. \(85 + 98 + 87 + 88\)
3. \(105 + 98 + 96\)
4. \(510 + 483 + 503\)
5. \(326 + 289 + 301 + 313\)
6. \(740 + 675 + 690 + 727\)
7. \(2943 + 3201 + 3065\)
8. \(5624 + 4875 + 5133\)

Problem Solving

9. In Elmsford’s schools, East has 489 students, Central has 535 students, and West has 492 students. About how many students are in Elmsford?

10. VideoLand rented out 199 movies on Friday, 248 movies on Saturday, and 218 movies on Sunday. About how many movies was this?
Use a strategy you have learned.

29. Nan had 7 jacks. Then she bought some packs with 6 jacks in each pack. Nan now has 55 jacks. How many packs did she buy?

Solve. Explain how you solved the problem and which multiplication property you used.

30. \(4 \times (5 + 6)\)

Use mental math to find each product. Then draw base ten blocks to check each answer.

31. \(8 \times 10\)  
32. \(3 \times 50\)  
33. \(2 \times 20\)
## Test Preparation

Choose the best answer.

1. How many ten thousands equal one million?
   - a. 10
   - b. 100
   - c. 1000
   - d. 10,000

2. Which of these numbers is 1000 less than 47,561,389?
   - a. 46,561,389
   - b. 47,560,389
   - c. 47,551,389
   - d. 47,561,289

3. Choose the related fact to find the value of the variable.
   \[ m - 3 = 9 \]
   - a. 12 - 3 = 9
   - b. 9 + 3 = 12
   - c. 12 - 9 = 3
   - d. \( m = 12 \)

4. Subtract.
   \[ 23,275,401 - 631,996 \]
   - a. 24,907,397
   - b. 23,643,405
   - c. 22,643,405
   - d. 22,644,405

5. Which expression matches the problem?
   - a. \( b + 4 \)
   - b. \( b - 4 \)
   - c. \( b = 4 \)
   - d. 4

   Paul shoots some baskets. Then he shoots 4 more.

6. Which shows compensation?
   \[ 39 + 42 \]
   - a. \( 42 + 39 \)
   - b. \( (30 + 9) + (40 + 2) \)
   - c. \( 40 + 41 \)
   - d. none of these

7. The product is 12. One factor is 1. What is the other factor?
   - a. 0
   - b. 1
   - c. 6
   - d. 12

8. Estimate the difference using front-end estimation.
   \[ 8191 - 3766 \]
   - a. about 8000
   - b. about 5000
   - c. about 4000
   - d. about 11,000

9. Estimate the difference by rounding.
   \[ 279,430 - 63,871 \]
   - a. 340,000
   - b. 140,000
   - c. 220,000
   - d. 210,000

10. Estimate the product by rounding.
    \[ $5.72 \times 24 \]
    - a. $100.00
    - b. $114.00
    - c. $120.00
    - d. $150.00

11. Add.
    \[ $83,217.41 + 15,328.18 \]
    - a. $98,545.59
    - b. $90,000.00
    - c. $98,535.59
    - d. $15,328.18

12. Choose the addition property.
    \[ 3 + (6 + 2) + 9 = (3 + 6) + (2 + 9) \]
    - a. Commutative Property
    - b. Identity Property
    - c. Associative Property
    - d. Zero Property
   \[34 \times 6\]
   a. 180
   b. 184
   c. 204
   d. 224

14. Find the product.
   \[9 \times \$5.09\]
   a. \$5.81
   b. \$45.09
   c. \$45.81
   d. \$46.81

15. Solve the expression when \( n = 17 \).
   \[23 - n\]
   a. 40
   b. 6
   c. 17
   d. 23

16. Which shows the best way to check the answer?
   \[$9.57 - 7.83\]
   a. \$1.74 + \$9.57 = \$11.31
   b. \$9.57 + \$1.74 = \$7.83
   c. \$11.31 - \$7.83 = \$9.57
   d. \$1.74 + \$7.83 = \$9.57

17. Kim walks 3 miles per hour. By 1:45 P.M. she had walked 9 miles. What time did she start?
   a. 10:45 A.M.
   b. 11:45 A.M.
   c. 12:45 P.M.
   d. 1:45 A.M.

18. Emily has 13 packets of seeds. She gives 8 packets to Lisa. How many packets does Emily have now?
   a. 5
   b. 8
   c. 13
   d. 21

19. Add.
   \[64,038 + 21,988 + 7,945\]
   a. 93,971
   b. 92,971
   c. 93,871
   d. 93,961

20. Find the product.
   \[43 \times \$9.00\]
   a. \$9.00
   b. \$27.00
   c. \$36.00
   d. not given

21. Which is more than 40,000 but less than 47,000?
   a. 48,000 - 800
   b. 50,650 - 1250
   c. 37,998 + 9001
   d. 30,022 + 765 + 16,525

22. Dan’s Deli sold 134 tuna subs, 246 turkey subs, and 371 ham subs. How many subs did the deli sell?
   a. 134
   b. 371
   c. 600
   d. 751

Tell About It

How do multiplication patterns help you solve the problem? Explain. Show all your work.

23. Mr. Kraus received one order for 33 packages of cups. There are 20 cups in each package. He received a second order for 330 packages, and a third order for 3300 packages. How many cups were ordered altogether?
In this chapter you will:

- Study the meanings and rules of division
- Investigate patterns, missing numbers, and divisibility
- Estimate and divide whole numbers and money
- Explore zeros in division
- Learn about the order of operations and averages
- Solve problems by interpreting the remainder

Critical Thinking/ Finding Together

Use counters to find the quotient and the remainder, the number left over, for each division on the page.

A Remainder of One

The story of Joe might just well explain what happens to numbers when they must remain after division, and they’re left behind as lonesome remainders. It seems so unkind!

From A Remainder of One by Elinor J. Pinczes.
You divide when you want to:

- **separate** a set into equal parts.
- **share** a set equally.

Cal has 12 pears. He puts 4 pears into each bag. How many bags does he use?

\[ 12 \div 4 = 3 \]

Cal uses 3 bags.

Jo, Meg, and Cara share 12 pears equally. How many pears does each girl get?

Each girl gets 4 pears.

Here are some rules that can help you to divide correctly.

- When the divisor is one, the quotient is the same as the dividend.
  \[ \frac{8}{18} \]
  \[ 8 \div 1 = 8 \]

- When the divisor and the dividend are the same number, the quotient is always one.
  \[ \frac{1}{55} \]
  \[ 5 \div 5 = 1 \]

- When the dividend is zero, the quotient is zero.
  \[ \frac{0}{60} \]
  \[ 0 \div 6 = 0 \]

- The divisor can never be zero.
  \[ \frac{9}{00} \]
  \[ 9 \div 0 \text{ is impossible.} \]

**Divide.**

1. \( \frac{6}{6} \)  
2. \( \frac{5}{0} \)  
3. \( \frac{1}{7} \)  
4. \( \frac{3}{3} \)  
5. \( \frac{2}{0} \)  
6. \( \frac{9}{9} \)  
7. \( \frac{4}{0} \)  
8. \( \frac{1}{5} \)  
9. \( \frac{1}{0} \)  
10. \( \frac{4}{4} \)  
11. \( \frac{1}{2} \)  
12. \( \frac{1}{6} \)
Find the quotient.

13. $2 \div 2$  
14. $9 \div 1$  
15. $0 \div 7$  
16. $8 \div 8$  
17. $3 \div 1$

18. $0 \div 8$  
19. $7 \div 7$  
20. $4 \div 1$  
21. $0 \div 9$  
22. $1 \div 1$

23. $5 \div 5$  
24. $8 \div 1$  
25. $0 \div 3$  
26. $0 \div 6$  
27. $9 \div 9$

Problem Solving

28. The dividend is 7. The quotient is 1. What is the divisor?

29. The divisor is 4. The quotient is 1. What is the dividend?

30. The divisor is 5. The quotient is 5. What is the dividend?

31. The quotient is 2. The dividend is 2. What is the divisor?

32. The dividend is 1. The quotient is 1. What is the divisor?

33. The quotient is 0. What is the dividend?

34. How should 4 friends share 24 apples equally?

35. How should Dale and 4 friends share 15 oranges equally?

36. Sara bakes 8 pies with 64 plums. Emily bakes 5 pies with 45 plums. How many more plums per pie are in Emily’s pie than Sara’s?

37. Ty packs 8 baskets with 5 peaches to a basket. Jill packs 9 baskets with 3 peaches per basket. How many peaches do Ty and Jill pack together?

Mental Math

Use the rules of division to divide mentally.

38. $0 \div 15$  
39. $26 \div 26$  
40. $49 \div 1$  
41. $0 \div 99$  
42. $75 \div 1$

43. $429 \div 429$  
44. $867 \div 1$  
45. $0 \div 539$  
46. $938 \div 938$
Relate Multiplication and Division

Division and multiplication are inverse operations. Division “undoes” multiplication and multiplication “undoes” division.

Find the related multiplication fact for \( 36 \div 9 = 4 \).

To find the related multiplication fact, first think about what each number in the division fact represents.

![Diagram showing the numbers in the division fact: 36, 9, and 4, with labels indicating their roles in the division process.]

Then think about the meaning of multiplication.

![Diagram showing the numbers in the multiplication fact: 4, 9, and 36, with labels indicating their roles in the multiplication process.]

So, \( 4 \times 9 = 36 \) is the related multiplication fact for \( 36 \div 9 = 4 \).

**Study this example.**

\[ 6 \times 7 = 42 \]

![Diagram showing the numbers in the division fact: 42, 7, and 6, with labels indicating their roles in the division process.]

So, \( 42 \div 7 = 6 \) is the related division fact for \( 6 \times 7 = 42 \).
Write a related multiplication fact for each.

1. \( 27 \div 3 = 9 \)  
2. \( 35 \div 5 = 7 \)  
3. \( 56 \div 7 = 8 \)  
4. \( 24 \div 4 = 6 \)

5. \( 18 \div 9 = 2 \)  
6. \( 63 \div 7 = 9 \)  
7. \( 36 \div 6 = 6 \)  
8. \( 14 \div 2 = 7 \)

9. \( 9 \div 9 = 1 \)  
10. \( 36 \div 9 = 4 \)  
11. \( 48 \div 6 = 8 \)  
12. \( 40 \div 8 = 5 \)

Write a related division fact for each.

13. \( 8 \times 1 = 8 \)  
14. \( 6 \times 3 = 18 \)  
15. \( 9 \times 5 = 45 \)  
16. \( 8 \times 4 = 32 \)

17. \( 9 \times 8 = 72 \)  
18. \( 5 \times 6 = 30 \)  
19. \( 8 \times 2 = 16 \)  
20. \( 6 \times 9 = 54 \)

21. \( \frac{8}{3} \div 24 = 3 \)  
22. \( \frac{6}{9} \div 54 = 4 \)  
23. \( \frac{5}{5} \div 25 = 5 \)  
24. \( \frac{7}{4} \div 28 = 7 \)

Write four related facts using the given numbers.

Think about fact families.

25. \( 9, 2, 18 \)
   - \( 9 \times 2 = 18 \)
   - \( 2 \times 9 = 18 \)
   - \( 18 \div 2 = 9 \)
   - \( 18 \div 9 = 2 \)

26. \( 3, 9, 27 \)
27. \( 6, 8, 48 \)
28. \( 7, 6, 42 \)

29. \( 8, 7, 56 \)
30. \( 9, 8, 72 \)
31. \( 3, 7, 21 \)

32. \( 4, 9, 36 \)
33. \( 5, 7, 35 \)
34. \( 9, 7, 63 \)

Solve the problem. Check using a related fact.

35. A classroom has 9 bulletin boards. Fifty-four thumbtacks are divided equally among the boards. Does each board have more or fewer than 5 tacks?

Write About It

36. Explain how knowing one fact from a fact family, or set of related facts, helps you know the other facts in that fact family.
Missing Numbers

Jill has 63 nuts. She wants to make 7 equal snack bags for her hiking club. How many nuts will Jill put in each bag?

To find how many nuts, \( n \),
divide: \( 63 \div 7 = n \)

Remember: Division and multiplication are inverse operations, so you can use a related multiplication fact to solve for \( n \).

The related multiplication fact for \( 63 \div 7 = n \) is \( 7 \times n = 63 \).

Jill will put 9 nuts in each bag.

Study these examples.

\[
\begin{align*}
48 \div n &= 8 \quad \text{Think} \quad n \times 8 &= 48 \\
6 \times n &= 42 \quad \text{Think} \quad 42 \div 6 &= n \\
6 \times 8 &= 48 \\
6 \times n &= 42 \\
So, 48 \div 6 &= 8. \\
\end{align*}
\]

\[
\begin{align*}
9 \\
\sqrt{36} \quad \text{So, } 4 \sqrt{36} \\
\text{Think} \quad n \times 9 &= 36 \\
4 \times 9 &= 36 \\
7 \times n &= 21 \quad \text{Think} \quad 21 \div 7 &= n \\
7 \times 3 &= 21. \\
\end{align*}
\]

Find the missing divisor.

1. \( 6 = 12 \div n \)
2. \( 30 \div a = 5 \)
3. \( 8 = 32 \div b \)
4. \( 54 \div c = 6 \)
5. \( 49 \div x = 7 \)
6. \( 56 \div y = 7 \)
7. \( 15 \div z = 3 \)
8. \( 2 = 14 \div s \)
9. \( 9 \div t = 1 \)
Find the value of the variable.

10. \( n \times 3 = 6 \)
11. \( 15 = a \times 5 \)
12. \( y \times 6 = 36 \)
13. \( 56 = a \times 7 \)
14. \( b \times 8 = 72 \)
15. \( c \times 2 = 2 \)
16. \( 28 = s \times 4 \)
17. \( t \times 6 = 42 \)
18. \( 20 = p \times 4 \)
19. \( 9 = 72 \div d \)
20. \( 64 \div r = 8 \)
21. \( v \div 3 = 4 \)
22. \( y \times 6 = 0 \)
23. \( 54 = 9 \times p \)
24. \( a \times 8 = 40 \)

25. \( \frac{5}{9})h \)
26. \( 0 \)
27. \( \frac{4}{4})b \)
28. \( \frac{3}{7})x \)
29. \( \frac{2}{9)c \)
30. \( \frac{3}{9)d \)
31. \( \frac{1}{3})f \)
32. \( \frac{8}{6})x \)

Problem Solving

33. Amy’s garden has 9 rows for planting seeds. She has 81 seeds to plant. How many seeds will she plant in each row so each row has the same number of plants?

34. Amy’s garden has 8 rows of tomato plants. There is one tomato growing on each plant. There are 72 tomatoes altogether. How many tomato plants are in each row?

DO YOU REMEMBER?

Match each definition with its multiplication property.

35. Changing the grouping of the factors does not change the product.  
   - commutative property
   - associative property
   - identity property
   - zero property
   - distributive property

36. The product of a number and the sum of two addends is the same as multiplying the number by each addend and adding the products.

37. Changing the order of the factors does not change the product.
What is the next number in this pattern?

- First find the rule.
  
  Think: 16, 8, 4, 2
  

- Then complete the pattern.

<table>
<thead>
<tr>
<th>Input</th>
<th>16</th>
<th>8</th>
<th>4</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>?</td>
</tr>
</tbody>
</table>

Think: \(\frac{16}{2} - 2 - \frac{2}{2} = 1\)

The next number in the pattern is 1.

Some patterns result from two different operations and cannot be represented in an input-output table.

What is the next number in the pattern?

2, 7, 6, 11, 10, ?

Think: 2, 7, 6, 11, 10, ?


The next number is 15.

Write the rule for each pattern. Then write the next number.

1. | Input | 10 | 12 | 14 | 16 |
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<tbody>
<tr>
<td>Output</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>?</td>
</tr>
</tbody>
</table>

2. | Input | 30 | 40 | 50 | 60 |
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>?</td>
</tr>
</tbody>
</table>
Write the rule. Complete the pattern.

3. | Input | 23 | 18 | 13 | 8 |
<table>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>18</td>
<td>13</td>
<td>8</td>
<td>?</td>
</tr>
</tbody>
</table>
4. | Input | 35 | 33 | 31 | 29 |
<table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>33</td>
<td>31</td>
<td>29</td>
<td>?</td>
</tr>
</tbody>
</table>

5. 42, 38, 34, __

6. 4, 8, 16, 32, __

7. 16, 20, 18, 22, 20, __

8. 54, 51, 52, 49, 50, __

9. 4, 12, 10, 30, 28, __

10. 5, 10, 13, 26, 29, __

11. 1, 4, 4, 7, 7, 10, __

12. 10, 12, 6, 8, 4, 6, __

Write a pattern of eight numbers for each rule.


15. Rule: Multiply by 2.


Problem Solving

19. Mary and Ed play a number game. Mary says several numbers and Ed applies a rule to them. Mary says, “5, 6, 7, 8.” Ed says, “15, 18, 21, 24.” What is Ed’s rule?

20. For every nickel Pat saves her father will give her a quarter. How much will Pat have if she saves 4 nickels?

Is the sum or product odd or even? Write O or E.

21. Even + Even

22. Even × Even

23. Odd + Odd

24. Odd × Odd

25. Even + Odd

26. Odd × Even

27. In your Math Journal, write two or three examples for each of exercises 21–26 to prove your answers.
You can estimate quotients before you divide.

Estimate: 2832 ÷ 8.

- Find where the quotient begins.

Try dividing thousands.

\[ 8 \overline{2832} \quad 8 > 2 \quad \text{Not enough thousands} \]

Try dividing hundreds.

\[ 8 \overline{2832} \quad 8 < 28 \quad \text{Enough hundreds} \]

So the quotient begins in the hundreds place. 8 \overline{2832}

- Find the first digit of the quotient.

Think of a basic multiplication fact with 8 and a number whose product is close to 28, but not greater than 28.

\[
\begin{align*}
2 \times 8 &= 16 \quad \text{too small} \\
3 \times 8 &= 24 \\
4 \times 8 &= 32 \quad \text{too large}
\end{align*}
\]

Write 3 in the hundreds place.

- Since you are estimating, write zeros for the other digits.

about 300

\[ 8 \overline{2832} \]

Study these examples.

about 200 \quad about 70 \quad about $6.00

2 \overline{523} \quad 6 \overline{425} \quad 5 \overline{32.75}

Write an X in the place where the quotient begins.

1. 4 \overline{76} 2. 6 \overline{48} 3. 2 \overline{451} 4. 7 \overline{927} 5. 8 \overline{745}

6. 3 \overline{127} 7. 5 \overline{370} 8. 2 \overline{1468} 9. 7 \overline{4303}
Estimate with Compatible Numbers

Compatible numbers are numbers that are easy to compute mentally.

Use division facts to find nearby numbers that are compatible.

Estimate: 53 ÷ 6
Divide: 53 ÷ 6
Think: 54 ÷ 6 = 9
So, 53 ÷ 6 is about 9.

Estimate: 223 ÷ 7
Divide: 223 ÷ 7
Think: 210 ÷ 7 = 30
So, 223 ÷ 7 is about 30.

Estimate the quotient. Use compatible numbers. Write the compatible numbers you used to estimate the quotient.

31. 55 ÷ 8  32. 46 ÷ 6  33. 362 ÷ 5  34. 178 ÷ 3

35. 4)29  36. 5)33  37. 8)26  38. 3)11  39. 7)40

40. 3)61  41. 4)84  42. 2)63  43. 5)56  44. 3)91

45. 7)285  46. 5)161  47. 6)524  48. 9)472  49. 7)551
Jaime gave the same number of pencils to each of 5 friends. He had 22 pencils. How many pencils did each friend receive? How many pencils were left over?

To find how many each received, divide: \(\frac{22}{5}\).

Estimate: Think of a basic multiplication fact with 5 and a number whose product is close to 22.

\[
3 \times 5 = 15 \quad \text{too small} \\
5 \times 5 = 25 \quad \text{too large}
\]

Think \(\frac{5}{22}\) 5 > 2 \(\text{Not enough tens}\)

Think \(\frac{5}{22}\) 5 < 22 \(\text{Enough ones}\)

The quotient begins in the ones place.

Divide. Multiply. Subtract and compare. Write the remainder.

\[
\begin{align*}
\text{Divide.} & \quad \frac{4}{5} \div 2 \quad \underline{2} \\
\text{Multiply.} & \quad \times \quad 4 \\
\text{Subtract and compare.} & \quad \underline{5} \quad \underline{2} \quad \underline{2} \\
\text{Write the remainder.} & \quad \underline{4} \\
& \quad \underline{5} \quad \underline{2} \\
& \quad \underline{2} \quad \underline{0} \\
& \quad \underline{2} \quad \underline{0} \\
\end{align*}
\]

22 is between 15 and 25. Try 4.

\[
\begin{array}{c}
4 \quad \text{quotient} \\
\times \quad 5 \quad \text{divisor} \\
\underline{20} \\
+ \quad 2 \quad \text{remainder} \\
\underline{22} \quad \text{dividend}
\end{array}
\]

Multiply and add to check. The remainder must always be less than the divisor.

Each friend received 4 pencils. There were 2 pencils left over.
Complete each division.

1. \[4 \div 2 = 2 \text{ R } 0\]
2. \[3 \div 2 = 1 \text{ R } 1\]
3. \[5 \div 4 = 1 \text{ R } 1\]
4. \[2 \div 1 = 2 \text{ R } 0\]

There is no remainder.

Divide.

5. \[2 \div 15 = 3 \text{ R } 0\]
6. \[4 \div 35 = 8 \text{ R } 0\]
7. \[3 \div 23 = 1 \text{ R } 0\]
8. \[5 \div 17 = 0 \text{ R } 1\]
9. \[6 \div 27 = 1 \text{ R } 0\]
10. \[6 \div 14 = 3 \text{ R } 2\]
11. \[4 \div 26 = 6 \text{ R } 2\]
12. \[5 \div 37 = 0 \text{ R } 5\]
13. \[7 \div 50 = 0 \text{ R } 4\]
14. \[4 \div 33 = 0 \text{ R } 4\]
15. \[6 \div 55 = 0 \text{ R } 6\]
16. \[5 \div 38 = 0 \text{ R } 5\]
17. \[8 \div 68 = 0 \text{ R } 8\]
18. \[2 \div 19 = 0 \text{ R } 2\]
19. \[7 \div 45 = 0 \text{ R } 7\]
20. \[8 \div 23 = 0 \text{ R } 8\]
21. \[3 \div 26 = 0 \text{ R } 3\]
22. \[7 \div 35 = 0 \text{ R } 7\]
23. \[7 \div 29 = 0 \text{ R } 7\]
24. \[8 \div 38 = 0 \text{ R } 8\]
25. \[9 \div 64 = 0 \text{ R } 9\]
26. \[8 \div 52 = 0 \text{ R } 8\]
27. \[6 \div 45 = 0 \text{ R } 6\]
28. \[9 \div 71 = 0 \text{ R } 9\]
29. \[9 \div 82 = 0 \text{ R } 9\]

Find the quotient and the remainder.

30. \[25 \div 3 = 8 \text{ R } 1\]
31. \[23 \div 7 = 3 \text{ R } 2\]
32. \[84 \div 9 = 9 \text{ R } 3\]
33. \[50 \div 8 = 6 \text{ R } 2\]
34. \[38 \div 4 = 9 \text{ R } 2\]
35. \[57 \div 6 = 9 \text{ R } 3\]

Problem Solving

36. Caryn put away 36 crayons in boxes. Each box holds 8 crayons. How many boxes could be filled? How many crayons would be left over?

37. Mika put 37 drawings in folders. She put 4 drawings in each folder. How many folders were there? How many extra drawings were there?

38. Bill placed the same number of pencils at each of 6 tables. He began with 44 pencils. At most, how many pencils could he have placed at each table? How many pencils would have been left over?
A number is divisible by another number when the remainder is zero when the number is divided by the other number.

The chart below shows the divisibility rules for 2, 5, 10, and 3.

<table>
<thead>
<tr>
<th>Rule</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>by 2</td>
<td>If its ones digit is divisible by 2.</td>
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<td>10, 32, 154, 3126, 45,398 are divisible by 2.</td>
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<td>by 5</td>
<td>If its ones digit is 0 or 5.</td>
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<td>40, 75, 820, 6515 are divisible by 5.</td>
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<tr>
<td>by 10</td>
<td>If its ones digit is 0.</td>
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<td>30, 170, 4280, 79,360 are divisible by 10.</td>
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<tr>
<td>by 3</td>
<td>If the sum of its digits is divisible by 3.</td>
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<td>24 $\rightarrow$ $2 + 4 = 6$ and $6 \div 3 = 2$.</td>
</tr>
<tr>
<td></td>
<td>369 $\rightarrow$ $3 + 6 + 9 = 18$ and $18 \div 3 = 6$.</td>
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<td>24 and 369 are divisible by 3.</td>
</tr>
</tbody>
</table>

Is the number divisible by 2? Write yes or no.

1. 28  2. 75  3. 700  4. 144  5. 807
6. 516  7. 343  8. 2931  9. 1462  10. 7749
11. 6847  12. 2900  13. 75,192  14. 27,346  15. 92,983

Is the number divisible by 5? Write yes or no.

16. 64  17. 85  18. 900  19. 245  20. 819
26. 8675  27. 3299  28. 10,000  29. 42,685  30. 74,007
Is the number divisible by 10? Write yes or no.
31. 930  32. 749  33. 6820  34. 5000  35. 8304
36. 1006  37. 4673  38. 52,651  39. 66,830  40. 90,060
41. 230,705  42. 562,840  43. 1,425,070  44. 1,099,801

Is the number divisible by 3? Write yes or no.
45. 72  46. 54  47. 253  48. 534  49. 312
50. 932  51. 210  52. 842  53. 1065  54. 4906
55. 12,774  56. 20,621  57. 37,596  58. 64,374

59. Explain in your own words when a number is divisible by 10 and when it is divisible by 3. Write a 2-digit, a 3-digit, and a 4-digit number that support each rule.

Copy and complete the table.

<table>
<thead>
<tr>
<th>Divisible by</th>
<th>60</th>
<th>88</th>
<th>75</th>
<th>600</th>
<th>494</th>
<th>750</th>
<th>2313</th>
<th>1026</th>
<th>8750</th>
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</thead>
</table>

CHALLENGE

A number is divisible by 6 if it is divisible by both 2 and 3.
A number is divisible by 9 if the sum of its digits is divisible by 9.

Copy and complete the table.

<table>
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<tr>
<th>Divisible by</th>
<th>891</th>
<th>1428</th>
<th>6570</th>
<th>9822</th>
<th>12,834</th>
<th>36,459</th>
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<td>6</td>
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</table>
Ian cut a 72-inch length of cloth into 2 equal strips. What was the length of each strip?

To find the length of each strip, divide: $72 \div 2$.

Estimate: Think of a basic multiplication fact with 2 and a number whose product is close to 7.

$$3 \times 2 = 6$$
$$4 \times 2 = 8$$

7 is between 6 and 8. Try 3.

Divide the tens.

$$2 \big) \underline{72}$$

Multiply.

$$\frac{3}{2} \underline{72}$$

Subtract and compare.

$$\frac{3}{1} \underline{0}$$

Bring down the ones.

$$\frac{3}{1} \underline{0} \underline{2}$$

Repeat the steps to divide the ones.

Estimate: Think of a basic multiplication fact with 2 and a number whose product is 12.

$$6 \times 2 = 12$$

Divide the ones.

$$2 \big) \underline{72}$$

Multiply.

$$\frac{3}{2} \underline{72}$$

Subtract and compare.

$$\frac{3}{1} \underline{0}$$

Check.

$$36 \times 2 = 2 \times 36$$

No remainder

The length of each strip was 36 inches.
Complete each division.

1. \[ \frac{40}{4} \]
   \[ \frac{0}{4} \]
   \[ \frac{0}{0} \]

2. \[ \frac{84}{2} \]
   \[ \frac{8}{8} \]
   \[ \frac{4}{4} \]

3. \[ \frac{78}{6} \]
   \[ \frac{7}{7} \]
   \[ \frac{8}{8} \]

4. \[ \frac{34}{2} \]
   \[ \frac{3}{3} \]
   \[ \frac{4}{4} \]

Remember to use basic facts to help you estimate.

Estimate. Then divide.

5. \[ \frac{60}{5} \]
6. \[ \frac{84}{6} \]
7. \[ \frac{64}{4} \]
8. \[ \frac{91}{7} \]
9. \[ \frac{69}{3} \]
10. \[ \frac{96}{8} \]
11. \[ \frac{92}{4} \]
12. \[ \frac{96}{6} \]
13. \[ \frac{48}{3} \]
14. \[ \frac{99}{9} \]

Find the quotient.

15. \[ 84 \div 3 \]
16. \[ 80 \div 5 \]
17. \[ 56 \div 4 \]
18. \[ 45 \div 3 \]
19. \[ 90 \div 2 \]
20. \[ 88 \div 2 \]

CRITICAL THINKING

Read each division problem carefully. Decide whether to use paper and pencil or mental math to solve each problem. Then solve.

Explain which method you used to solve problems 21 and 22.

21. Reg made 80 pom-poms. He sewed 9 pom-poms on each costume. At most, how many costumes were there? How many pom-poms were left over?

22. Kate cut an 80-inch long ribbon into 4 equal parts. How many inches long was each part?

23. If you need to know the remainder, why is it easier to use paper and pencil?
Luz has 80 favors to divide equally into 6 party bags. At most, how many favors can she put in each bag? How many will be left over?

To find how many in each bag, divide: \(80 \div 6\).

**Think**

\[
6 \longdiv{80}, \quad 6 < 8 \quad \text{Enough tens: begin the quotient in the tens place.}
\]

Estimate: Think of a basic multiplication fact with 6 and a number whose product is close to 8.

1. \(1 \times 6 = 6\) ← Try 1.
2. \(2 \times 6 = 12\)

**Divide the tens.**

\[
\begin{array}{c}
6 \\ \underline{\times 1} \\
6 \\
\end{array}
\]

**Multiply.**

\[
\begin{array}{c}
6 \\ \underline{\times 1} \\
6 \\
\end{array}
\]

**Subtract and compare.**

\[
\begin{array}{c}
1 \\
\underline{-6} \\
2 < 6
\end{array}
\]

**Bring down the ones.**

\[
\begin{array}{c}
6 \\
\underline{\times 2} \\
18
\end{array}
\]

**Repeat the steps.**

\[
\begin{array}{c}
13 \\
\underline{-6} \\
20
\end{array}
\]

At most, she could put 13 favors into each bag. There would be 2 favors left over.
Complete each division.

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Estimate. Then divide.

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Problem Solving

38. There were 65 balloons at Willy's party. He tied 6 balloons to each tree in his yard and the extra balloons to his mailbox. What is the greatest number of trees that could be in Willy's yard? How many balloons did he tie to his mailbox?

39. Val hid 96 eggs in the yard. Each of 7 children found the same number of eggs. What is the greatest number of eggs each child could have found? How many eggs would still have remained hidden?
Three-Digit Quotients

Divide: $745 \div 2$.

Use the division steps to find three-digit quotients. Remember to use basic facts to help you do the estimate step.

- Divide the hundreds.

  Estimate: $\frac{3}{2} \times 2 = 7$

  $\underline{3} \times 2 = 6$

  $\underline{4} \times 2 = 8$

  $\underline{14}$

  Try 3.

- Divide the tens.

  Estimate: $\frac{3}{2} \times 2 = 14$

  $\underline{7} \times 2 = 14$

  $\underline{14}$

  Try 7.

- Divide the ones.

  Estimate: $\frac{3}{2} \times 2 = 5$

  $\underline{2} \times 2 = 4$

  $\underline{3} \times 2 = 6$

  $\underline{14}$

  Try 2.

  Remember: Write the remainder in the quotient.

- Check.

  $\underline{372}$

  $\times \underline{2}$

  $\underline{744}$

  $\underline{+1}$

  $\underline{745}$

  This 0 need not be written.

Division Steps

- Estimate.
- Divide.
- Multiply.
- Subtract.
- Compare.
- Bring down.
- Repeat the steps as necessary.
- Check.
Complete each division.

1. \( \frac{125}{5} \) \( \overrightarrow{R3} \)   Check. \( \frac{243}{3} \) \( \overrightarrow{R2} \)   Check.

2. \( \frac{243}{125} \) \( \overrightarrow{R6} \)   \( \overrightarrow{R13} \)   \( \overrightarrow{R12} \)   \( \overrightarrow{R11} \)   \( \overrightarrow{R?} \)   \( \overrightarrow{R2} \)   \( \overrightarrow{R3} \)   \( \overrightarrow{R729} \)   \( \overrightarrow{R?} \)   \( \overrightarrow{R731} \)

3. \( \frac{26?}{3} \) \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)

4. \( \frac{?2?}{651} \) \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)   \( \overrightarrow{?} \)

Estimate. Then divide.

5. \( \frac{632}{2} \)   6. \( \frac{976}{4} \)   7. \( \frac{733}{3} \)   8. \( \frac{762}{4} \)   9. \( \frac{931}{7} \)
10. \( \frac{568}{5} \)   11. \( \frac{868}{7} \)   12. \( \frac{907}{4} \)   13. \( \frac{918}{6} \)   14. \( \frac{872}{4} \)
15. \( \frac{936}{8} \)   16. \( \frac{860}{5} \)   17. \( \frac{524}{2} \)   18. \( \frac{802}{7} \)   19. \( \frac{922}{2} \)
20. \( \frac{988}{3} \)   21. \( \frac{537}{3} \)   22. \( \frac{714}{6} \)   23. \( \frac{815}{5} \)   24. \( \frac{884}{3} \)

Problem Solving

25. At the supermarket 950 apples were placed in 3 piles. Each pile contained the same number of apples. At most, how many apples were there in each pile? How many apples were left over?
More Quotients

Handcraft Toys had 274 trains to ship to 8 stores. The same number of trains were shipped to each store. At most, how many trains did each store receive? How many trains were left over?

To find how many each received, divide: $274 \div 8$.

**Think**

- $8 \div 274$ 8 > 2 Not enough hundreds
- $8 \div 274$ 8 < 27 Enough tens

Estimate: $3 \times 8 = 24$ → Try 3.

$4 \times 8 = 32$

**Think**

Which basic fact has a product close to 27, but not greater than 27?

Divide the tens.

Divide the ones.

Check.

Each store received at most 34 trains. There were 2 trains left over.

Complete each division.

1. $\overline{8}608 \div 56 \downarrow -56 \downarrow -56 \downarrow ?8 -?8 \downarrow ?$
2. $\overline{5}433 \div -?? -?? -?? \downarrow 3? -3? \downarrow ?8 -?8 \downarrow ?$
3. $\overline{6}358 \div -30 \downarrow -30 \downarrow -30 \downarrow 3 -3 -30 \downarrow ?8 -3\downarrow ?$
4. $\overline{9}472 \div -4? \downarrow -4? \downarrow -4? \downarrow 4 -4\downarrow ? -4\downarrow ?$
Estimate. Then find the quotient.

5. \(3 \div 105\)  
6. \(4 \div 232\)  
7. \(6 \div 258\)  
8. \(3 \div 186\)  
9. \(5 \div 130\)  
10. \(6 \div 436\)  
11. \(7 \div 201\)  
12. \(5 \div 359\)  
13. \(4 \div 354\)  
14. \(7 \div 182\)  
15. \(9 \div 756\)  
16. \(3 \div 202\)  
17. \(9 \div 337\)  
18. \(6 \div 576\)  
19. \(8 \div 197\)  
20. \(6 \div 220\)  
21. \(4 \div 228\)  
22. \(7 \div 195\)  
23. \(5 \div 295\)  
24. \(6 \div 335\)  
25. \(7 \div 308\)  
26. \(9 \div 823\)  
27. \(8 \div 692\)  
28. \(7 \div 666\)  
29. \(9 \div 717\)

Divide.

30. \(657 \div 9\)  
31. \(267 \div 8\)  
32. \(396 \div 4\)  
33. \(462 \div 5\)  
34. \(498 \div 6\)  
35. \(591 \div 7\)

Problem Solving

36. The dividend is 272. The quotient is 34. What is the divisor?  
37. The dividend is 359. The divisor is 7. What is the remainder?  
38. Peg packs 594 wooden animals into 6 boxes of the same size. At most, how many wooden animals does she pack into each box?  
39. Janice has 12 dozen wooden pegs to put into plastic containers. Each container holds six pegs. How many containers does Janice need to fit all the pegs?  
40. There are 147 tops at the factory store. If the same number of tops are sold on each of 5 days, what is the greatest number of tops that could be sold each day? How many tops would not be sold?  
41. Brendan carves 193 figurines of people for dollhouses. There are 4 people in each dollhouse family. At most, how many families does he carve? How many figurines are left over?
Zeros in the Quotient

Liz, Darcy, and Emma have to hang 317 flyers. Can they split the flyers evenly among them?

Divide: $317 \div 3$

**Materials:** base ten blocks, paper, pencil

**Step 1**
Model 317. Then share the hundreds equally into 3 sets.

$$
\begin{array}{c}
3) \frac{317}{3} \\
-3 \\
\hline
01
\end{array}
$$

How many hundreds are in each equal set? Are there any hundreds left over?

**Step 2**
You cannot share 1 ten into the 3 sets. Regroup the 1 ten as 10 ones.

$$
\begin{array}{c}
10 \\
3) \frac{317}{3} \\
-3 \\
01
\end{array}
$$

How many tens are there now? How many ones?

**Step 3**
Share the ones equally into the 3 sets.

$$
\begin{array}{c}
105 R 2 \\
3) \frac{317}{3} \\
-3 \\
01
\end{array}
$$

How many ones are in each equal set? How many ones are left over? What is the quotient and the remainder when you divide 317 by 3? Since there is a remainder, the girls cannot split the flyers evenly among them.
Divide and check. You may use base ten blocks.

1. \(4|800\)  
2. \(2|600\)  
3. \(3|390\)  
4. \(4|840\)  
5. \(5|550\)  
6. \(3|918\)  
7. \(4|824\)  
8. \(8|832\)  
9. \(9|954\)  
10. \(6|642\)  
11. \(6|609\)  
12. \(2|817\)  
13. \(4|842\)  
14. \(7|745\)  
15. \(5|508\)  
16. \(5|841\)  
17. \(9|985\)  
18. \(2|615\)  
19. \(3|902\)  
20. \(8|847\)  

21. Examine the divisors and the first two digits of the dividends in exercises 6–20. Explain how you can predict that a zero will probably be in the tens place in the quotient?
Divide: 4925 ÷ 7.

**Think...**

- **7 | 4925**  
  7 > 4  **Not enough thousands**
  
- **7 | 4925**  
  7 < 49  **Enough hundreds**

**Divide the hundreds.**
Estimate: ? × 7 = 49
\[
\frac{7}{7} \times 7 = 49
\]
Try 7.
\[
\overline{7 | 4925}
\]
\[
\underline{49}
\]
\[
25
\]

**Divide the tens.**
Estimate: 7 > 2  
**Not enough tens**
Write 0 in the tens place.

\[
\frac{7}{70} \times 7 = 20
\]
\[
\underline{49}
\]
\[
25
\]

**Divide the ones.**
Estimate: ? × 7 = 25
\[
\frac{3}{3} \times 7 = 21
\]
\[
\frac{4}{4} \times 7 = 28
\]
Try 3.
\[
\overline{703}
\]
\[
\underline{4925}
\]
\[
21
\]
\[
4
\]

**Check.**
\[
\frac{703}{7}
\]
\[
\underline{4921}
\]
\[
+ 4
\]
\[
4925
\]
35. Felipe has 2943 stamps. He keeps an equal number of stamps in each of 3 stamp albums. Does Felipe keep more than 960 stamps in each stamp album?

36. In 9 months Jill collected 941 stamps and Joe collected 931 stamps. The total number of stamps they collected each month was the same. How many stamps did they collect each month?
Meghan bought 4 identical garden spades for $95.92. What did each spade cost?

To find the cost of each, divide: $95.92 ÷ 4.

Write the dollar sign and decimal point in the quotient above the dollar sign and decimal point in the dividend.

\[
\begin{array}{c}
\text{Divide as usual.} \\
\$9.592 \\
4 \text{) } 9.592 \\
\hline \\
8 \\
15 \\
12 \\
39 \\
36 \\
32 \\
\end{array}
\]

Each spade cost $23.98.

Study these examples.

\[
\begin{array}{c}
\text{Check.} \\
\$0.7 \\
7 \text{) } 0.49 \\
- 49 \\
\hline \\
49 \\
\end{array}
\quad \text{Check.} \\
\$0.7 \\
5 \text{) } 4.50 \\
\hline \\
0 \\
\end{array}
\]

There are no dimes in the quotient. Write a zero.
Complete each division.

1. $8.04 \div 4 = 2.01$
2. $49.95 \div 9 = 5.55$
3. $8.4 \div 7 = 1.2$
4. $0.56 \div 8 = 0.07$

Estimate. Then find the quotient.

5. $1.35 \div 5 = 0.27$
6. $4.94 \div 2 = 2.47$
7. $2.44 \div 4 = 0.61$
8. $2.31 \div 7 = 0.33$
9. $8.58 \div 2 = 4.29$
10. $20.84 \div 4 = 5.21$
11. $24.16 \div 8 = 3.02$
12. $6.12 \div 6 = 1.02$
13. $24.72 \div 3 = 8.24$
14. $18.10 \div 5 = 3.62$
15. $49.77 \div 9 = 5.53$
16. $14.82 \div 6 = 2.47$
17. $27.93 \div 7 = 3.99$
18. $20.88 \div 8 = 2.61$
19. $26.00 \div 5 = 5.20$
20. $21.63 \div 7 = 3.09$
21. $17.01 \div 7 = 2.43$
22. $63.00 \div 4 = 15.75$
23. $73.53 \div 9 = 8.17$
24. $22.20 \div 6 = 3.70$

Problem Solving

25. Help Meghan copy and complete the order form.

<table>
<thead>
<tr>
<th>Amount</th>
<th>Description</th>
<th>Cost per Item</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pairs</td>
<td>Gardening Gloves</td>
<td>$?</td>
<td>$23.96</td>
</tr>
<tr>
<td>3</td>
<td>Lawn Chairs</td>
<td>$?</td>
<td>$50.94</td>
</tr>
<tr>
<td>6</td>
<td>Tulip Bulbs</td>
<td>$0.95</td>
<td>$?</td>
</tr>
<tr>
<td>8</td>
<td>Daylily Plants</td>
<td>$?</td>
<td>$98.80</td>
</tr>
<tr>
<td>5</td>
<td>Flower Bots</td>
<td>$?</td>
<td>$14.95</td>
</tr>
<tr>
<td>24</td>
<td>Gladiola Bulbs</td>
<td>$1.45</td>
<td>$?</td>
</tr>
<tr>
<td>4</td>
<td>Fertilizers</td>
<td>$?</td>
<td>$31.96</td>
</tr>
<tr>
<td>2</td>
<td>Grass Rakes</td>
<td>$18.09</td>
<td>$?</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$?</td>
</tr>
</tbody>
</table>
Order of Operations

Tim and Tom were given this problem to solve.

\[6 + \frac{54}{2} - 4 \times 5 = n\]

Tim did this:
- \[6 + 54 = 60\]
- \[60 ÷ 2 = 30\]
- \[30 - 4 = 26\]
- \[26 \times 5 = 130\]

Tom did this:
- \[54 ÷ 2 = 27\]
- \[4 \times 5 = 20\]
- \[6 + 27 = 33\]
- \[33 - 20 = 13\]

Whose answer was correct?

Tom’s answer was correct. He used the mathematical rules called the order of operations.

These are the rules for the order of operations:

- *First* multiply or divide.
  Work in order from left to right.

- *Then* add or subtract.
  Work in order from left to right.

\[6 + \frac{54}{2} - 4 \times 5 = n\]

\[6 + 27 - 20 = 13\]

First multiply and divide from left to right. Then add and subtract from left to right.

Study these examples.

\[100 - 6 \times 7 ÷ 2 = x\]
\[100 - \frac{42}{2} = x\]
\[100 - 21 = 79\]

\[3 \times 4 \times 6 + 5 ÷ 5 = a\]
\[12 \times 6 + 5 ÷ 5 = a\]
\[72 + 1 = 73\]
Use the order of operations to solve.

1. \(18 - 5 + 6\)  
2. \(9 + 6 - 7\)  
3. \(8 \times 6 \div 4\)  
4. \(54 \div 6 \times 3\)  
5. \(20 + 20 - 16\)  
6. \(85 - 15 \times 2\)  
7. \(10 \div 5 + 5 \times 3\)  
8. \(8 - 4 \div 4 + 4\)  
9. \(24 + 4 \div 4 - 5\)  
10. \(35 - 5 + 10 \div 2\)  
11. \(6 \times 6 + 10 \div 5 - 1\)  
12. \(64 \div 8 \times 10 - 40 - 5\)  
13. \(30 \div 6 \times 9 + 9 - 1\)  
14. \(25 \times 3 - 50 \div 2 + 25\)  
15. \(18 + 6 \div 2 - 11 + 5\)  
16. \(20 \div 4 + 54 \div 6 + 4\)  
17. \(7 \times 30 - 10 + 150 \div 3\)  
18. \(45 \div 5 - 1 + 3 \times 7\)  
19. \(44 \div 2 \times 3 - 12 + 4\)  
20. \(20 \times 5 - 50 \times 2 + 0\)  
21. \(30 + 20 - 25 \div 5 \times 5\)  
22. \(200 \div 4 \times 3 - 50 + 1\)

23. Which part of the expression do you solve first?  
\(20 \times 10 - 4 \div 2 + 8\)  
A. \(2 + 8\)  
B. \(4 \div 2\)  
C. \(20 \times 10\)  
D. \(10 - 4\)

24. Use the order of operations to solve.  
\(50 \times 3 - 24 \div 6 + 10\)  
F. \(31\)  
G. \(136\)  
H. \(156\)  
J. \(236\)

25. \(46 \times 8 + 10 - 50 \div 2 + 75 \div 3 - 100\)  
A. \(728\)  
B. \(278\)  
C. \(89\)  
D. \(94\)
Find the Mean

Aidan scored 75, 85, 90, 80, and 90 on math tests last term. What was his mean, or average, test score?

To find the mean:

Add the numbers. Divide the sum by the number of addends.

Add:

\[
\begin{align*}
75 & \\
85 & \\
90 & \\
80 & \\
90 & \\
\hline
420 & 
\end{align*}
\]

Divide:

\[
\frac{420}{5} = 84
\]

Aidan's mean test score was 84.

Study this example.

Find the mean: $2.44, 3.68, 4.20, 1.64$

\[
\begin{align*}
2.44 & \\
3.68 & \\
4.20 & \\
1.64 & \\
\hline
11.96 & 
\end{align*}
\]

Think:

\[
\begin{align*}
\text{Think} & \\
5 \text{ addends} & \\
5)420 & \\
-40 & \\
-20 & \\
\hline
\text{mean} & 84
\end{align*}
\]

Find the mean.

1. 36, 42, 72
2. 256, 498
3. 93, 126, 117
4. 500, 250
5. 49, 93, 86
6. 88, 0, 78, 90
Find the mean.

7. 23, 37, 41, 19  
8. 56, 18, 42, 64  
9. 633, 495, 711  
10. 420, 504, 297  
11. $4.32, $.88, $4.00, $.76  
12. 488, 128, 952, 720  
13. 72, 216, 96, 108  
14. $1.84, $2.76, $4.08, $2.32  
15. 58, 77, 95, 49, 81  
16. 93, 102, 115, 83, 42  
17. 517, 423, 648, 212, 555  
18. $4.25, $6.71, $3.24, $5.06, $4.94  
19. $8.44, $.31, $2.97, $3.13, $.80

Problem Solving

Use the information in the grade book.

20. What was Carly’s mean test score? Was her mean score greater or less than Dawn’s?

21. Did the five students have a higher mean score on Test A or Test B?

22. Did the five students have the lowest mean score on Test A, Test B, or Test C?

23. List Bob, Dawn, and Eric in order from the highest mean to the lowest mean.

TEST PREPARATION

24. What is the mean of $3.24, $1.03, $5.69, and $.72?
   
   A $1.99  B $2.49  C $2.67  D $3.56
A diner has 98 mugs. The shelves they get stored on can hold only 8 mugs each. How many shelves are needed to store the mugs?

**Read**

Visualize the facts of the problem as you reread.

**Facts:**
- 98 mugs in all
- 8 mugs on each shelf

**Question:** How many shelves are needed?

**Plan**

Divide because a whole is being separated into equal groups of 8. Find the remainder.

The quotient and the remainder will tell how many shelves are needed to hold all the equal groups of 8 mugs, plus any remaining mugs.

\[
98 \div 8 = ? \text{ R } ?
\]

number of mugs mugs on each shelf

**Solve**

\[
\begin{array}{c@{\,}c@{\,}c@{\,}c}
\toprule
& 1 & 2 & R \, 2 \\
8 & 9 & 8 & \\
\hline
& 8 & 1 & 8 \\
& - & 1 & 6 \\
\hline
& 2 & &
\end{array}
\]

Think:

Since 12 shelves do not hold 98 mugs, increase the quotient by 1.

\[12 + 1 = 13\]

13 shelves are needed to store the mugs.

**Check**

Multiply and add to check division.

\[12 \times 8 = 96 \quad \text{and} \quad 1 \times 2 = 2\]

\[96 + 2 = 98\]

The answer checks.
Interpret the remainder to solve each problem.

1. Jason uses 9-inch strips of plastic. He can buy a 75-inch roll of plastic or a 125-inch roll of plastic. Which roll will have less wasted material?

Visualize the facts of the problem as you reread.

Facts: 9-inch strips of plastic
       75-inch or 125-inch roll of plastic

Question: Which roll will have less plastic left over when it is cut into 9-inch strips?

Divide both 75 inches and 125 inches by 9. Compare the remainders. Look for the smaller remainder.

2. Each CD bin at Sound City holds 8 disks. How many bins are needed to hold 195 disks?

3. Each treasure hunt team will have 5 people. So far 42 people have signed up. How many more people are needed to make every team equal? How many teams will there be?

4. Boxes of juice are sold in packs of 6. The Day Center needs 103 boxes of juice. How many packs should the center buy?

5. A soccer card club has 7 members. Together they have 1305 cards. How many more cards do they need to share the cards equally?

6. Write a problem that uses a remainder. Have a classmate solve it.
Problem-Solving Applications: Mixed Review

Solve each problem and explain the method you used.

1. Nora buys a 32-minute cartoon DVD. Each cartoon is 4 minutes long.
   a. How many cartoons are on the DVD?
   b. The DVD costs $6. How much does Nora spend for each cartoon?

2. Alex watches a 1-hour cartoon special. How many 5-minute cartoons can be shown if there are no commercials? What if there are 15 minutes of commercials?

3. A cartoon channel shows 192 cartoons each day. If it shows 8 cartoons each hour, how many hours a day does the channel broadcast?

4. There are 64 characters in a film. Half of them are animals. Of the remaining characters, 8 are puppets. The remaining characters are an even number of boys and girls. How many girls are there?

5. A movie is 84 minutes long. A hopping frog appears every third minute. How many times does the frog appear?

Use the pictograph for problem 7.

6. Fourth-grade students used cartoons to illustrate their stories. How many more students used space creatures than animals?

<table>
<thead>
<tr>
<th>Fourth-Grade Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
</tr>
<tr>
<td>Animals</td>
</tr>
<tr>
<td>Space Creatures</td>
</tr>
</tbody>
</table>

Key: Each 😊 = 6 students.
     Each ☹️ = 3 students.
Choose a strategy from the list or use another strategy you know to solve each problem.

7. Mae draws 24 pictures to make 1 second of an animated cartoon. How many pictures does she draw for a 1-minute cartoon?

8. A cartoon, made up of 5760 drawings, uses the same number of drawings for each of the 4 minutes it runs. How many drawings are used per minute?

9. Chris watches a 30-minute cartoon show. If it shows as many 8-minute cartoons as possible, explain if a 7-minute cartoon can also be shown in that time?

10. A DVD includes 4 cartoons. They are 5 minutes, 6 minutes, 8 minutes, and 9 minutes long. What is their average length?

11. Another cartoon DVD is 60 minutes long and costs $8.95. How much will 3 DVDs cost?

12. Three cartoon characters are a chicken, a dog, and an octopus. Flick has more legs than Click, but fewer legs than Glick. Name each animal.

13. A video store orders 60 cartoon DVDs. Each shipping box holds 8 discs. How many boxes will the store receive?

14. Two fourth-grade classes go on a field trip to a cartoon studio. The vans taking the students each hold 7 students. How many vans are needed for 47 students?

15. Write a problem modeled on problem 13. Have a classmate solve it.
35. An equal number of crayons were put on each of 8 tables. There were 84 crayons. How many crayons were not put on tables?

36. What was Billy’s mean score for basketball if he scored the following points: 24, 30, 18, 15, 28?
**Factor Trees**

A **composite number** has more than two factors.  

6 = 1 × 6  
\[5 = 1 \times 5\]

A **prime number** is greater than 1 and has exactly two factors, itself and 1.

The factors of a number that are prime are called **prime factors**.

You can use a **factor tree** to help you find all the prime factors, or the prime factorization, of a number.

Look at these factor trees for 12.

- **Factor Tree 1:**
  
  \[
  \begin{array}{c}
  12 \\
  3 \times 4 \\
  3 \times 2 \times 2 \\
  \end{array}
  \]

- **Factor Tree 2:**
  
  \[
  \begin{array}{c}
  12 \\
  6 \times 2 \\
  3 \times 2 \times 2 \\
  \end{array}
  \]

3 and 2 are prime numbers.  
So the prime factorization of 12 is \(3 \times 2 \times 2\).

**Copy and complete each factor tree.**

1. \[
\begin{array}{c}
30 \\
6 \times 5 \\
? \times 2 \times ?
\end{array}
\]

2. \[
\begin{array}{c}
40 \\
4 \times 10 \\
? \times 2 \times ?
\end{array}
\]

3. \[
\begin{array}{c}
54 \\
6 \times 9 \\
3 \times ? \times ?
\end{array}
\]

4. \[
\begin{array}{c}
36 \\
9 \times ? \\
? \times ? \times ?
\end{array}
\]

**Draw a factor tree for each number.**

5. 16  
6. 10  
7. 20  
8. 24  
9. 27  
10. 32  
11. 48  
12. 35  
13. 56  
14. 72
Chapter 5 Test

Estimate. Then divide.

1. \(6 \div 45\)  
2. \(5 \div 880\)  
3. \(8 \div 268\)  
4. \(7 \div 8.26\)  
5. \(6 \div 660\)  
6. \(2 \div 408\)  
7. \(6 \div 804\)  
8. \(5 \div 610\)  
9. \(7 \div 700\)  
10. \(3 \div 406\)

11. \(4 \div 24.16\)  
12. \(3 \div 13.23\)  
13. \(7 \div 7.84\)  
14. \(8 \div 12.48\)  
15. \(9 \div 11.70\)

Write the rule. Complete the pattern.

16. 3, 7, 11, 15, __, __.
17. 57, 54, 51, 48, __, __.
18. 1, 2, 4, 8, __, __.
19. 3, 8, 7, 12, 11, __, __.

Use the order of operations to solve.

20. \(6 \times 5 + 10 \div 5\)

21. \(32 \div 8 \times 10 - 5 - 10\)

Problem Solving

Use a strategy you have learned.

22. Each shelf holds 8 dictionaries. Jean has 37 dictionaries. How many shelves does she need to hold all the dictionaries?

23. On four days Jan read 156 pages, 274 pages, 856 pages, and 306 pages. What was the mean number of pages read by Jan per day?

Tell About It

Explain how you find the value of the variable.

24. \(48 \div n = 8\)

25. \(7 \times a = 35\)

Performance Assessment

What might the missing numbers be? Explain why.

26. The divisor is 1. What are the dividend and quotient?
27. The dividend is 0. What are the quotient and divisor?
28. The quotient is 1. What are the divisor and dividend?
**Test Preparation**

**Choose the best answer.**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Choose the standard form of the number.</td>
<td>a. 90,517</td>
<td>b. 9,500,017</td>
<td>c. 90,005,017</td>
</tr>
<tr>
<td>2. Which expression matches the problem?</td>
<td>a. ( b + 7 )</td>
<td>b. ( 7 + b )</td>
<td>c. ( 7 - b )</td>
</tr>
<tr>
<td>3. 48,166 + 57,369</td>
<td>a. 90,797</td>
<td>b. 95,348</td>
<td>c. 105,535</td>
</tr>
<tr>
<td>4. What is the period of the underlined digits?</td>
<td>a. billions</td>
<td>b. hundreds</td>
<td>c. thousands</td>
</tr>
<tr>
<td>5. 7 \times 88</td>
<td>a. 81</td>
<td>b. 95</td>
<td>c. 556</td>
</tr>
<tr>
<td>6. 60 \times 530</td>
<td>a. 3180</td>
<td>b. 12,800</td>
<td>c. 30,900</td>
</tr>
<tr>
<td>7. 6 \div 97</td>
<td>a. 11 R6</td>
<td>b. 12 R3</td>
<td>c. 16 R1</td>
</tr>
<tr>
<td>8. Round $947.84 to the nearest ten dollars.</td>
<td>a. $1000.00</td>
<td>b. $950.00</td>
<td>c. $940.00</td>
</tr>
<tr>
<td>9. $863.69 - 651.18</td>
<td>a. $1514.87</td>
<td>b. $212.51</td>
<td>c. $211.51</td>
</tr>
<tr>
<td>10. 80,000 - 47,789</td>
<td>a. 32,211</td>
<td>b. 42,211</td>
<td>c. 47,789</td>
</tr>
<tr>
<td>11. $38.43 \times 3</td>
<td>a. $115.29</td>
<td>b. $12.81</td>
<td>c. $94.29</td>
</tr>
<tr>
<td>12. Find the value of the variable.</td>
<td>a. ( r = 0 )</td>
<td>b. ( r = 1 )</td>
<td>c. ( r = 3 )</td>
</tr>
<tr>
<td>13. $5.27 \times 46</td>
<td>a. $168.28</td>
<td>b. $224.86</td>
<td>c. $242.42</td>
</tr>
<tr>
<td>14. 8 \div 968</td>
<td>a. 101</td>
<td>b. 121</td>
<td>c. 131</td>
</tr>
</tbody>
</table>
15. Which is a related multiplication fact for $21 \div 7 = 3$?
   a. $3 \times 7 = 21$
   b. $7 \times 4 = 28$
   c. $21 \div 3 = 7$
   d. $21 = 7 + 14$

20. Find the mean.
   96, 164, 328, 157, 70
   a. 328
   b. 258
   c. 164
   d. 163

   $6 \div 37.38$
   a. $6.23$
   b. $6.38$
   c. $36.38$
   d. not given

21. Which shows the best way to check the answer?
   1859
   a. 1859
   b. 1859 + 1584 = 3443
   c. 275 + 1584 = 1859
   d. 275 + 1859 = 2134

17. What is the pattern rule for 55, 48, 41, 34, 27, . . . ?
   a. Start at 55, subtract 48
   b. Start at 55, subtract 27
   c. Start at 27, subtract 7
   d. Start at 55, subtract 7

22. The elevation of Mt. Luna is 737 feet. The elevation of Mt. Rose is 488 feet. How much taller is Mt. Luna than Mt. Rose?
   a. 737 ft
   b. 488 ft
   c. 349 ft
   d. 249 ft

18. Align and add.
   $63,138.55 + 45,864.21$
   a. $109,002.76$
   b. $109,092.76$
   c. $108,902.76$
   d. $17,274.34$

23. Choose the related fact to find the value of $f$.
   $15 - f = 8$
   a. $f = 8$
   b. $15 - 7 = 8$
   c. $15 - 8 = 7$
   d. $15 - 5 = 10$

19. Which multiplication property is used?
   $9 \times 1 = 9$
   a. Commutative
   b. Associative
   c. Identity
   d. Zero

   $7028 + 2109$
   a. 10,137
   b. 9137
   c. 9127
   d. 4919

**Tell About It**

Use estimation to solve. Choose the method. Using your method, do you think the estimate is less than or greater than the actual product? How would another method of estimation change your answer? Explain.

25. Jose has 466 rare coins. Nel has about 8 times that number. About how many rare coins does Nel have?
In this chapter you will:
Estimate and compute with customary and metric units, with renaming.
Investigate time and temperature—both Fahrenheit and Celsius.
Solve problems using more than one step.

Critical Thinking/Finding Together
Measure the length of various objects using the nonstandard units below.
- **cubit** (distance from elbow to fingertip)
- **span** (distance between outstretched thumb and pinky)

from
**TAKE A NUMBER**

Imagine a world
Without mathematics:
No rulers or scales,
No inches or feet,
No dates or numbers
On house or street,
No prices or weights,
No determining heights,
No hours running through
Days and nights.
No zero, no birthdays,
No way to subtract
All of the guesswork
Surrounding the fact.
No sizes for shoes,
Or suit or hat . . .
Wouldn’t it be awful
To live like that?

*Mary O’Neill*
You can use a ruler to measure an object to the nearest inch, nearest half inch, and nearest quarter inch.

When you measure length, align the object you are measuring with the beginning of the ruler.

- To the nearest inch, the straw is about 5 in. long.
- To the nearest half inch, the straw is about $4\frac{1}{2}$ in. long.
- To the nearest quarter inch, the straw is about $4\frac{3}{4}$ in. long.

Measure each to the nearest inch, nearest half inch, and nearest quarter inch.

1. 

Think
Each inch on the ruler is divided into 2 half inches and 4 quarter inches.
Draw a line segment for each length.

4. 3 in.  
5. $2\frac{1}{4}$ in.  
6. $1\frac{1}{2}$ in.  
7. $4\frac{3}{4}$ in.  
8. $5\frac{1}{2}$ in.  
9. $3\frac{3}{4}$ in.  
10. $6\frac{1}{4}$ in.  
11. 4 in.

Estimate the length of each to the nearest inch. Then measure each line to check your estimates.

12.  
13.  
14.  
15.  
16.  

Use an inch ruler to measure objects.

17. Measure the length and width of some of the objects in your classroom. Record each measurement. Discuss your results with your class.

Problem Solving

18. Could you use the ruler at the right to measure the line in exercise 14? How?

19. What is the length of the red line in the figure at the right?

Challenge

Draw a line segment for each length. Label each line segment.

20. $2\frac{1}{4}$ in., 2 in., $2\frac{3}{4}$ in., $2\frac{1}{2}$ in.

21. Order the labeled line segments from longest to shortest.
 Rename Units of Length

Can Don fit a shelf that is 72 in. long in a closet that is 5 ft wide?

Compare: 72 in. ? 5 ft

Before you can compare measurements in different units, you need to rename the measurements using the same units.

You can make a table to rename units. Rename 5 ft as inches.

<table>
<thead>
<tr>
<th>ft</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>12</td>
<td>24</td>
<td>36</td>
<td>48</td>
<td>60</td>
</tr>
</tbody>
</table>

Think

1 ft = 12 in.

5 ft = 60 in. 72 > 60 So 72 in. > 5 ft.

You can multiply the larger unit to rename units.

5 ft = ? in.
5 ft = (5 × 12) in.

5 ft = 60 in. 72 > 60 So 72 in. > 5 ft.

Don cannot fit a shelf that is 72 in. long in a closet that is 5 ft wide.

Rename each unit of measure. Make a table or compute with paper and pencil. Use the Table of Measures on page 500 to help.

1. 2 yd = ? in. 2. 8 ft = ? in. 3. 18 ft = ? yd
4. 7 ft = ? in. 5. 4 yd = ? ft 6. 4 yd = ? in.
Compare. Write <, =, or >.
You may make a table or compute.

7. 6 yd ? 9 ft  
8. 8 ft ? 84 in.  
9. 36 in. ? 3 ft  
10. 7 ft ? 108 in.  
11. 20 yd ? 45 ft  
12. 8 yd ? 18 ft  

The **mile (mi)** is a customary unit of length.

Miles are used to measure long lengths called **distances**.

- 5280 feet (ft) = 1 mile (mi)
- 1760 yards (yd) = 1 mile (mi)

It takes about 25 minutes to walk 1 mile.

Compare. Write <, =, or >.

13. 2 mi ? 3520 yd  
14. 5280 yd ? 3 mi  
15. 3 mi ? 21,120 ft  
16. 10,560 ft ? 2 mi  
17. 6 mi ? 42,240 ft  
18. 7040 yd ? 4 mi  

**Problem Solving**

19. The width of the teachers’ parking lot at Harlington Elementary School is 34 yd. How many feet wide is it?  
20. The Public Library is 1810 yd from Luz’s house and 5045 ft from Tanya’s house. Whose house is closer to the library?  
21. Which is the most reasonable distance a person can walk in two hours, 4 miles, 4 yards, 4 inches, or 4 feet?
6-3  Compute Customary Units

Last month a sunflower was 4 feet 7 inches tall. Then it grew 1 foot 8 inches taller. How tall is the sunflower now?

To find how tall it is now, add: 4 ft 7 in. + 1 ft 8 in.

Add the smaller units first. Rename units as needed.

\[
\begin{align*}
4 \text{ ft} & \quad 7 \text{ in.} \\
+ & \quad 1 \text{ ft} \quad 8 \text{ in.} \\
\hline
5 \text{ ft} & \quad 15 \text{ in.} = 5 \text{ ft} + 1 \text{ ft} + 3 \text{ in.} = 6 \text{ ft} \ 3 \text{ in.}
\end{align*}
\]

\[
15 \text{ in.} = 12 \text{ in.} + 3 \text{ in.} = 1 \text{ ft} + 3 \text{ in.}
\]

The sunflower is 6 ft 3 in. tall now.

A lilac stem was 7 feet 7 inches tall. Sam pruned 2 feet 5 inches off the stem. How tall was the stem after pruning?

To find how tall, subtract: 7 ft 7 in. − 2 ft 5 in.

Subtract the smaller units first. Rename units as needed.

\[
\begin{align*}
7 \text{ ft} & \quad 7 \text{ in.} \\
− & \quad 2 \text{ ft} \quad 5 \text{ in.} \\
\hline
5 \text{ ft} & \quad 2 \text{ in.} \quad \text{The stem was 5 ft 2 in. tall after pruning.}
\end{align*}
\]

Study these examples.

\[
\begin{align*}
8 \text{ yd} & \quad 1 \text{ ft} \\
+ & \quad 2 \text{ yd} \quad 2 \text{ ft} \\
\hline
10 \text{ yd} & \quad 3 \text{ ft} = 10 \text{ yd} + 1 \text{ yd} = 11 \text{ yd}
\end{align*}
\]

\[
4 \text{ ft} 11 \text{ in.} \quad 9 \text{ in.} \quad 4 \text{ ft} \quad 2 \text{ in.}
\]
Add.
1. 6 ft 2 in. + 3 ft 5 in.  2. 7 yd 1 ft + 1 yd 1 ft  3. 3 yd 2 ft + 5 yd

4. 8 ft 6 in. + 5 in.  5. 10 ft 3 in. + 4 ft 10 in.  6. 5 ft 8 in. + 7 ft 11 in.

7. 6 ft 9 in. + 9 ft 5 in.  8. 4 yd 2 ft + 3 yd 2 ft

Subtract.
9. 4 ft 8 in. − 1 ft 3 in.  10. 9 ft 4 in. − 9 ft 2 in.  11. 7 yd 2 ft − 2 ft

12. 2 yd 2 ft − 2 yd  13. 12 ft 9 in. − 2 ft 4 in.  14. 8 ft 10 in. − 5 ft 6 in.

15. 9 ft 7 in. − 4 ft 3 in.  16. 4 ft 6 in. − 2 ft 6 in.

Problem Solving

17. Amy’s fence is 18 ft 10 in. long. She adds a 3 ft 5 in. section to the fence. How long is the fence then?

18. Joe painted 6 ft of a fence that is 20 ft 6 in. long. How much of the fence is not painted?

CHALLENGE

Subtract. Rename when necessary.
19. 4 ft 4 ft
    1 ft 1 ft
    2 ft 10 in.

Regroup 1 ft as 12 in.

20. 8 ft 6 in.
    − 3 ft 11 in.

21. 9 yd 2 ft
    − 8 yd 4 ft
22. 5 ft 1 in.
    − 4 ft 11 in.
23. 12 ft
    − 6 ft 8 in.
Customary Units of Capacity

The customary units for measuring capacity are cup, pint, quart, and gallon.

Each unit can be measured in fluid ounces (fl oz).

8 fluid ounces is equal to 1 cup.

- How many fluid ounces are equal to 3 pints?

To find how many fluid ounces, rename pints as cups. Then rename cups as fluid ounces.

\[
3 \text{ pt} = \frac{3 \times 2}{1} \text{ c} = 6 \text{ c} = (6 \times 8) \text{ fl oz} = 48 \text{ fl oz}
\]

48 fluid ounces are equal to 3 pints.

- How many cups are equal to 16 fluid ounces?

To find how many cups, rename fluid ounces as cups.

\[
16 \text{ fl oz} = \frac{16 \div 8}{1} \text{ c} = 2 \text{ c}
\]

2 cups are equal to 16 fluid ounces.

Study this example.

\[
42 \text{ fl oz} = \frac{5 \text{ R}2}{8} \text{ fl oz} = 5 \text{ c} 2 \text{ fl oz}
\]
Complete each table to find equivalent measures.

<table>
<thead>
<tr>
<th></th>
<th>gal</th>
<th>1</th>
<th>2</th>
<th>?</th>
<th>4</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>qt</td>
<td>4</td>
<td>8</td>
<td>?</td>
<td>?</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>pt</td>
<td>8</td>
<td>?</td>
<td>24</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>pt</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>?</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>c</td>
<td>2</td>
<td>?</td>
<td>?</td>
<td>8</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>fl oz</td>
<td>16</td>
<td>32</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Rename each unit of capacity.

3. 2 pt = ? c
4. 8 c = ? fl oz
5. 16 qt = ? gal
6. 2 gal = ? qt
7. 10 pt = ? c
8. 48 pt = ? gal

Compare. Use <, =, or >.

9. 6 pt ? 12 c
10. 9 qt ? 2 gal
11. 3 c ? 36 fl oz
12. 2 qt ? 10 c
13. 54 fl oz ? 6 c
14. 32 fl oz ? 1 qt

Problem Solving

15. Would you need 6 c, 6 pt, or 6 gal of paint to paint the walls of a 16 ft by 18 ft room?

16. Would you drink 1 fl oz, 1 c, or 1 qt of milk at lunch?

17. Ted’s pail holds 2 qt of water. He filled the pail 6 times to wash his mother’s car. How many gallons of water did Ted use?

18. How many 14-fl oz cans of broth are needed for a recipe that calls for 1 qt of broth?

MENTAL MATH

Rename each unit of capacity mentally.

19. 1 qt = ? pt
20. 1 c = ? fl oz
21. 1 gal = ? qt
22. 1 pt = ? c
The ounce (oz), the pound (lb), and the ton (T) are customary units of weight.

A letter weighs about 1 ounce. A compact car weighs about 1 ton.

16 ounces (oz) = 1 pound (lb)
2000 pounds (lb) = 1 ton (T)

Write oz, lb, or T for the unit you would use to measure the weight of each.

1. a carrot
2. an elephant
3. an electric guitar
4. a fire engine
5. a person
6. a toaster
7. a dog
8. a canary
9. a dump truck

Choose the letter of the best estimate.
10. an orange
   a. 6 oz
   b. 1 lb
   c. 2 lb
11. a cat
   a. 30 lb
   b. 12 oz
   c. 12 lb

Complete each table to find equivalent measures.

12. \[
    \begin{array}{c|c|c|c|c|c|c}
    \text{oz} & 16 & 32 & ? & 64 & ? & ? \\
    \text{lb} & 1 & 2 & 3 & ? & 5 & 6 \\
    \end{array}
    \]

13. \[
    \begin{array}{c|c|c|c|c|c|c|c}
    \text{lb} & 2000 & ? & 6000 & ? & ? \\
    \text{T} & 1 & 2 & ? & 4 & ? \\
    \end{array}
    \]
Compare. Write <, =, or >. You may make a table to help.

14. 5 lb ___ 96 oz
15. 6 T ___ 12,000 lb
16. 4 lb ___ 58 oz
17. 8 lb ___ 112 oz
18. 144 oz ___ 6 lb
19. 8500 lb ___ 5 T
20. 48 oz ___ 2 lb
21. 2 T ___ 2000 lb
22. 10 lb ___ 1600 oz

Match. Write the letter of the tool you would use to measure each.

23. length of a pencil a. ruler
24. water for a vase b. scale
25. length of the classroom c. measuring cup
26. weight of a person d. yardstick

Problem Solving

27. Akeem has 5 sisters. He gives a 4-oz plum to each sister. In all do the plums weigh more or less than 1 lb?

28. A truck can carry 3000 lb of cargo. Can it carry two tractors that each weigh 1000 lb and a 625-lb plow?

29. Can a truck that weighs 7500 lb safely cross a bridge with a 3 T weight limit?

DO YOU REMEMBER?

Complete the sentences. Use the words in the box.

In the subtraction sentence 67 − 24 = 33:

30. The ___ is 67.
31. The ___ is 24.
32. The ___ is 33.
The **decimeter (dm)** is a metric unit of length.

10 centimeters (cm) = 1 decimeter (dm)

In base ten blocks each ten rod is about 1 decimeter long.

You can use a metric ruler to measure an object to the **nearest centimeter** or the **nearest decimeter**.

The length of the piece of yarn is between 8 cm and 9 cm. It is closer to 8 cm.

To the nearest centimeter, the piece of yarn is 8 cm long.
To the nearest decimeter, the piece of yarn is 1 dm long.

Measure each to the nearest centimeter.

1. 
2. 
3. 

---

216 Chapter 6
Draw a line segment for each length.

4. 2 cm  
5. 8 cm  
6. 12 cm  
7. 10 cm  
8. 2 dm  
9. 16 cm  
10. 1 dm  
11. 20 cm  
12. 3 dm  
13. 3 cm

Estimate each to the nearest centimeter and to the nearest decimeter. Then measure to check your estimates.

14. the length of your shoe  
15. the length of a pencil case  
16. the width of your hand  
17. the length of your desk  
18. the length of a dollar bill  
19. the length of this book  
20. the width of this book

21. For exercises 14–20, was it easier to estimate in centimeters or in decimeters? Why?

22. Josh and Ray measure the same wall. Josh says it is 360 centimeters long. Ray says it is 36 decimeters long. Can they both be right? Explain your answer.

23. Lila needs 63 cm of balsa wood to make a model plane. The three pieces she has are 3 dm long, 2 dm long, and 8 cm long. How many more cm of balsa wood does Lila need?

24. Find and explain the meanings of these prefixes commonly used in the metric system of measurement.

---

**Problem Solving**

---

**Write About It**

---

**Practice**

---
**Work with Metric Units**

The **millimeter (mm)** and the **kilometer (km)** are other metric units of length.

A dime is about 1 millimeter thick.

It takes about 15 minutes to walk 1 kilometer.

<table>
<thead>
<tr>
<th>m</th>
<th>1000</th>
<th>2000</th>
<th>3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>km</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

3 < 4  So 3000 m < 4 km.

### Multiply:

4 km = \((4 \times 1000)\) m
4 km = 4000 m
3000 < 4000
So 3000 m < 4 km.

<table>
<thead>
<tr>
<th>cm</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>dm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

4 > 3  So 40 cm > 3 dm.

### Divide:

40 cm = \((40 \div 10)\) dm
40 cm = 4 dm
4 > 3  So 40 cm > 3 dm.

---

10 millimeters (mm) = 1 centimeter (cm)
100 millimeters (mm) = 1 decimeter (dm)
10 decimeters (dm) = 1 meter (m)
1000 meters (m) = 1 kilometer (km)
Compare. Write <, =, or >.
You may make a table or compute.

1. 40 km \_ 400 m
2. 2000 mm \_ 200 cm
3. 9 dm \_ 900 cm
4. 6 m \_ 80 dm
5. 7 dm \_ 7000 mm
6. 500 cm \_ 5 dm
7. 2000 m \_ 5 km
8. 9 dm \_ 1 m
9. 8000 cm \_ 80 m

Problem Solving

Use the map below.

10. What is the shortest route from Ames to Lyman? About how many kilometers long is this route?

11. Mr. Yuan wants to travel from Harris to Deer Park to Canton. About how many kilometers will he travel?

12. Ms. Rau must travel from Lyman to Merrit. Should she go through Farmdale or through Canton? Why?

13. What is the shortest route from Deer Park to Ames? From Easton to Harris? About how long is each route?

14. The distance from City A to City B is 40 miles. What is the distance from City A to City C?
Metric Units of Capacity

The milliliter (mL) is a metric unit of liquid capacity.

1000 milliliters (mL) = 1 liter (L)

There are about 20 drops of water in 1 mL.

Choose the letter of the best estimate.

1. bottle of liquid soap
   a. 1 mL  
   b. 10 mL  
   c. 1 L

2. gasoline for a car
   a. 48 mL  
   b. 48 L  
   c. 480 L

3. bowl of soup
   a. 5 mL  
   b. 500 mL  
   c. 5 L

4. ladle of soup
   a. 25 mL  
   b. 250 mL  
   c. 250 L

5. water in an aquarium
   a. 60 mL  
   b. 600 mL  
   c. 60 L

Write mL or L for the unit you would use to measure the capacity of each.

6. large jug of apple cider
7. tablespoon of syrup

8. glass of juice
9. bucket

10. washing machine
11. cup

Complete the table to find equivalent measures.

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>1</th>
<th>2</th>
<th>?</th>
<th>?</th>
<th>?</th>
<th>6</th>
<th>?</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>mL</td>
<td>1000</td>
<td>?</td>
<td>3000</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>7000</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>
Compare. Write <, =, or >.
You may make a table or compute.

13. 2 L ? 200 mL  14. 5 L ? 6000 mL  15. 8 L ? 8000 mL
16. 15 L ? 1500 mL  17. 4000 mL ? 3 L  18. 9000 mL ? 10 L

Write in order from the least amount to the greatest amount.

19. 4 L, 40 mL, 400 mL, 4 mL  20. 200 L, 20 mL, 20 L, 2 mL
21. 38 L, 380 mL, 380 L, 138 L  22. 24 L, 2400 mL, 240 mL, 240 L

Problem Solving

23. Mr. Wood’s van can travel 5 km on 1 L of gasoline. How much gasoline does the van use to travel 50 kilometers?

24. Mrs. Wood’s water jug holds 4 L of water. It has 500 mL of water in it now. How much more water is needed to fill the jug?

25. Ellen and Allen both carry small canteens. Each canteen holds 750 mL of water. How much water, in liters, do they need to fill both canteens?

26. The Woods began their trip with 75 L of gasoline in their gas tank. They used 68 L of gasoline. How much gasoline was left in the tank?

27. Ellen filled her 750-mL canteen four times in one day. How many liters of water did she use?

TEST PREPARATION

28. Which would most likely be measured in milliliters?
   A a full bathtub
   B a teaspoon of honey
   C a carton of milk
   D a bucket of water

29. Ty’s thermos holds 2 L. How many milliliters does it hold?
   F 2 mL  G 20 mL
   H 200 mL  J 2000 mL
Metric Units of Mass

The gram (g) is a metric unit of mass. 1000 grams (g) = 1 kilogram (kg)

A paper clip has a mass of about 1 gram.

1 gram (g) about 1 gram (g)

Choose the letter of the best estimate.

1. an egg  
   a. 90 g  
   b. 9 kg  
   c. 90 kg

2. a shark  
   a. 100 g  
   b. 1000 g  
   c. 1000 kg

3. a worm  
   a. 14 g  
   b. 14 000 g  
   c. 14 kg

4. a small dog  
   a. 880 g  
   b. 8 kg  
   c. 88 kg

5. a slice of bread  
   a. 2 g  
   b. 28 g  
   c. 28 kg

Write g or kg for the unit you would use to measure the mass of each.

6. a dinosaur  
7. a mouse  
8. a math book

9. a bag of oranges  
10. a feather  
11. a crayon

12. a paper clip  
13. a bag of flour  
14. a flower

Complete the table to find equivalent measures.

<table>
<thead>
<tr>
<th>kg</th>
<th>1</th>
<th>3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>g</td>
<td>1000</td>
<td>4000</td>
<td></td>
</tr>
</tbody>
</table>
Compare. Write <, =, or >.
You may make a table or compute.

16. 2 kg ? 20 g  
17. 5 kg ? 5000 g  
18. 9 kg ? 90 000 g  
19. 8 kg ? 9000 g  
20. 80 g ? 8 kg  
21. 6000 g ? 5 kg

Problem Solving

22. A penny has a mass of about 3 g. About what is the mass of a roll of 50 pennies? of 2 rolls of 50 pennies?

23. Pete puts 150 g of turkey into each turkey sandwich. How many kilograms of turkey does he need for 20 sandwiches?

24. Each loaf of bread that Pete uses has a mass of 500 g. He orders 10 loaves of bread. Is this more than or less than 8 kilograms?

25. A carton holds up to 30 kg. Pete has 28 kg of canned goods and 4000 g of side dishes. Can he pack them all into the carton?

26. Pete cooks two turkeys. The first has a mass of 11 000 g. The second has a mass of 17 kg. Which turkey has the greater mass? how much greater?

27. Find objects in your classroom that you think have a mass of about 50 g. Then use a balance to check your guesses. How close were your guesses?

CRITICAL THINKING

Choose reasonable numbers so that each picture makes sense.

29.  
30.  
31.  

Chapter 6 223
A thermometer is used to measure temperature.

Temperature can be measured in degrees Fahrenheit (°F) or in degrees Celsius (°C).

Each line on the Fahrenheit scale stands for 2°F. Room temperature in degrees Fahrenheit is about 68°F.

Each line on the Celsius scale stands for 1°C. Room temperature in degrees Celsius is about 20°C.

Use a minus sign to write temperatures below zero.

Write: \(-5^\circ\text{F}\)
Read: 5 degrees Fahrenheit below zero

Write: \(-10^\circ\text{C}\)
Read: 10 degrees Celsius below zero

Write the letter of the better estimate.

1. hot summer day
   a. 90°C  b. 90°F

2. ice skating weather
   a. \(-10^\circ\text{C}\)  b. 10°C
Write each temperature.

3. 4. 5. 6.

Compare. Write <, =, or >.
You may use the thermometer on page 224.

7. 30°C  ? 120°F  8. 100°C  ? 212°F  9. 50°F  ? 10°C
10. 140°F  ? 60°C  11. −10°F  ? −20°C  12. 100°F  ? 50°C

Problem Solving  Use the thermometer on page 224.

13. At 6:00 A.M. the temperature was 45°F. It rose 13°F by noon. What was the temperature at noon?
14. The temperature was 22°C at 8:00 P.M. If the temperature dropped 3° every hour, what was the temperature at 11:00 P.M.?

15. The temperature was 36°F at 7:00 P.M. It dropped 10°F by midnight. What was the temperature at midnight?
16. At 5:00 A.M. the temperature was −3°C. By noon it was 6°C. By how many degrees did the temperature rise?

17. The temperature rose 11°F from 5:30 A.M. to 10:00 A.M. It was −17°F at 5:30 A.M. What was the temperature at 10:00 A.M.?
18. The temperature rose from 52°C to the temperature shown on the thermometer in exercise 5. How many degrees did the temperature rise?

Write About It  Choose Fahrenheit or Celsius to keep a record of the temperature at the same time each day for 7 days in a row. Share your temperature record with your class.
You can read time after the half hour as minutes past the hour or as minutes to the next hour.

Read: 26 minutes past 6
Write: 6:26
Read: 43 minutes past 2; 17 minutes to 3
Write: 2:43

24 hours = 1 day

midnight
12:00 A.M.

6:00 A.M.

noon
12:00 P.M.

6:00 P.M.

midnight
12:00 A.M.

Use A.M. for the hours between 12:00 midnight and 12:00 noon.
Use P.M. for the hours between 12:00 noon and 12:00 midnight.

Write the time in minutes past the hour and in minutes to the hour.

1. 2. 3.
4. 5. 6.
Write A.M. or P.M. to make each statement reasonable.

7. Bill has breakfast at 7:15 ?
8. School lets out at 3:00 ?
9. Ann goes to bed at 9:30 ?
10. School begins at 8:00 ?

Write the time. Use A.M. or P.M.

11. 10 minutes past 8
in the morning
12. 22 minutes to 10
at night
13. 36 minutes past 4
in the afternoon
14. 8 minutes to 9
in the morning
15. 18 minutes to noon
16. 45 minutes past midnight

Equivalent Units of Time

How many seconds are in 42 minutes?

Multiply to rename larger units as smaller units.

42 min = ? s
42 min = (42 × 60) s

1 min = 60 s

42 min = 2520 s  There are 2520 seconds in 42 minutes.

Complete each table to find equivalent measures.

17. \[
\begin{array}{c|c|c|c|c}
\text{d} & 1 & ? & 3 & ? \\
\hline
\text{h} & 24 & ? & ? & 96 \\
\end{array}
\]

18. \[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\text{min} & 60 & ? & ? & ? & ? & 240 \\
\hline
\text{h} & ? & 2 & ? & ? \\
\end{array}
\]

19. \[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\text{y} & ? & 2 & ? & ? \\
\text{wk} & 52 & ? & ? & 208 \\
\end{array}
\]

20. \[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\text{mo} & ? & ? & 36 & ? \\
\text{y} & 1 & ? & ? & 4 \\
\end{array}
\]
Jody arrived at the airport at 11:10 A.M. to meet Lisa. Lisa’s plane landed at 1:24 P.M. How long did Jody wait for Lisa?

To find the elapsed time or how much time has passed:

- Count the hours by 1s.
- Count the minutes by 5s and 1s.

Start at 11:10 A.M.
Count the hours to 1:10 P.M.

11:10
12:10
1:10

1 hour
1 hour

2 hours

Count the minutes to 1:24 P.M.

1:10
1:15
1:20
1:21
1:22
1:23
1:24

5 minutes
5 minutes
1 minute
1 minute
1 minute
1 minute
1 minute

14 minutes

Jody waited 2 hours 14 minutes for Lisa.

Write the elapsed time.

1. from 8:05 A.M. to 8:30 A.M.
2. from 1:25 P.M. to 1:50 P.M.
3. from 6:30 A.M. to 6:51 A.M.
4. from 11:15 P.M. to 11:47 P.M.
5. from 11:45 P.M. to 12:04 A.M.
6. from 11:55 A.M. to 12:16 P.M.
7. from 3:25 P.M. to 4:40 P.M.
8. from 8:30 A.M. to 10:05 A.M.
Elapsed Time on a Calendar

Lisa arrived on June 26 and left on July 8. How many days did she visit?

Count from June 26 to July 8. Count June 27 as day 1.

Lisa visited for 12 days.

Rename each unit of time.

9. 2 wk 4 d = ___ d

10. 3 y 6 mo = ___ mo

11. 3 y 5 wk = about ___ wk

12. 2 y 94 d = ___ d

Remember:

7 d = 1 wk
365 d = 1 y
52 wk = 1 y
12 mo = 1 y

Problem Solving

Use the calendar above for exercises 13 and 14.

13. What date is 10 days after July 22?

14. What date is 21 days before July 2?

15. Jody and Lisa left the airport at 2:05 P.M. They drove for 47 minutes before arriving at Jody’s house. What time did they arrive at Jody’s house?

16. Jody and Lisa will visit their cousin, who lives 1 hour and 10 minutes away. They want to get there at 11:00 A.M. What time should they leave?
Problem-Solving Strategy: Use More Than One Step

Maria has 3 packages to send to Hawaii in zone 8. One weighs 3 lb and the others weigh 4 lb each. How much money will she save if she uses 4-day delivery instead of paying $13.40 for using 2-day delivery?

Visualize the facts of the problem as you reread it.

Facts: 1—3-lb package  
2—4-lb packages

Question: How much money is saved by using 4-day delivery?

Plan the steps to follow.

Step 1: Use the prices in the chart. Add to find the cost of sending the packages by 4-day delivery.

3-lb cost + 4-lb cost = total cost

Step 2: Subtract to find the difference.

2-day delivery − 4-day delivery = savings

Step 1: 4-day delivery

\[
\begin{align*}
\text{3-lb cost} & \quad \text{4-lb cost} \\
1 & \quad 3 \\
4.05 & \quad 4.60 \\
\hline \\
\text{total cost} & \\
$13.25 & \\
\end{align*}
\]

Step 2: savings

\[
\begin{align*}
\text{2-day delivery} & \quad \text{4-day delivery} \\
$13.40 & \quad $13.40 \\
\hline \\
\text{savings} & \\
$0.15 & \\
\end{align*}
\]

Maria will save $0.15 by using 4-day delivery.

Check

Remember to check the computation in each step.
Use more than one step to solve each problem.

1. Paul sends his cousin three 28-oz fruitcakes and a 27-oz package of poppy seed muffins. What is the total weight of the package?

   **Visualize the facts of the problem as you reread it.**

   **Facts:**
   - 3—28-oz fruitcakes
   - 1—27-oz package of muffins

   **Question:** What is the total weight?

   **Plan the steps to follow.**

   **Step 1:** Multiply to find the weight of the 3 fruitcakes:
   
   \[3 \times 28 \text{ oz}\]

   **Step 2:** Add to find the total weight.

2. This year, Dan's wood-carving club includes 17 children, 23 teenagers, and 46 adults. Last year, there were 54 members in all. By how much has the membership changed?

3. Dan works as a wood carver from 8:30 A.M. to 4:30 P.M. each day. How many hours does Dan work in a 5-day work week?

4. Ira sends six 2-lb packages to Hawaii using 4-day delivery. How much change will he get from $20? *(Hint: Use the chart on page 230.)*

5. Mr. Cheng bought 8 gallons of paint. Each gallon cost $12.27. He also bought a paint roller for $4.75. What was the total cost?
Solve each problem and explain the method you used.

1. The sun set at 7:52 P.M. It rose the next morning at 5:02 A.M. How much time passed from sunset to sunrise?

2. Ray caught 3 fish that were about 4 lb each. Mary caught 4 fish that were each about the same weight as Ray’s. About how many pounds of fish did they catch?

3. Mrs. O’Hara packed 2 pounds of trail mix. Her family ate 7 ounces of the mix. How much was left?

4. Mr. O’Hara brought 3 rolls of fishing line. Each roll holds 525 yards of line. Did he bring more than a mile of line?

5. Mrs. O’Hara caught a 12 kg fish. How much is this in grams?

6. The O’Haras drove to Loon Lake. They left home at 8:25 A.M. Lunch at a rest stop took 45 minutes. They arrived at Loon Lake at 4:00 P.M. How long were they driving?

7. Mary’s jug holds 3 L of water. It already has 500 mL in it. How much water should Mary add to fill it?

8. A hiking trail is 4 km long. There are trail markers every 8 m. How many trail markers are there?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. Ray heard a loon’s call at 7:48 A.M. and again 13 minutes later. What time did he hear the second call?

10. Mary glues 8 pine needles onto each postcard. She has 130 pine needles. How many postcards can she make?

11. The distance across Loon Lake is 2 miles. Mary rows the boat 2640 yd across. How far away is she from the other side?

12. Six cabins are about evenly spaced along the 3 km perimeter of Moon Lake. About how far apart are the cabins?

13. There were 325 yd of line on Ray’s fishing reel. He cuts off 18 feet of line. How much line is left on the reel?

14. The family leaves Loon Lake at 9:00 A.M. and arrives home at 5:30 P.M. Mr. O’Hara drives the first half of the trip and then Mrs. O’Hara drives. About what time does Mrs. O’Hara start driving?

Use the map for problems 15 and 16.

15. About how long will it take to get from Loon Lake to Moon Lake at a rate of 50 miles per hour?

16. From Moon Lake, Joe wants to visit both Loon and Spoon lakes. What is the distance of the shortest route? the longest route?
Check Your Progress
Lessons 1–14

Write \textit{in., ft, yd, or mi} for the unit you would use to measure each.  
(See pp. 206–209.)
1. distance across the county
2. width of a creek
3. width of a book
4. length of a pool

Add.  
(See pp. 210–211.)
5. \(3 \text{ ft} 9 \text{ in.} + 4 \text{ ft} 5 \text{ in.}\)
6. \(4 \text{ yd} 1 \text{ ft} + 6 \text{ yd} 1 \text{ ft}\)
7. \(9 \text{ yd} 1 \text{ ft} - 5 \text{ yd} 1 \text{ ft}\)
8. \(7 \text{ ft} 10 \text{ in.} - 6 \text{ ft}\)

Rename each unit.  
(See pp. 212–219.)
9. \(4 \text{ pt} = ? \text{ c}\)
10. \(32 \text{ oz} = ? \text{ lb}\)
11. \(6000 \text{ lb} = ? \text{ T}\)
12. \(6 \text{ cm} = ? \text{ mm}\)
13. \(4000 \text{ m} = ? \text{ km}\)
14. \(300 \text{ mm} = ? \text{ cm}\)

Compare. Write <, =, or >.  
(See pp. 212–223.)
15. \(6 \text{ kg} \underline{?} 6000 \text{ g}\)
16. \(16 \text{ fl oz} \underline{?} 2 \text{ c}\)
17. \(60 \text{ mm} \underline{?} 6 \text{ m}\)
18. \(400 \text{ mL} \underline{?} 4 \text{ L}\)
19. \(16 \text{ qt} \underline{?} 1 \text{ gal}\)
20. \(5000 \text{ lb} \underline{?} 1 \text{ T}\)
21. \(100 \text{ cm} \underline{?} 10 \text{ m}\)
22. \(5 \text{ dm} \underline{?} 50 \text{ m}\)
23. \(50 \text{ kg} \underline{?} 1 \text{ g}\)

Choose the letter of the better estimate.  
(See pp. 224–225.)
24. snow skiing weather  a. \(25^\circ\text{F}\)  b. \(25^\circ\text{C}\)
25. a day for a picnic  a. \(32^\circ\text{C}\)  b. \(32^\circ\text{F}\)

Write the elapsed time.  
(See pp. 226–229.)
26. from 11:25 A.M. to 12:15 P.M.
27. from 11:30 P.M. to 7:15 A.M.

Rename each unit of time.  
(See pp. 228–229.)
28. \(2 \text{ y } 17 \text{ w} = \text{ about } ? \text{ w}\)
29. \(42 \text{ w} 27 \text{ d} = ? \text{ d}\)

(See Still More Practice, p. 466.)
Time Zones

The clocks show the time in four different time zones of the United States when it is 12:00 noon Central time.

Problem Solving

1. What time is it in California when it is 2:00 P.M. in Maine?
2. What time is it in Georgia when it is 10:00 A.M. in Iowa?
3. Emily lives in Arizona. She will call Chad in Nevada at 6:30 P.M. Eastern time. What is that time in Arizona?
4. Niles will call Nat in Ohio at 1:45 P.M. Eastern time from New York. What time is that in Nevada?
6. A 6-hour flight to Utah leaves Delaware at 1:27 P.M. Eastern time. What is the time in Utah when the plane arrives?
Chapter 6 Test

Compare. Write <, =, or >.

1. 36 in. ? 4 ft
2. 900 g ? 9 kg
3. 5280 yd ? 2 mi
4. 4 km ? 400 m
5. 32 fl oz ? 1 gal
6. 14 lb ? 208 oz

Write mL or L for the unit you would use to measure the capacity of each.

7. glass of milk
8. pond
9. cup of soda
10. gasoline tank of a car

Write true or false for each statement.

11. You can ice skate at 30°C.
12. You can wear shorts at 90°F.
13. You need a coat at 8°C.
14. 11:30 P.M. is school time.
15. Lunch time is about 12:05 P.M.
16. It is usually dark at 10:30 A.M.

Problem Solving

Use a strategy you have learned.

17. Joe has saved $24 a week for the last 4 weeks. He wants to buy a ukelele that costs $89.95. Does he have enough money?

Tell About It

Explain how you solved the problem.

18. One basketball player is 2 m tall. Another player is 18 dm tall. Are they both the same height?

Find equivalent measures. Complete and extend each table by 3 columns.

19. pt | 1 | 2 | ?
c | 2 | ? | fl oz | ? | 32

20. gal | 1 | ? | 3
qt | 4 | ? | 12
pt | 8 | 16 | ?

21. cm | 2 | 4 | ?
mm | 20 | ? | 60
### Test Preparation

**Choose the best answer.**

1. Subtract.  
\[ \$9.35 - \$2.49 \]
   - a. \$6.86  
   - b. \$6.96  
   - c. 686  
   - d. 696

7. Add.  
\[ \$37.62 + \$19.99 \]
   - a. \$17.23  
   - b. \$28.73  
   - c. \$47.61  
   - d. \$57.61

2. Which is ordered from the least amount to the greatest amount?  
   - a. 5800 mL, 58 L, 58 mL, 580 mL  
   - b. 58 mL, 58 L, 580 mL, 5800 mL  
   - c. 58 L, 5800 mL, 580 mL, 58 mL  
   - d. 58 mL, 580 mL, 5800 mL, 58 L

8. Use front-end estimation to estimate the difference.  
   - a. about 5000  
   - b. 5783  
   - c. about 9000  
   - d. 9985

3. Where does the quotient begin?  
\[ \underline{7} \overline{5524} \]
   - a. thousands place  
   - b. hundreds place  
   - c. tens place  
   - d. ones place

9. Which number is divisible by 3?  
   - a. 12,955  
   - b. 19,540  
   - c. 52,671  
   - d. 63,959

4. Add.  
\[ 6 \text{ ft } 6 \text{ in.} + 3 \text{ ft } 8 \text{ in.} \]
   - a. 10 ft 2 in.  
   - b. 10 ft 14 in.  
   - c. 9 ft 2 in.  
   - d. not given

10. Use the order of operations to solve.  
\[ 60 - 4 \times 5 + 30 \div 5 \]
   - a. 46  
   - b. 62  
   - c. 286  
   - d. 392

5. Which strategy could best help you find this sum mentally?  
\[ 6 \quad \underline{2} \quad \underline{0} \quad + \underline{4} \]
   - a. compensation  
   - b. make 10  
   - c. doubles  
   - d. doubles + 1

11. The dividend is 705. The quotient is 141. What is the divisor?  
   - a. 9  
   - b. 7  
   - c. 5  
   - d. 2

6. Divide.  
\[ 4 \overline{827} \]
   - a. 26 R3  
   - b. 206 R3  
   - c. 260 R3  
   - d. not given

12. Rename the unit of time.  
\[ 5 \text{ weeks} = \underline{?} \text{ days} \]
   - a. 5  
   - b. 7  
   - c. 30  
   - d. 35
13. Compare. Choose <, =, or >.
32 fl oz ___ 2 qt
a. <
b. =
c. >

14. Find the value of the variable.
\[
\frac{6}{m} \quad 7
\]
a. \( m = 6 \)
b. \( m = 7 \)
c. \( m = 36 \)
d. \( m = 42 \)

15. Which shows the use of compensation to solve?
678 + 97
a. \( 97 + 678 = 775 \)
b. \( (600 + 78) + (90 + 7) = 775 \)
c. \( 675 + 100 = 775 \)
d. not given

652
- 445
a. 207
b. 217
c. 1078
d. 1097

17. A store manager orders 143 boxes of pens. There are 24 pens in each box. How many pens are there in all?
a. 2332
b. 2860
c. 3322
d. 3432

18. Compare. Choose <, =, or >.
4 dm ___ 30 cm
a. <
b. =
c. >

19. Multiply.
8000 \times 3
a. 240,000
b. 24,000
c. 2400
d. 240

20. Which is the correct time?
21 minutes to 8 at night
a. 7:21 P.M.
b. 7:39 A.M.
c. 8:21 P.M.
d. 7:39 P.M.

21. Find the mean.
517, 524, 628, 424, 727
a. 727
b. 564
c. 424
d. 303

22. Write the rule. Complete the pattern.
30, 34, 32, 36, 34, 38, ____
a. Start at 30; subtract 2; 36
b. Start at 30; add 4; 42
c. Start at 30; subtract 4; add 2; 34
d. Start at 30; add 4, subtract 2; 36

Tell About It

How can you use more than one step to solve the problem? Explain. Show all your work.

23. Scott gets on a scale and sees that he weighs 67 lb. When he gets on the scale holding his puppy, the scale reads 81 lb. When his sister, Sara, gets on the scale holding the puppy, the scale reads 73 lb. How much does Sara weigh?
In 1919, Babe Ruth hit 29 home runs, batted .322, and made $40,000.

In 1991 the average major league baseball player hit 15 home runs, batted .275, and made $840,000.

WHAT IS THE CORRECT ANSWER:
Babe Ruth < The average modern baseball player
Babe Ruth > The average modern baseball player
Babe Ruth = The average modern baseball player

From *Math Curse* by Jon Scieszka and Lane Smith.

In this chapter you will:
Collect, organize, and interpret data
Investigate combinations
Predict probability of events
Explore tree diagrams
Solve problems by using a diagram or graph

Critical Thinking/Finding Together
A batting average of .100 means 100 hits out of 1000 times at bat. A batting average of .200 means 200 hits out of 1000 times at bat. Describe Babe Ruth’s batting average.
Kai made a tally of the number of dogs in each category in the dog show.

Then Kai organized his data in a pictograph.

To make a pictograph:
- List each category.
- If necessary, round the data to nearby numbers. 36 → 35 39 → 40
- Choose a picture or symbol that can represent the number in each category.
- Choose a key. Let each ▪ = 10 dogs.
- Draw pictures to represent the number in each category.
- Label the pictograph. Write the title and the key.

### Dogs in Dog Show

<table>
<thead>
<tr>
<th>Category</th>
<th>Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sporting</td>
<td>🐶🐶🐶🐶🐶</td>
</tr>
<tr>
<td>Terriers</td>
<td>🐶🐶</td>
</tr>
<tr>
<td>Working</td>
<td>🐶🐶🐶</td>
</tr>
<tr>
<td>Hounds</td>
<td>🐶🐶</td>
</tr>
<tr>
<td>Toy</td>
<td>🐶</td>
</tr>
<tr>
<td>Nonsporting</td>
<td>🐶</td>
</tr>
</tbody>
</table>

Key: Each ▪ = 10 dogs. Each 🐶 = 5 dogs.

About how many of the dogs in the show were sporting dogs?

To find about how many, use the key in the graph:

\[
10 + 10 + 10 + 5 = 35
\]

About 35 dogs were sporting dogs.

Find the median of 10, 36, 39, 5, 20, 30.

To find the median, arrange the numbers in order:

5, 10, 20, 30, 36, 39

The median of a set of numbers that has an even number of items is the average of the two middle numbers:

\[
20 + 30 = 50 \rightarrow 50 \div 2 = 25
\]

The median is 25.
Problem Solving

The pictograph at the right shows the ice cream cones Ida sold at Ida’s Ice Cream on a weekend in June.

Use the pictograph.

1. Which flavor was the most popular? How many cones of this flavor did Ida sell?

2. Ida sold 350 cones of one flavor. What flavor was this?

3. Which flavor was the least popular?

4. How many more cherry cones would Ida need to sell to make a total of 450 cones?

5. Find the median of these numbers: 250, 300, 390, 350, 175, 100.

Use each set of data to make a pictograph.

6. Color of Car | Tally  
| --- | ---  
| Black | [ ] [ ] [ ] [ ] [ ]  
| Gray | [ ] [ ] [ ] [ ] [ ] [ ]  
| Blue | [ ] [ ]  
| Red | [ ] [ ]  
| White | [ ] [ ] [ ] [ ] [ ] [ ] [ ]  
| Green | [ ]  

7. Cats in the Cat Show

<table>
<thead>
<tr>
<th>Breed</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Shorthair</td>
<td>275</td>
</tr>
<tr>
<td>Abyssinian</td>
<td>150</td>
</tr>
<tr>
<td>Siamese</td>
<td>200</td>
</tr>
<tr>
<td>Persian</td>
<td>250</td>
</tr>
<tr>
<td>Burmese</td>
<td>125</td>
</tr>
<tr>
<td>Manx</td>
<td>50</td>
</tr>
<tr>
<td>Rex</td>
<td>50</td>
</tr>
<tr>
<td>Himalayan</td>
<td>125</td>
</tr>
</tbody>
</table>

8. Write two questions for each of the pictographs you made.

Write the number that is halfway between each pair.

9. 100; 200
10. 0; 1000
11. 0; 500
12. 50; 100
13. 1000; 3000
Heidi found some information about the tallest tree of each species in the United States.

Heidi organized the data she found in a vertical bar graph.

To make a vertical bar graph:
- Use the data from the table to choose an appropriate scale. Start at 0.
- Draw and label the scale on the vertical axis. (Vertical means “up and down.”)
- Draw and label the horizontal axis. (Horizontal means “across.”)
- List the name of each item.
- Draw vertical bars to represent the data.
- Title the graph.

How can you use the bar graph to find how tall the tallest red spruce tree is in the United States?

To find how tall, look at the bar labeled Red Spruce.

The top of the bar is halfway between 120 and 140.

The number that is halfway between 120 and 140 is 130.

So the tallest red spruce tree in the United States is 130 feet tall.
Use the bar graph on page 242.

1. Which tree is 160 feet tall? How much taller is it than the shortest tree?

2. Which two trees are the same height? How tall are they?

Use the table to complete the horizontal bar graph.

Draw bars across to represent the data.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Miles Per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>30</td>
</tr>
<tr>
<td>Cheetah</td>
<td>70</td>
</tr>
<tr>
<td>Elephant</td>
<td>25</td>
</tr>
<tr>
<td>Grizzly Bear</td>
<td>30</td>
</tr>
</tbody>
</table>

3. Use the completed horizontal bar graph to interpret the data.

4. Which animal has the shortest bar? Explain why.

5. Which two animals have bars of the same length? What does this mean?

Use the data from the pictograph on page 241 to make a bar graph. Use a scale of 100.

6. For which flavors were fewer than 300 cones sold?

7. Which graph is easier to use to answer exercise 6? Why?

The bar graph shows cat food sales.

8. In what way is this graph misleading?

9. How might you fix the graph so it is not misleading?
A line graph shows how data changes over time.

The Movie Museum keeps track of how many visitors it has each year. About how many visitors did the museum have in 2000?

To find how many:
1. Find the year on the horizontal axis.
2. Move up to the point.
3. Read the number on the vertical scale at the left.

The point is about halfway between 30,000 and 40,000.
The number 35,000 is halfway between 30,000 and 40,000.

So the museum had about 35,000 visitors in 2000.

A line graph shows when data increases and when it decreases.

Did attendance at the museum increase or decrease from 1999 to 2005?
The line slants up, so attendance increased.

You can often use a line graph to predict how data will continue to change.

Is the museum likely to have fewer than or more than 64,000 visitors in 2006?
The number of visitors has increased since 1999. It is likely that the number of visitors will continue to increase.
Use the line graph on page 244 for exercises 1–6.

1. How many visitors did the museum have in:

2. In which years did the museum have more than 50,000 visitors?

3. In which years did the museum have fewer than 40,000 visitors?

4. Between which two years was there a difference of about 2000 visitors?

5. Between which two consecutive years was there a difference of about 15,000 visitors?

6. In 1998, was it likely that the museum had more or fewer than 20,000 visitors? Explain your answer.

Use the line graph at the right.

7. In which years were there the most 4th graders? How many students were there?

8. In which year were there 350 fourth graders?

9. Is the difference in the number of 4th graders from 2000 to 2005 greater or less than that between 1990 and 1995?

Use the data in the table to make a line graph and a bar graph.

10. Is the temperature likely to be greater than or less than 27°F on Saturday?

11. Which graph was more helpful when answering exercise 10?
A survey is a way to collect data by asking a question.

Kay took a survey of her class. She asked her classmates how many hours each day they spend reading.

Kay used the results of her survey to create a line plot.

A line plot shows data by arranging Xs along a number line.

Kay found the range and the mode of the data on her line plot.

To find the range, subtract the least value in the data from the greatest value in the data: \( 7 - 1 = 6 \)

So, 6 is the range.

To find the mode, look for the number that has the greatest number of Xs.

1 is the mode.

**Use the line plot above to answer each question.**

1. How many students spend 2 hours reading each day?

2. How many students read fewer than 2 hours each day?

3. How many more students spent 3 hours reading each day, rather than 4 hours reading each day?

4. How many students were surveyed?
The tally chart shows the results of Ken’s survey about how many of his friends have 2, 3, or 4 cousins.

5. Use the survey results to make a line plot.

6. What is the range of the data?

7. What is the mode of the data?

8. How many friends did Ken survey? How do you know?

9. How many friends have 2 cousins?

10. How many fewer friends have 3 cousins than 4 cousins?

Take a survey.

Ask 6 friends what their favorite even number is from 2 to 10. Tally the results in a tally chart. Then show the results on a line plot.

11. What is the range of the data?

12. What is the mode of the data?

13. Does your data have an outlier? If yes, what is it?

14. How many friends chose 4 as their favorite even number?

15. Compare your survey results with a friend’s results. Can you draw any conclusions from the data? Explain.

CHALLENGE

This graph is a stem-and-leaf plot. The stems are the tens digits and the leaves are the ones digits.

16. What is the greatest amount of money saved?

17. What is the least amount of money saved?

18. What is the range?
A circle graph shows data as parts of a whole.

This circle graph shows the number of singers who were selected for the Community Chorus.

Which group of singers makes up one half of the chorus?

To find the group of singers that represents one half of the chorus, look for the part of the circle graph that is one half of the circle.

*Sopranos* is one half of the circle graph. Sopranos make up one half of the chorus.

Which two groups of singers make up one fourth of the chorus?

To find the two groups of singers that represent one fourth of the chorus, find the two parts of the circle graph that together are one fourth of the circle.

*Basses* and *Altos* together are one fourth of the circle graph. Basses and altos make up one fourth of the chorus.

How many singers make up the Community Chorus?

To find the number that is represented by the whole graph, add the numbers in the sections of the graph:

\[ 24 + 8 + 4 + 12 = 48 \]

Forty-eight singers make up the Community Chorus.
Problem Solving

Use the circle graph at the right.

1. Which fruit is the favorite of 110 students?

2. How many students named melons as their favorite fruit?

3. Which two fruits together were the favorites of one fourth of the students?

4. Which fruit was chosen most by students? How many students chose that fruit?

5. Which fruit was chosen as the favorite by the fewest students? Which fruit was chosen by double that number of students?

6. Were apples more or less popular than bananas and pears together? by how many votes?

7. Which three fruits together were the favorites of one half of the students? How many students was this?

8. How many students are there in Woodvale?

DO YOU REMEMBER?

Write the heading that matches the information in each column.

9. ?
   • unit of length
   • equivalent to 10 cm

10. ?
    • unit of capacity
    • about 20 drops of water

11. ?
    • unit of mass
    • about the mass of a paper clip

Woodvale Students’ Favorite Fruits

- Apples 110
- Oranges 125
- Grapes 75
- Pears 50
- Melons 60
- Cherries 30
- Bananas 50

Chapter 7 249
Suppose you went to Didi’s Diner. How many different ways could you order the Early Bird Special?

To find how many different ways, draw a tree diagram. Then count the combinations.

```
Main Dish | Side Dish | Vegetable | Combination
-----------|-----------|-----------|------------------------
chicken    | potato    | broccoli  | chicken, potato, broccoli
chicken    | spinach   | carrots   | chicken, potato, spinach
chicken    | broccoli  | carrots   | chicken, potato, carrots
chicken    | rice      | broccoli  | chicken, rice, broccoli
chicken    | rice      | spinach   | chicken, rice, spinach
chicken    | rice      | carrots   | chicken, rice, carrots
fish       | potato    | broccoli  | fish, potato, broccoli
fish       | spinach   | carrots   | fish, potato, spinach
fish       | broccoli  | carrots   | fish, potato, carrots
fish       | rice      | broccoli  | fish, rice, broccoli
fish       | rice      | spinach   | fish, rice, spinach
fish       | rice      | carrots   | fish, rice, carrots
```

You could order the Early Bird Special 12 different ways.

You can also find the number of combinations by multiplying.

```
Main Dish | Side Dish | Vegetable | Combinations
-----------|-----------|-----------|------------------------
2          | 2         | 3         | 12
```

There are 12 combinations.
1. One night, the Early Bird Special offered a choice of either ravioli or macaroni and cheese, with either string beans, peas, or cole slaw. How many different ways could you order?

2. Suppose Didi ran out of spinach. How many different ways could you order the Early Bird Special from the menu on page 250?

3. If you order Didi's Breakfast Special, you can choose either scrambled or poached eggs; orange, apple, or grapefruit juice; and whole wheat or white toast. How many combinations of eggs, juice, and toast could you order?

4. Mr. Gorme has breakfast at Didi’s every day. He always orders either pancakes or waffles; orange, apple, grapefruit, or tomato juice; and bacon, ham, or sausage. How many days in a row can he have breakfast without repeating an order?

5. At work Didi wears either a red, white, or blue blouse; a red, white, or black skirt; and a flower-print, striped, or white apron. Can she wear a different outfit every day for four weeks without repeating a combination of blouse, skirt, and apron? Explain your answer.

6. Mr. Gorme drives a delivery van. He must wear a white, blue, or gray shirt with black, blue, or gray pants. Which shows the correct method to find how many combinations of shirt and pants he can wear?

   A 3 + 3 = 6  B 2 × 3 = 6  C 3 × 3 = 9  D 3 × 3 × 3 = 27
**Predict Probability**

**Probability** is the chance that a given event will occur in an experiment.

Random experiments—like tossing a coin, rolling a number cube, spinning a spinner, and selecting an item from a set without looking—mean you do not know what the result, or **outcome**, of the experiment will be.

What is the probability of the spinner landing on red? on blue? on white?

- Two ways to describe probability are in words and as a fraction.

The spinner has 8 **equal** sections. Of the equal sections, 3 are red, 3 are blue, and 2 are white.

The probability of the spinner landing on
- red is 3 out of 8, or \(\frac{3}{8}\).
- blue is 3 out of 8, or \(\frac{3}{8}\).
- white is 2 out of 8, or \(\frac{2}{8}\).
- not white is 6 out of 8, or \(\frac{6}{8}\).

Use words and a fraction to write the probability of each spinner landing on yellow.

1. 2. 3. 4.
5. Use words and fractions to describe the probability of the spinner landing on
   a. blue   b. red
   c. green   d. yellow

Use the set of marbles.

6. Use words to describe the probability that you would randomly pick a marble that is:
   a. green   b. not red
   c. orange   d. blue
   e. black   f. yellow

7. Would you be more or less likely to pick yellow than green? black than yellow? red than blue? yellow than orange? Explain why for each.

8. Would you be equally likely to pick black or green? orange or blue? orange or black? black or red? red or blue? Explain why for each.

Use the number cube at the right to find the probability of each event.

9. Use words or fractions to describe the probability that you would roll
   a. 3   b. 6
   c. 7   d. any number other than 4

10. For each spinner, describe in words and fractions the probability of landing on each color.
    a.  
    b.  
    c.  
The probability of an event is affected by whether the experiment is conducted with or without replacement.

Rae put these letters into a bag. She picked a letter at random ten times and replaced the letter in the bag each time. Then she graphed her results.

What conclusion can Rae draw about the probability of picking B on the 11th pick?

Since Rae puts the card back in the bag after each pick, the contents of the bag do not change. So, the probability of picking B is the same for every pick.

The probability of picking B is always \( \frac{1}{3} \).

As the number of possible outcomes changes, so does the probability of an event.

Ben put these digits into a bag. He picked a digit at random and did not replace it in the bag. He did this for each pick.

What is the probability of Ben picking 0 on the 3rd pick?

1st Try: 5 digits in the bag
Probability of picking 0: 1 out of 5; \( \frac{1}{5} \)

2nd Try: 4 digits in the bag
Probability of picking 0: 1 out of 4; \( \frac{1}{4} \)

3rd Try: 3 digits in the bag
Probability of picking 0: 1 out of 3; \( \frac{1}{3} \)

The probability of Ben picking 0 on the 3rd pick is 1 out of 3, or \( \frac{1}{3} \).
Problem Solving

Use the information given on page 254.

1. Suppose Ben picks 4 on the 3rd try. What is the probability of his picking 0 on the 4th try?
   [Remember: Ben’s experiment was without replacement. Rae’s experiment was with replacement.]

2. If Ben picks 4 on the 3rd try, is it equally likely that he would pick 2 or 0 on the 4th try?

3. Suppose Rae started with A, B, C, D, E, and F. What would be the probability of her picking A on the 1st try? B on the 10th try? E on the 25th try? D on the 100th try?

Conduct a probability experiment.

4. Flip a coin 25 times. Record the outcomes in a tally chart.
5. Display the outcomes of your experiment in a bar graph.

6. What conclusion can you draw about the probability of the 26th flip landing on heads?

Suppose there are 2 red marbles and 2 black marbles in a bag.

7. What is the probability of picking red? black?

8. On the 1st try you pick a red marble and put it in your pocket. On the 2nd try, what is the probability of picking red? of picking black?

Write About It

Make two spinners like the ones at the right. Decide which player is EVEN and which is ODD. Spin both spinners at the same time and find the sum. If the sum is odd, ODD scores 1 point. If the sum is even, EVEN scores 1 point. The winner is the first player to score 10 points. Switch roles and play again.

9. List all possible outcomes. Is this game fair or unfair? Explain your answer.
Problem-Solving Strategy: Use a Diagram/Graph

Jeffrey created the graph at the right. Which of the following could be the title of the graph?

a. Number of students in the 4th grade
b. Number of cars washed at two fairs
c. Number of sides in a rectangle, a triangle, a square, and a pentagon
d. Number of pies sold by four bakeries

Read

Visualize yourself in the problem as you reread it. Focus on the facts and questions.

Fact: The graph is a bar graph with four bars.

Question: Which choice is the best title for the graph?

Plan

Study the graph and think about the data it shows.

Solve

Compare each choice to the data in the graph.

• Choice A only refers to one grade. There are four bars in the graph, so Choice A is not correct.
• Choice B refers to two fairs. There are more than two bars in the graph, so Choice B is not correct.
• Choice C is about polygons with no more than 5 sides, which does not match the data in the graph. So Choice C is not correct.
• Choice D refers to four bakeries. There are four bars in the graph, so Choice D is the best choice.

Check

Look again at the data in the graph. Is it reasonable that four bakeries would have sold the number of pies shown in the graph? Yes.
Use a diagram or graph to solve each problem.

1. This tree diagram shows the choices available at a frozen yogurt stand. What questions can you ask using this diagram?

   Visualize the problem as you reread it.

   **Fact:** Frozen yogurt can be ordered in different ways.

   **Question:** What questions can you ask using the diagram?

   **Plan**
   Study the diagram and the data it shows. Think about the combinations and the kinds of questions you could ask.

2. Write a true statement about the data in the line graph.

3. A box of pushpins contains 64 pins in a variety of colors. What questions can you ask using the data in the circle graph?

4. Michael exercised for 12 minutes. He did 20 sit-ups and 10 push-ups. What kind of graph would you use to display the data in the tally chart? Explain why.
Solve each problem and explain the method you used.

1. There were 175 dogs at the Rosedale Pet Show. There were 50 small dogs and 85 medium-size dogs. The rest were large dogs. How many large dogs were in the show? Make a pictograph about the dogs in the pet show.

2. Use words to describe the probability that each type of dog won the Rosedale show.

Use the circle graph for problems 3–5.

3. Were more than half the pets dogs?
4. What fraction of the pets were birds and cats?
5. How many pets were entered in the Rosedale Pet Show?

Use the bar graph for problems 6–9.

6. How many turtles were in the pet show?
7. Which type of pet had the fewest entries in the show?
8. How many more gerbils than mice were in the pet show?
9. How many fewer fish than rabbits were in the pet show?
Choose a strategy from the list or use another strategy you know to solve each problem.

10. Eight cats were finalists for best cat, and twice as many were semifinalists. There were twice as many quarterfinalists as semifinalists. How many cats were quarterfinalists?

11. Admission to the show was $3.75 for adults and $2.00 for children. Alana spent $13.25 for tickets. What tickets did she buy?

12. A dog-food supplier gave away 560 pounds of dog food. The food was bundled in 4-ounce packages. How many packages were given away?

13. A collie, a turtle, and a canary won the top three prizes. The disappointed collie buried the winner’s ribbon. The first- and third-place pets both had four feet. Who won first prize?

Use the line graph for problems 14 and 15.

14. About how many people in all attended the pet show?

15. Between which two days was the increase in attendance the greatest?

Write Your Own

16. Write a problem using one of the graphs from pages 258 or 259. Have a classmate solve it.
Use the tally chart to solve problems 1–3.

Meg surveyed her class about the number of pets each student owns.

1. Make a bar graph and a line plot from the data in the tally chart.

2. Find the range and mode of the data in the tally chart.

3. Which number is the outlier? Why?

Use the line graph below to solve problems 4–6.

4. In which week was there the most rain?

5. How many inches of rain fell in week 2? week 3?

6. Is week 5 likely to have less than or more than 5 1/2 inches of rain? Explain.

Find the number of combinations.

7. For lunch, Chad can buy either a tuna fish, chicken, or ham sandwich on either rye, whole-grain, or wheat bread. How many ways can he choose to buy his sandwich?

Use the spinner.

8. Use words and fractions to write the probability that the spinner will land on
   a. red
   b. blue
   c. yellow
   d. white
Double Bar Graphs

A double bar graph is used to compare two similar sets of data. Each set of data is graphed separately, but on the same grid. The key identifies the sets of data.

**Soccer Players at Fremont School**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number of Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>10</td>
</tr>
<tr>
<td>4th</td>
<td>15</td>
</tr>
<tr>
<td>5th</td>
<td>25</td>
</tr>
<tr>
<td>6th</td>
<td>30</td>
</tr>
</tbody>
</table>

**Key:**
- Boys: Purple bars
- Girls: Blue bars

The purple bars in the graph stand for the boys. The blue bars stand for the girls.

**Problem Solving**

Use the double bar graph above.

1. How many 5th grade boys play soccer?
2. How many girls play soccer at Fremont School?
3. How many more 6th grade boys play soccer than 6th grade girls?
4. How many fewer 3rd grade boys play soccer than 5th grade girls?
5. In which grade do the same number of boys and girls play soccer?
6. How many soccer players are there at Fremont School?
7. How many more 5th graders play soccer than 3rd graders?
8. Is it likely that more than 35 7th grade boys play soccer?
Chapter 7 Test

Use the circle graph at the right.
1. What fraction of students drank
   a. milk?   b. juice?   c. soda or water?

2. Did fewer students drink milk than water and soda? Explain.

Use the spinner.
3. Use words and fractions to describe the probability of the spinner landing on
   a. white   b. red   c. blue

Problem Solving
Use a strategy you have learned.
4. How much weight did the puppy gain from March to May?
5. What other questions can you ask using the line graph?

Tell About It
Use the line graph from problem 4.
6. Is the puppy’s weight likely to be more than 8 pounds in June? Explain why or why not.

Performance Assessment
Draw and color a spinner on which
7. it would be equally likely to land on red or yellow.
8. the probability of landing on red is 1 out of 4, or $\frac{1}{4}$.
Test Preparation

Choose the best answer.

1. What is the value of the underlined digit in 68,325,784?
   a. 6 ten millions  b. 6 billions  c. 6 thousands  d. 6 millions

2. Estimate the sum by rounding.
   $50.24 + 3.69 + 12.28$
   a. $54.00  b. $55.00  c. $66.00  d. $70.00

3. $7846 + 685$
   a. 7531  b. 8521  c. 14,696  d. not given

4. The product is 8. One factor is 1. What is the other factor?
   a. 8  b. 6  c. 4  d. 0

5. Find the value of the variable.
   $\sqrt[8]{56}$
   a. 6  b. 7  c. 8  d. 9

6. Find the length to the nearest half inch.
   a. $1 \frac{1}{2}$ in.  b. $2 \frac{1}{2}$ in.  c. 3 in.  d. $3 \frac{1}{2}$ in.

7. Round 874,376 to the nearest hundred thousand.
   a. 800,000  b. 900,000  c. 880,000  d. 870,000

8. Subtract.
   $5.98 - 0.54$
   a. $5.34  b. $5.42  c. $5.44  d. not given

9. $4000 - 3951$
   a. 49  b. 149  c. 1049  d. not given

10. Use front-end digits to estimate.
    $9 \times 94$
    a. 100  b. 700  c. 810  d. 1500

11. What is the next number in the pattern?
    $27, 9, 3, ?$
    a. 0  b. 1  c. 3  d. 81

12. Find the length to the nearest centimeter.
    a. 7 cm  b. 8 cm  c. 67 cm  d. 80 cm

13. What is the probability of the spinner landing on blue?
    a. 1 out of 5; $\frac{1}{5}$  
    b. 2 out of 5; $\frac{2}{5}$  
    c. 1 out of 2; $\frac{1}{2}$  
    d. 3 out of 5; $\frac{3}{5}$
14. How much change will you receive?
Cost: $14.22
Amount given: $20.00
a. $5.88
b. $6.78
c. $6.88
d. $5.78

19. Estimate the product by rounding.
$7.95
× 6
a. $42.00
b. $48.00
c. $47.00
d. $43.00

15. 23,956 – 15,987
a. 6968
b. 7979
c. 7969
d. 39,943

20. 36,083 + 24,167
a. 11,919
b. 60,250
c. 60,240

16. Nick puts 42 buns in tins. Each tin holds 8 buns. How many tins can he fill, with how many buns left over?
a. 5 tins, 2 buns
b. 4 tins, 2 buns
c. 5 tins, 4 buns
d. 4 tins, 4 buns

21. Amy has 5 fish. She gives 4 to Meg. Then she buys 6 new fish. How many fish does Amy have now?
a. 7
b. 8
c. 9
d. 10

17. 8 × 3 thousands
a. 27,000
b. 24,000
c. 8,000
d. 3,000

22. 72 ÷ 4
a. 76
b. 68
c. 18
d. 12

18. 3 c = ? fl oz
a. 8
b. 12
c. 16
d. 24

23. 9 ft 7 in. + 4 ft 6 in.
a. 12 ft 13 in.
b. 13 ft 1 in.
c. 14 ft 1 in.
d. 13 ft 11 in.

24. Which 2 vegetables together were the favorites of one half of the people who voted for their favorite vegetable?
a. celery and tomato
b. cucumber and carrot
c. tomato and cucumber
d. celery and carrot

25. The students at Spellman School voted for their favorite color. The results are in the table at the right.
Using the data in the table, what color should the school's new baseball uniforms be?

<table>
<thead>
<tr>
<th>Favorite Vegetables</th>
<th>6th Grade</th>
<th>7th Grade</th>
<th>8th Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onion</td>
<td>25</td>
<td>40</td>
<td>37</td>
</tr>
<tr>
<td>Cucumber</td>
<td>38</td>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td>Tomato</td>
<td>32</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Celery</td>
<td>15</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Carrot</td>
<td>14</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Tell About It
Explain how you solved the problem. Show all your work.
Dividing

Here is an apple, ripe and red
On one side; on the other green.
And I must cut it with a knife
Across or in between.

And if I cut it in between,
And give the best (as Mother said)
To you, then I must keep the green,
And you will have the red.

But Mother says that green is tough
Unless it comes in applesauce.
You know what? I’ve been sick enough:
I’ll cut it straight across.

David McCord

In this chapter you will:
Explore fractional parts of regions and sets
Learn about equivalent fractions and mixed numbers
Identify fractions on a number line
Estimate, compare, and order fractions
Solve problems using logical reasoning

Critical Thinking/ Finding Together
Draw a picture to show what the apple would look like if it was cut straight across. Why do you think the boy decided to cut the apple straight across?
8-1

Write Fractions

What fractional part of the whole is yellow? What fractional part of the set is yellow?

Both the whole and the set have 6 equal parts. One of the equal parts of the whole is yellow. One of the equal parts of the set is yellow.

\[
\frac{1}{6}
\]

of the whole is yellow. \[
\frac{1}{6}
\]

of the set is yellow.

The numerator names the number of equal parts. \[
\frac{1}{6}
\]

The denominator names the total number of equal parts in the whole or the set.

Write: \[
\frac{1}{6}
\]

Read: one sixth

one divided by six

one out of six

What fractional part of the whole or of the set is purple?

\[
\frac{5}{6}
\]

of the whole is purple. \[
\frac{5}{6}
\]

of the set is purple.

\[
\frac{5}{6}
\]

numerator

\[
\frac{5}{6}
\]

denominator

number of equal parts that are purple

total number of equal parts in the whole or the set

Write: \[
\frac{5}{6}
\]

Read: five sixths

five divided by six

five out of six
Write each as a fraction. Then circle the denominator.
1. one fourth  
2. two tenths  
3. one half  
4. four fifths  
5. three fourths  
6. five eighths  
7. five sixths  
8. three sevenths  
9. one twelfth

Write each as a fraction. Then circle the numerator.
10. seven tenths  
11. three fifths  
12. one eighth  
13. one third  
14. two sixths  
15. nine twelfths  
16. seven eighths  
17. one ninth  
18. four hundredths

Write each fraction in words three different ways. Then draw a picture to show each.
19. \(\frac{1}{10}\)  
20. \(\frac{2}{5}\)  
21. \(\frac{1}{6}\)  
22. \(\frac{3}{8}\)  
23. \(\frac{2}{7}\)  
24. \(\frac{5}{12}\)

Draw a picture to justify your answer.
25. Michelle designed a banner that was \(\frac{7}{8}\) purple. Write this fraction in words.
26. Louis trimmed three tenths of a group of posters in red. Write this as a fraction.

Write About It

Color fraction strips to show each fraction. Then write about how you decided which strips to use.
27. \(\frac{2}{5}\)  
28. \(\frac{1}{2}\)  
29. \(\frac{1}{10}\)  
30. \(\frac{3}{8}\)  
31. \(\frac{5}{6}\)  
32. \(\frac{11}{12}\)
Fractions On a Number Line

A number line can help to show and order whole numbers.

- On a number line the *lesser* of two numbers is to the *left* of the greater number.
- The *greater* of two numbers is to the *right* of the lesser number.

14 is to the *left* of 17.
So, $14 < 17$

19 is to the *right* of 17.
So, $19 > 17$

Like whole numbers, fractions can be shown on a number line. This number line shows fifths.

As with whole numbers, the *lesser* of two fractions is to the *left* of the greater fraction.
The *greater* of two fractions is to the *right* of the lesser fraction.

Write the fraction that completes each number line.

1. $\frac{0}{3}, \frac{1}{3}, \frac{?}{3}, \frac{3}{3}$

2. $\frac{0}{7}, \frac{1}{7}, \frac{2}{7}, \frac{?}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, \frac{7}{7}$

3. $\frac{0}{8}, \frac{?}{8}, \frac{2}{8}, \frac{3}{8}, \frac{4}{8}, \frac{5}{8}, \frac{6}{8}, \frac{7}{8}, \frac{8}{8}$

4. $\frac{0}{6}, \frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}, \frac{?}{6}, \frac{6}{6}$
Name the fraction represented by the letter A.

5. \[ \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{5}{5} \]

6. \[ \frac{1}{8}, \frac{2}{8}, \frac{3}{8}, \frac{4}{8}, \frac{5}{8}, \frac{6}{8}, \frac{7}{8}, \frac{8}{8} \]

7. \[ \frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}, \frac{5}{6}, \frac{6}{6} \]

8. \[ \frac{1}{10}, \frac{2}{10}, \frac{3}{10}, \frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{7}{10}, \frac{8}{10}, \frac{9}{10}, \frac{10}{10} \]

---

**Drawing Number Lines for Fractions**

Show \( \frac{3}{4} \) on a number line.

- Draw a number line from 0 to 1.
- Divide the number line into 4 equal parts.
- Label the third equal part \( \frac{3}{4} \).

---

Show each fraction on a number line.

9. \( \frac{1}{3} \)  
10. \( \frac{4}{5} \)  
11. \( \frac{6}{6} \)  
12. \( \frac{5}{8} \)  
13. \( \frac{7}{10} \)

---

Name the fraction for letter B.

14. \( B \)  
15. \( B \)  
16. \( B \)  
17. \( B \)

---

**CHALLENGE**

18. The ant is walking toward the apple. What fraction of the distance has it gone?

19. The ladybug is crawling toward the leaf. What fraction of the distance has it gone?
Estimate Fractions

You can use \( \frac{1}{2} \) to estimate a fraction of a region.

About what fraction of each region is blue?

- Think: more than \( \frac{1}{2} \)
  - about \( \frac{3}{4} \) blue

- Think: less than \( \frac{1}{2} \)
  - about \( \frac{1}{3} \) blue

You can use models or a number line to tell whether a fraction is closer to 0, closer to \( \frac{1}{2} \), or closer to 1.

Is each of these fractions closer to 0, to \( \frac{1}{2} \), or to 1?

- \( \frac{8}{10} \) is halfway between 0 and 1.
- \( \frac{2}{10} \) is between 0 and \( \frac{1}{2} \). It is closer to 0.
- \( \frac{6}{10} \) is between \( \frac{1}{2} \) and 1. It is closer to \( \frac{1}{2} \).
- \( \frac{8}{10} \) is between \( \frac{1}{2} \) and 1. It is closer to 1.
Write more than half or less than half to tell about what fraction of each region is shaded.

1. 2. 3. 4.

5. 6. 7. 8.

Use the number lines. Write whether each fraction is closer to 0, closer to \( \frac{1}{2} \), or closer to 1.

9. \( \frac{3}{8} \) 10. \( \frac{7}{8} \) 11. \( \frac{1}{8} \) 12. \( \frac{5}{8} \)
13. \( \frac{10}{12} \) 14. \( \frac{5}{12} \) 15. \( \frac{11}{12} \) 16. \( \frac{7}{12} \)
17. \( \frac{2}{9} \) 18. \( \frac{4}{9} \) 19. \( \frac{7}{9} \) 20. \( \frac{1}{9} \)

Write whether each fraction is closer to 0, closer to \( \frac{1}{2} \), or closer to 1. You may use models or number lines.

21. \( \frac{3}{10} \) 22. \( \frac{1}{8} \) 23. \( \frac{4}{5} \) 24. \( \frac{3}{7} \) 25. \( \frac{1}{12} \) 26. \( \frac{2}{3} \)

About where on each number line is the arrow pointing?

27. 28.

29. Which fraction is closer to 0?
   A \( \frac{5}{6} \) B \( \frac{2}{6} \) C \( \frac{3}{6} \) D \( \frac{4}{6} \)
30. Which fraction is closer to 1?
   F \( \frac{6}{7} \) G \( \frac{1}{7} \) H \( \frac{3}{7} \) J \( \frac{5}{7} \)
**Equivalent Fractions**

Equivalent fractions name the *same part* of a region or a set.

**Equivalent Fraction Table**

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<th>Whole</th>
<th>Halves</th>
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Use the equivalent fraction table to find the equivalent fraction.

$$\frac{3}{4} = \frac{n}{8}$$

Remember: A variable stands for an unknown number.

Notice that \(\frac{3}{4} = \frac{6}{8}\).

\(\frac{3}{4}\) and \(\frac{6}{8}\) are equivalent fractions.

They name the same part.
Write the equivalent fraction. Use the equivalent fraction table on page 272.

1. \( \frac{1}{2} = \frac{n}{6} \)
2. \( \frac{1}{4} = \frac{a}{8} \)
3. \( \frac{2}{5} = \frac{x}{10} \)
4. \( \frac{4}{8} = \frac{b}{4} \)
5. \( \frac{2}{3} = \frac{m}{12} \)
6. \( \frac{5}{10} = \frac{s}{2} \)
7. \( \frac{3}{12} = \frac{v}{4} \)
8. \( \frac{2}{3} = \frac{t}{9} \)
9. \( \frac{1}{3} = \frac{d}{6} \)
10. \( \frac{2}{4} = \frac{c}{8} \)
11. \( \frac{2}{3} = \frac{r}{6} \)
12. \( \frac{1}{5} = \frac{w}{10} \)
13. \( \frac{1}{3} = \frac{y}{12} \)
14. \( \frac{2}{6} = \frac{f}{12} \)
15. \( \frac{3}{4} = \frac{k}{8} \)
16. \( \frac{3}{5} = \frac{y}{10} \)
17. \( \frac{1}{2} = \frac{f}{10} \)
18. \( \frac{3}{4} = \frac{z}{12} \)
19. \( \frac{2}{2} = \frac{e}{8} \)
20. \( \frac{1}{3} = \frac{h}{9} \)

Does each pair show equivalent fractions? Explain why or why not. Then write the equivalent fractions.

21. \( \quad \) 22. \( \quad \)

23. \( \quad \) 24. \( \quad \)

Use fraction strips to show your work.

25. How many fifths are equal to four tenths?
26. How many twelfths are equal to five sixths?

CRITICAL THINKING

27. Use fraction strips to write all the fractions from \( \frac{1}{2} \) to \( \frac{12}{12} \):
   a. that are equal to \( \frac{1}{2} \);
   b. that are equal to 1.

28. Look at fifths and tenths. Then look at sixths and twelfths. Name a fraction that is equivalent to \( \frac{2}{7} \).
Write Equivalent Fractions

Suppose you did not have an equivalent fraction table. How would you find equivalent fractions?

To find equivalent fractions, multiply the numerator and the denominator by the same number.

\[
\frac{3}{4} = \frac{n}{8} \quad \text{Think} \quad 4 \times 2 = 8
\]

\[
\frac{3 \times 2}{4 \times 2} = \frac{6}{8}
\]

So \( \frac{3}{4} = \frac{6}{8} \). These are equivalent fractions.

Study these examples.

\[
\frac{1}{3} = \frac{a}{9} \quad \text{Think} \quad 3 \times 3 = 9
\]

\[
\frac{1 \times 3}{3 \times 3} = \frac{3}{9}
\]

So \( \frac{1}{3} = \frac{3}{9} \).

\[
\frac{3}{5} = \frac{12}{n} \quad \text{Think} \quad 3 \times 4 = 12
\]

\[
\frac{3 \times 4}{5 \times 4} = \frac{12}{20}
\]

So \( \frac{3}{5} = \frac{12}{20} \).

Write the equivalent fraction.

1. \( \frac{1 \times 2}{3 \times 2} = ? \)
2. \( \frac{5 \times 3}{6 \times 3} = ? \)
3. \( \frac{2 \times 2}{5 \times 2} = ? \)
4. \( \frac{3 \times 4}{4 \times 4} = ? \)
5. \( \frac{1 \times 3}{8 \times 3} = ? \)
6. \( \frac{3 \times 2}{10 \times 2} = ? \)
7. \( \frac{1 \times 3}{7 \times ?} = \frac{3}{?} \)
8. \( \frac{3 \times ?}{8 \times 2} = ? \)
9. \( \frac{2 \times 4}{3 \times ?} = ? \)
10. \( \frac{1 \times 5}{4 \times ?} = ? \)
11. \( \frac{5 \times ?}{7 \times 2} = ? \)
12. \( \frac{2 \times ?}{9 \times 2} = ? \)
Find an equivalent fraction.

13. \(\frac{3}{4} = \frac{n}{12}\)  
14. \(\frac{4}{5} = \frac{x}{10}\)  
15. \(\frac{1}{12} = \frac{a}{36}\)

16. \(\frac{1}{2} = \frac{b}{10}\)  
17. \(\frac{5}{6} = \frac{c}{12}\)  
18. \(\frac{3}{8} = \frac{s}{24}\)

19. \(\frac{5}{9} = \frac{t}{27}\)  
20. \(\frac{1}{4} = \frac{w}{16}\)  
21. \(\frac{3}{7} = \frac{d}{14}\)

22. \(\frac{2}{5} = \frac{r}{25}\)  
23. \(\frac{2}{3} = \frac{f}{18}\)  
24. \(\frac{6}{10} = \frac{m}{20}\)

25. \(\frac{1}{6} = \frac{z}{30}\)  
26. \(\frac{5}{8} = \frac{f}{40}\)  
27. \(\frac{2}{4} = \frac{y}{12}\)

Find the missing numerator or denominator.

28. \(\frac{3}{5} = \frac{n}{20}\)  
29. \(\frac{a}{7} = \frac{12}{21}\)  
30. \(\frac{2}{6} = \frac{8}{x}\)  
31. \(\frac{6}{b} = \frac{42}{63}\)

32. \(\frac{d}{11} = \frac{4}{22}\)  
33. \(\frac{7}{y} = \frac{28}{40}\)  
34. \(\frac{4}{4} = \frac{12}{f}\)  
35. \(\frac{s}{9} = \frac{12}{36}\)

36. \(\frac{5}{m} = \frac{15}{18}\)  
37. \(\frac{6}{8} = \frac{36}{p}\)  
38. \(\frac{r}{9} = \frac{21}{27}\)  
39. \(\frac{4}{v} = \frac{48}{96}\)

Write two equivalent fractions for each.

40. \(\frac{2}{3}\)  
41. \(\frac{5}{8}\)  
42. \(\frac{1}{11}\)  
43. \(\frac{4}{5}\)  
44. \(\frac{3}{15}\)  
45. \(\frac{5}{6}\)

46. \(\frac{6}{7}\)  
47. \(\frac{7}{9}\)  
48. \(\frac{6}{12}\)  
49. \(\frac{2}{16}\)  
50. \(\frac{4}{25}\)  
51. \(\frac{2}{18}\)

52. \(\frac{1}{6}\)  
53. \(\frac{3}{10}\)  
54. \(\frac{3}{4}\)  
55. \(\frac{7}{12}\)  
56. \(\frac{2}{2}\)  
57. \(\frac{8}{9}\)

Find the product or the missing factor.

58. \(\frac{n}{48} \times \frac{1}{1}\)  
59. \(\frac{24}{a} \times \frac{2}{2}\)  
60. \(\frac{16}{48} \times c\)  
61. \(\frac{r}{48} \times \frac{4}{4}\)  
62. \(\frac{8}{y} \times \frac{6}{6}\)

63. \(6 \times n = 24\)  
64. \(b \times 3 = 24\)  
65. \(2 \times a = 24\)
Factors

Any whole number can be represented by one or more rectangles.

Materials: tiles, paper, pencil

Use tiles to find as many different rectangles as you can for 24. Record each width and length.

1. How many different rectangles did you find?

The widths and lengths stand for the factors of 24.

2. What are all the factors of 24?

Now find as many different rectangles as you can for 18. Record each width and length.

3. How many different rectangles did you find?

4. What are all the factors of 18?

5. Did 18 and 24 have any rectangles and factors that were the same? Which ones?

Common factors are numbers that are factors of two or more products.

6. What are all the common factors of 24 and 18?
Chapter 8

The greatest common factor (GCF) of two or more products is the greatest number that is a factor of those products.

7. What is the greatest common factor (GCF) of 24 and 18?

You can also use multiplication sentences to find all the factors of a number.

\[
\begin{align*}
1 \times 24 &= 24 \\
2 \times 12 &= 24 \\
3 \times 8 &= 24 \\
4 \times 6 &= 24 \\
\end{align*}
\]

Factors of 24: 1, 2, 3, 4, 6, 8, 12, and 24

8. How would you use multiplication sentences to find all the common factors of two or more numbers?

List all the common factors of each set of numbers. Then circle the GCF.

9. 8 and 12  
10. 6 and 15  
11. 9 and 21  
12. 10 and 30

13. 12 and 16  
14. 18 and 30  
15. 25 and 35  
16. 36 and 42

17. 8, 20, and 40  
18. 10, 25, and 45  
19. 18, 48, and 54

20. A prime number is greater than 1 and has exactly two factors, itself and 1. Composite numbers have more than two factors. Of the common factors you identified in exercises 17 through 19 above, which are prime numbers and which are composite numbers?

21. Look at the set of numbers at the right. Can the GCF be greater than 12? Explain why or why not. Then find the GCF.
Fractions: Lowest Terms

The terms of a fraction are its numerator and its denominator. A fraction is in lowest terms, or simplest form, when its numerator and denominator have no common factor other than 1.

\[
\frac{2}{5} \text{ is in lowest terms.} \quad \frac{6}{10} \text{ is not in lowest terms.}
\]

Factors of 2: 1, 2
Factors of 5: 1, 5
Common factor of 2 and 5: 1

Factors of 6: 1, 2, 3, 6
Factors of 10: 1, 2, 5, 10
Common factors of 6 and 10: 1, 2

To rename a fraction as an equivalent fraction in lowest terms or simplest form, divide the numerator and the denominator by their greatest common factor.

Write \(\frac{6}{10}\) in lowest terms.

\[
\frac{6 \div 2}{10 \div 2} = \frac{3}{5}
\]

The GCF of 6 and 10 is 2.

So \(\frac{6}{10}\) in lowest terms is \(\frac{3}{5}\).

Complete to find the simplest form of each fraction.

1. \(\frac{4 \div 4}{8 \div 4} = \frac{?}{?}\)
2. \(\frac{3 \div 3}{9 \div 3} = \frac{?}{?}\)
3. \(\frac{6 \div 2}{8 \div 2} = \frac{?}{?}\)
4. \(\frac{8 \div 2}{10 \div 2} = \frac{?}{?}\)
5. \(\frac{9 \div \ ?}{12 \div 3} = \frac{?}{?}\)
6. \(\frac{14 \div 7}{21 \div \ ?} = \frac{?}{?}\)
7. \(\frac{10 \div \ ?}{25 \div \ ?} = \frac{?}{5}\)
8. \(\frac{12 \div \ ?}{42 \div \ ?} = \frac{?}{7}\)
9. \(\frac{16 \div \ ?}{24 \div \ ?} = \frac{2}{?}\)
Is each fraction in simplest form? Write yes or no. Explain.

10. \( \frac{4}{7} \)  
11. \( \frac{6}{9} \)  
12. \( \frac{11}{12} \)  
13. \( \frac{7}{10} \)  
14. \( \frac{2}{10} \)  
15. \( \frac{8}{12} \)

Write each fraction in simplest form.

16. \( \frac{2}{6} \)  
17. \( \frac{4}{24} \)  
18. \( \frac{9}{18} \)  
19. \( \frac{3}{12} \)  
20. \( \frac{2}{4} \)  
21. \( \frac{12}{20} \)

22. \( \frac{6}{18} \)  
23. \( \frac{10}{20} \)  
24. \( \frac{8}{24} \)  
25. \( \frac{9}{15} \)  
26. \( \frac{15}{20} \)  
27. \( \frac{4}{10} \)

28. \( \frac{6}{24} \)  
29. \( \frac{8}{14} \)  
30. \( \frac{6}{15} \)  
31. \( \frac{10}{12} \)  
32. \( \frac{7}{21} \)  
33. \( \frac{5}{15} \)

34. \( \frac{8}{18} \)  
35. \( \frac{9}{27} \)  
36. \( \frac{15}{18} \)  
37. \( \frac{10}{15} \)  
38. \( \frac{9}{15} \)  
39. \( \frac{12}{18} \)

Express each answer in simplest form.

40. The chorus sang 12 songs at open house. Four of the songs were folk songs. What fractional part of the songs were folk songs?

41. Of 35 paintings on display in the school lobby, 7 were done in watercolors. What fractional part of the paintings were watercolors?

42. Jamie’s parents looked at his notebook. Ten of the 40 pages were filled with math problems. What fractional part of his notebook had math problems?

43. Glenda cut out the 26 letters of the alphabet to decorate the classroom. She cut 13 letters from green paper. What fractional part of the letters were green?

44. Writing awards were presented to 30 students. Of the awards, 6 were for poetry and 10 were for essays. What fractional part of the awards were for poetry? for essays?

45. There were 80 fourth graders in Hadley School. Of these, 35 were boys. What fractional part of the fourth graders were girls?
Chapter 8280

Mixed Numbers

Darryl is baking bread. His recipe calls for three and two thirds cups of whole-wheat flour.

Write: \(3\frac{2}{3}\)

Read: three and two thirds

\(3\frac{2}{3}\) is a mixed number.

A **mixed number** is made up of a whole number and a fraction.

**Study these examples.**

1. Write: \(1 + \frac{5}{6}\)
   Read: one and five sixths

2. Write: \(2 + \frac{1}{4}\)
   Read: two and one fourth

**Write as a mixed number. Then model each.**

1. four and three tenths
2. seven and two fifths
3. ten and one ninth
4. eight and five twelfths
5. two and three eighths
6. six and one half
Write a mixed number for each.

7. \[ \triangle \ \square \ \triangle \ \square \ \triangle \ \square \]

8. \[ \bigcirc \ \bigcirc \ \bigcirc \]

9. \[ \square \ \square \ \square \ \square \ \square \]

10. \[ \bigbox \ \bigbox \ \bigbox \]

To what mixed number is the arrow pointing?

11. \[1 \downarrow 2\]

12. \[4 \downarrow 5\]

13. \[3 \downarrow 4\]

14. \[9 \downarrow 10\]

Rename each as a whole number.

15. \[\frac{3}{3}\]

16. \[\frac{10}{1}\]

17. \[\frac{12}{1}\]

18. \[3\frac{12}{12}\]

19. \[\frac{9}{1}\]

20. \[5\frac{11}{11}\]

21. \[\frac{15}{1}\]

22. \[\frac{19}{1}\]

23. \[\frac{14}{14}\]

24. \[\frac{36}{1}\]

Rename as Whole Numbers

Some fractions can be renamed as whole numbers.

Numerator and denominator are the same. Denominator is 1.

\[\frac{4}{4} = 1\]

\[2\frac{4}{4} = 2 + 1 = 3\]

\[\frac{1000}{1000} = 1\]

\[\frac{4}{1} = 4\]

\[\frac{75}{1} = 75\]

\[\frac{1000}{1} = 1000\]
Compare Fractions

Compare: $\frac{5}{8}$ ? $\frac{3}{8}$

The denominators are the same.

To compare fractions with the same denominators, compare the numerators.

$\frac{5}{8} > \frac{3}{8}$, so $\frac{5}{8} > \frac{3}{8}$.

Compare: $\frac{2}{3}$ ? $\frac{5}{6}$

The denominators are different.

To compare fractions with different denominators, first rename as equivalent fractions with the same denominators. Then compare the numerators.

$\frac{2}{3} = \frac{4}{6}$, $\frac{5}{6} = \frac{5}{6}$, so $\frac{4}{6} < \frac{5}{6}$, and $\frac{2}{3} < \frac{5}{6}$.

Compare: $1 \frac{2}{5}$ ? $1 \frac{4}{5}$

To compare mixed numbers, first compare the whole numbers. Then compare the fractions.

$\frac{2}{5} < \frac{4}{5}$, so $1 \frac{2}{5} < 1 \frac{4}{5}$.

Chapter 8
Compare. Write <, =, or >. Use models to help.

1. \(\frac{3}{4} \ ? \ \frac{1}{4}\)  
2. \(\frac{5}{8} \ ? \ \frac{7}{8}\)  
3. \(\frac{2}{7} \ ? \ \frac{4}{7}\)  
4. \(\frac{7}{9} \ ? \ \frac{5}{9}\)

5. \(\frac{1}{6} \ ? \ \frac{5}{6}\)  
6. \(\frac{4}{5} \ ? \ \frac{4}{5}\)  
7. \(\frac{7}{10} \ ? \ \frac{3}{10}\)  
8. \(\frac{11}{12} \ ? \ \frac{5}{12}\)

9. \(\frac{8}{12} \ ? \ \frac{3}{4}\)  
10. \(\frac{2}{3} \ ? \ \frac{6}{9}\)  
11. \(\frac{1}{2} \ ? \ \frac{4}{6}\)  
12. \(\frac{1}{4} \ ? \ \frac{2}{8}\)

13. \(\frac{1}{3} \ ? \ \frac{1}{6}\)  
14. \(\frac{3}{5} \ ? \ \frac{3}{10}\)  
15. \(\frac{7}{8} \ ? \ \frac{2}{4}\)  
16. \(\frac{7}{12} \ ? \ \frac{5}{6}\)

17. \(\frac{6}{10} \ ? \ \frac{3}{5}\)  
18. \(\frac{1}{2} \ ? \ \frac{4}{8}\)  
19. \(\frac{3}{4} \ ? \ \frac{10}{12}\)  
20. \(\frac{3}{10} \ ? \ \frac{1}{2}\)

21. \(\frac{4}{4} \ ? \ \frac{4}{4}\)  
22. \(\frac{1}{3} \ ? \ \frac{2}{3}\)  
23. \(\frac{5}{9} \ ? \ \frac{2}{9}\)  
24. \(\frac{6}{5} \ ? \ \frac{6}{5}\)

25. \(\frac{3}{10} \ ? \ \frac{3}{10}\)  
26. \(\frac{8}{5} \ ? \ \frac{8}{5}\)  
27. \(\frac{2}{9} \ ? \ \frac{4}{9}\)  
28. \(\frac{1}{6} \ ? \ \frac{1}{6}\)

29. Of the evergreen trees in the park, \(\frac{3}{10}\) were pines and \(\frac{1}{10}\) were spruce. Were there more pines or more spruce in the park?

30. At the feeding station, \(\frac{1}{3}\) of the birds were sparrows and \(\frac{3}{12}\) were finches. Were there more sparrows or finches at the feeding station?

31. The northern sector of the park had \(3\frac{3}{4}\) mi of trails. The eastern sector had \(3\frac{1}{4}\) mi of trails. Which sector had more miles of trails?

32. On Monday, \(\frac{3}{4}\) of the park’s visitors were schoolchildren. On Tuesday \(\frac{5}{8}\) of the visitors were schoolchildren. Did more schoolchildren visit the park on Monday or on Tuesday?

Complete to make each comparison true.

33. \(1\frac{2}{3} > \ ?\)  
34. \(5\frac{3}{8} < \ ?\)  
35. \(2\frac{3}{5} < \ ?\)  
36. \(4\frac{3}{4} > \ ?\)
Order Fractions

Order from least to greatest: $\frac{1}{2}$, $\frac{7}{10}$, $\frac{3}{10}$

To order fractions with different denominators:

- Rename as equivalent fractions with the same denominator.

\[
\begin{align*}
\frac{1}{2} &= \frac{1 \times 5}{2 \times 5} = \frac{5}{10} \\
\frac{7}{10} &= \frac{7}{10} \\
\frac{3}{10} &= \frac{3}{10}
\end{align*}
\]

- Compare the fractions by comparing the numerators.

\[
\begin{align*}
3 &< 5 \quad \frac{3}{10} < \frac{5}{10} \\
5 &< 7 \quad \frac{5}{10} < \frac{7}{10}
\end{align*}
\]

- Arrange in order from least to greatest.

The order from least to greatest: $\frac{3}{10}$, $\frac{1}{2}$, $\frac{7}{10}$

Order from greatest to least: $\frac{3}{8}$, $\frac{1}{8}$, $\frac{7}{8}$

To order fractions with like denominators:

- Compare the fractions by comparing the numerators.

\[
\begin{align*}
7 &> 3 \quad \frac{7}{8} > \frac{3}{8} \\
3 &> 1 \quad \frac{3}{8} > \frac{1}{8}
\end{align*}
\]

- Arrange in order from greatest to least.

The order from greatest to least: $\frac{7}{8}$, $\frac{3}{8}$, $\frac{1}{8}$
Write in order from least to greatest. Use models to help.

1. \(\frac{4}{6}, \frac{2}{6}, \frac{3}{6}\)
2. \(\frac{1}{5}, \frac{4}{5}, \frac{2}{5}\)
3. \(\frac{5}{12}, \frac{9}{12}, \frac{1}{12}\)
4. \(\frac{1}{8}, \frac{6}{8}, \frac{4}{8}\)
5. \(\frac{8}{9}, \frac{5}{9}, \frac{7}{9}\)
6. \(\frac{3}{7}, \frac{5}{7}, \frac{2}{7}\)
7. \(\frac{8}{10}, \frac{2}{10}, \frac{6}{10}\)
8. \(\frac{2}{4}, \frac{1}{4}, \frac{3}{4}\)
9. \(\frac{1}{2}, \frac{1}{4}, \frac{3}{4}\)
10. \(\frac{5}{6}, \frac{2}{6}, \frac{2}{3}\)
11. \(\frac{3}{8}, \frac{5}{8}, \frac{1}{8}\)
12. \(\frac{5}{12}, \frac{1}{6}, \frac{3}{12}\)
13. \(\frac{3}{10}, \frac{9}{10}, \frac{2}{10}\)
14. \(\frac{1}{2}, \frac{6}{8}, \frac{1}{8}\)
15. \(\frac{2}{3}, \frac{5}{12}, \frac{11}{12}\)
16. \(\frac{7}{9}, \frac{1}{3}, \frac{4}{9}\)

Write in order from greatest to least. Use models to help.

17. \(\frac{1}{7}, \frac{6}{7}, \frac{4}{7}\)
18. \(\frac{4}{9}, \frac{8}{9}, \frac{2}{9}\)
19. \(\frac{1}{10}, \frac{7}{10}, \frac{8}{10}\)
20. \(\frac{5}{8}, \frac{2}{8}, \frac{7}{8}\)
21. \(\frac{9}{12}, \frac{3}{12}, \frac{6}{12}\)
22. \(\frac{3}{6}, \frac{5}{6}, \frac{1}{6}\)
23. \(\frac{3}{5}, \frac{1}{5}, \frac{4}{5}\)
24. \(\frac{3}{10}, \frac{9}{10}, \frac{2}{10}\)
25. \(\frac{1}{6}, \frac{1}{2}, \frac{2}{6}\)
26. \(\frac{5}{12}, \frac{9}{12}, \frac{1}{2}\)
27. \(\frac{2}{3}, \frac{2}{9}, \frac{5}{9}\)
28. \(\frac{3}{12}, \frac{3}{4}, \frac{7}{12}\)

**Problem Solving**

29. Marie cut three lengths of ribbon. They were \(\frac{1}{2}\) yd, \(\frac{3}{8}\) yd, and \(\frac{5}{8}\) yd long. Which was the longest length? Which was the shortest?

30. Brad lives \(\frac{3}{4}\) mi from school. Donna lives \(\frac{1}{4}\) mi from school, and Chris lives \(\frac{1}{2}\) mi from school. Who lives closest to school?

**DO YOU REMEMBER?**

Choose a word from the box to complete each sentence.

31. To find the \_\_ of data, subtract the least number from the greatest number.

32. The \_\_ is the number that shows up most frequently in a set of data.
Problem-Solving Strategy: Logical Reasoning

Gwen, Maraya, and Sonia each buy a bracelet. One is \(6 \frac{5}{8}\) in., one is \(6 \frac{1}{2}\) in., and the third is \(6 \frac{4}{8}\) in. Gwen’s bracelet is longer than Sonia’s. How long is Maraya’s bracelet?

Read

Visualize the facts of the problem as you reread it.

**Facts:** Bracelets are \(6 \frac{5}{8}\) in., \(6 \frac{1}{2}\) in., and \(6 \frac{4}{8}\) in. Gwen’s bracelet is longer than Sonia’s.

**Question:** How long is Maraya’s bracelet?

Plan

To compare mixed numbers:
First, compare the whole number parts. \(6 = 6 = 6\)
Then, compare the fraction parts. \(\frac{5}{8} \quad ? \quad \frac{1}{2}, \quad \frac{1}{2} \quad ? \quad \frac{4}{8}\)

Solve

Compare: \(\frac{5}{8} \quad ? \quad \frac{1}{2}\)
\[
\frac{5}{8} = \frac{5}{8} \quad \quad 5 > 4 \quad \frac{5}{8} > \frac{4}{8} \quad \text{So} \quad \frac{5}{8} > \frac{1}{2}.
\]

Compare: \(\frac{1}{2} \quad ? \quad \frac{4}{8}\)
\[
\frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8} \quad \quad 4 = 4 \quad \frac{4}{8} = \frac{4}{8} \quad \frac{1}{2} = \frac{4}{8}.
\]

So \(6 \frac{5}{8} > 6 \frac{1}{2}\) and \(6 \frac{5}{8} > 6 \frac{4}{8}\).

Two bracelets are the same length. Gwen’s is longer than Sonia’s, so Gwen’s bracelet is \(6 \frac{5}{8}\) in. long. Sonia’s and Maraya’s must be equal in length. \(6 \frac{1}{2}\) in. = \(6 \frac{4}{8}\) in.

Check

Draw 3 lines: \(6 \frac{5}{8}\) in., \(6 \frac{1}{2}\) in., \(6 \frac{4}{8}\) in. Then compare.
Use logical reasoning or an analogy to solve each problem.

1. Can you complete the analogy?
   \( \frac{1}{2} \) is to \( \frac{2}{4} \) as \( \frac{3}{6} \) is to __?

Facts: \( \frac{1}{2} \) and \( \frac{2}{4} \) are related.

Question: What fraction is related to \( \frac{3}{6} \) in the same way?

Plan: To solve an analogy, first read it aloud. Then draw and label the fractions.
   One half is to two fourths as three sixths is to __?

Think about how \( \frac{1}{2} \) and \( \frac{2}{4} \) are related.

Solve: __

Check: __

2. \( \frac{5}{10} \) is to \( \frac{10}{10} \) as \( \frac{4}{8} \) is to __?

3. ABAB is to CDCD as ABBA is to __?

4. 8 is to \( \frac{16}{24} \) as 6 is to __?

5. One worm is \( 4\frac{1}{4} \) in. long, another is \( 4\frac{3}{8} \) in. long, and a third is \( 4\frac{5}{8} \) in. long. The longest worm is in the garden and the shortest worm is on a leaf. Which worm is on a leaf?

6. A certain fraction has a numerator that is 3 less than its denominator. It is equivalent to \( \frac{9}{18} \). What is the fraction?

7. \( 1\frac{1}{2} \) is to 1 as \( 3\frac{1}{2} \) is to __?

8. 6 is to \( \frac{12}{18} \) as 4 is to __?
Solve each problem and explain the method you used.

1. A bouquet of a dozen flowers has 4 roses. The rest are carnations. What fractional part of the bouquet is roses? is carnations?

2. Pete plants \(\frac{3}{8}\) of the garden with tomatoes, \(\frac{1}{2}\) with peas, and \(\frac{1}{8}\) with peppers. Order the sections from largest to smallest.

3. Delia’s garden is \(\frac{9}{12}\) flowers and \(\frac{4}{16}\) herbs. Are there more flowers or herbs in her garden?

4. A garden has \(\frac{1}{10}\) red, \(\frac{1}{5}\) white, \(\frac{2}{10}\) yellow, and \(\frac{2}{5}\) pink roses. Of which color are there the most roses? the least? Which colors share an equal number?

5. One plant is \(7\frac{10}{16}\) in. tall. Another is \(7\frac{3}{4}\) in. tall. The herb is the shorter plant. How tall is it?

6. Marci has 12 sections in her flower garden and 16 sections in her herb garden. If both gardens are equal in size, which has smaller sections?

Use the circle graph for problems 7 and 8.

7. About what fractional part of Greta’s garden is tulips? is red tulips?

8. What flowers make up equal parts of Greta’s garden?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. For every sunflower seed Deven plants, he also plants 4 zinnia seeds. Deven plants 45 seeds in all. How many zinnia seeds does he plant?

10. Diego has 10 pots. He puts marigolds in \(\frac{2}{5}\) of the pots and daisies in \(\frac{1}{2}\) of the pots. Are there more pots with daisies or marigolds?

11. A fraction has a denominator that is 8 greater than its numerator. It is equivalent to \(\frac{1}{3}\). What is the fraction?

12. The circle graph at right shows how many rows of each kind of vegetable Kito has planted in his garden. What questions can you ask using the circle graph?

13. Ms. Tallchief plants 2 red and 2 pink geraniums in a row in her window box. How many different arrangements can she make?

14. Two fractions are equivalent. The denominator of one is the same as the numerator of the other. What are some possibilities for the two fractions?

15. Lila plants tulips, daffodils, and lilies. The flowers take up \(\frac{2}{6}\), \(\frac{2}{12}\), and \(\frac{1}{2}\) of her garden. She plants twice as many tulips as lilies. What fraction of her garden does each flower take up?
Check Your Progress

Lessons 1–12

Write each as a fraction.  
(See pp. 266–267.)

1. one half  
2. three eighths  
3. five sevenths  
4. four out of nine  
5. six-tenths  
6. two divided by three

Write the fraction represented by the letter A.  
(See pp. 268–269.)

7.  
8. 

Tell whether the fraction is closer to 0, \( \frac{1}{2} \), or 1.  
(See pp. 270–271.)

9. \( \frac{6}{7} \)  
10. \( \frac{2}{9} \)  
11. \( \frac{6}{10} \)  
12. \( \frac{9}{11} \)

Write the equivalent fraction.  
(See pp. 272–275.)

13. \( \frac{1}{9} = \frac{5}{n} \)  
14. \( \frac{7}{10} = \frac{14}{x} \)  
15. \( \frac{6}{9} = \frac{y}{54} \)  
16. \( \frac{3}{4} = \frac{18}{a} \)

Find the common factors for each set of numbers. Then circle the greatest common factor.  
(See pp. 276–277.)

17. 8, 12  
18. 6, 16  
19. 12, 20

Write each fraction in simplest form.  
(See pp. 278–279.)

20. \( \frac{10}{15} \)  
21. \( \frac{6}{12} \)  
22. \( \frac{8}{24} \)  
23. \( \frac{4}{20} \)  
24. \( \frac{15}{40} \)

Write in order: least to greatest.  
(See pp. 282–285.)

25. \( \frac{4}{10}, \frac{7}{10}, \frac{4}{5} \)  
26. \( \frac{11}{12}, \frac{3}{4}, \frac{2}{12} \)  
27. \( \frac{6}{9}, \frac{1}{3}, \frac{4}{9} \)  
28. \( \frac{4}{5}, \frac{3}{10}, \frac{7}{10} \)

Compare. Write <, =, or >.  
(See pp. 280–283.)

29. \( 2 \frac{7}{14} \) ? \( 3 \frac{4}{14} \)  
30. \( \frac{10}{12} \) ? \( \frac{9}{12} \)  
31. \( 1 \frac{2}{3} \) ? \( 2 \frac{1}{3} \)  

(See Still More Practice, p. 468.)
Ratio and Percent

You can use a **ratio** to compare the number of violins to the number of trombones.

The ratio of violins to trombones is 6 to 2.

You can write a ratio in three ways.

1. violins → 6 to 2 ← trombones
2. violins → 6 : 2 ← trombones
3. violins → 6
   
   2 ← trombones

The ratio of violins to trombones: 6 to 2, 6:2, or \( \frac{6}{2} \)
The ratio of trombones to violins: 2 to 6, 2:6, or \( \frac{2}{6} \)

If you write a ratio as a fraction with a denominator of 100, you can express that ratio as a **percent (%)**.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{8}{100} )</td>
<td>8%</td>
</tr>
<tr>
<td>( \frac{10}{100} )</td>
<td>10%</td>
</tr>
<tr>
<td>( \frac{85}{100} )</td>
<td>85%</td>
</tr>
<tr>
<td>( \frac{100}{100} )</td>
<td>100%</td>
</tr>
</tbody>
</table>

Write each ratio three ways.

1. 4 clarinets to 7 trumpets
2. 10 oboes to 1 piano
3. 5 cellos to 8 tubas
4. 9 bassoons to 6 saxophones

Write each ratio as a percent.

5. \( \frac{50}{100} \)
6. \( \frac{1}{100} \)
7. \( \frac{75}{100} \)
8. 25:100
9. 99:100

Write each percent as a fraction.

10. 30%
11. 5%
12. 62%
13. 48%
14. 150%
Chapter 8 Test

Write each as a fraction.
1. five sixths  
2. seven eighths  
3. two divided by ten  
4. four out of seven

Write the equivalent fraction.
5. \( \frac{3}{4} = \frac{n}{12} \)  
6. \( \frac{1}{5} = \frac{5}{a} \)  
7. \( \frac{1}{3} = \frac{3}{x} \)  
8. \( \frac{2}{7} = \frac{d}{21} \)

Find the common factors for each set. Then circle the GCF.
9. 12, 24  
10. 18, 36, 12

Write each in simplest form.
11. \( \frac{8}{12} \)  
12. \( \frac{6}{10} \)  
13. \( \frac{12}{36} \)  
14. \( \frac{14}{28} \)  
15. \( \frac{8}{10} \)

Write in order from greatest to least.
16. \( \frac{14}{21}, \frac{3}{7}, \frac{3}{21} \)  
17. \( \frac{1}{3}, \frac{8}{9}, \frac{4}{9} \)

Problem Solving

Use a strategy you have learned.
18. Chet, Juan, and Ty walked around the track. Chet walked farther than Juan. Ty walked the farthest. If they walked \( \frac{3}{5} \) mi, \( \frac{2}{5} \) mi, \( \frac{5}{10} \) mi, how far did each boy walk?

Tell About It

What fractions are shown? Explain why they are equivalent.
19. \[ \text{A} \]

Performance Assessment

20. Extend the number line to show 1.

Draw a number line and locate each point.
21. \( \frac{0}{4} \)  
22. \( \frac{3}{4} \)  
23. \( \frac{1}{2} \)
Test Preparation

Choose the best answer.

1. \[ \begin{align*}
\text{Choose the best answer.} \\
1. & \quad \$ .86 \\
& \quad \underline{-.81} \\
\text{a.} & \quad .15 \\
\text{b.} & \quad .05 \\
\text{c.} & \quad \$ 1.67 \\
\text{d.} & \quad \$ .50 \\
\end{align*} \]

2. Choose the rule for the pattern.
14, 11, 12, 9, 10

\[ \begin{align*}
a. & \quad \text{Start at 11; } -3, +1 \\
b. & \quad \text{Start at 14; } -3 \\
c. & \quad \text{Start at 14; } -3, +2, -1 \\
d. & \quad \text{Start at 14; } -3, +1 \\
\end{align*} \]

3. Choose the value of the variable.
\[ \frac{9}{a^{63}} \]

\[ \begin{align*}
a. & \quad a = 54 \\
b. & \quad a = 9 \\
c. & \quad a = 8 \\
d. & \quad a = 7 \\
\end{align*} \]

4. \[ \begin{align*}
5768 \\
\times \underline{6} \\
\text{a.} & \quad 34,608 \\
\text{b.} & \quad 34,668 \\
\text{c.} & \quad 34,208 \\
\text{d.} & \quad 30,608 \\
\end{align*} \]

5. \[ \$ .79 + \$ .17 \]

\[ \begin{align*}
a. & \quad \$ 1.06 \\
b. & \quad \$ .62 \\
c. & \quad \$ .86 \\
d. & \quad \$ .96 \\
\end{align*} \]

6. Round the number to the place of the underlined digit.
402,516,970

\[ \begin{align*}
a. & \quad 400,000,000 \\
b. & \quad 401,000,000 \\
c. & \quad 402,000,000 \\
d. & \quad 403,000,000 \\
\end{align*} \]

7. \[ \begin{align*}
7. & \quad \underline{6217} \\
\text{a.} & \quad 35 \text{ R7} \\
\text{b.} & \quad 36 \\
\text{c.} & \quad 36 \text{ R1} \\
\text{d.} & \quad 36 \text{ R2} \\
\end{align*} \]

8. Sam puts 220 g of raisins into each snack bag. How many kilograms of raisins does he need for 15 bags?

\[ \begin{align*}
a. & \quad 3300 \text{ kg} \\
b. & \quad 15 \text{ kg} \\
c. & \quad 4 \text{ kg} \\
d. & \quad 3 \text{ kg} \\
\end{align*} \]

9. Choose the value of the variable.
\[ 19 = n + 8 \]

\[ \begin{align*}
a. & \quad n = 8 \\
b. & \quad n = 11 \\
c. & \quad n = 19 \\
d. & \quad n = 27 \\
\end{align*} \]

10. \[ \begin{align*}
603 \\
\times \underline{7} \\
\text{a.} & \quad 4271 \\
\text{b.} & \quad 4221 \\
\text{c.} & \quad 4201 \\
\text{d.} & \quad 596 \\
\end{align*} \]

11. \[ 3 \text{ yd} = \underline{?} \]

\[ \begin{align*}
a. & \quad 9 \text{ ft} \\
b. & \quad 36 \text{ ft} \\
c. & \quad 8 \text{ ft} \\
d. & \quad 96 \text{ in.} \\
\end{align*} \]

12. Choose the multiplication property.
\[ (3 \times 5) \times 2 = 3 \times (5 \times 2) \]

\[ \begin{align*}
a. & \quad \text{commutative property} \\
b. & \quad \text{associative property} \\
c. & \quad \text{identity property} \\
d. & \quad \text{zero property} \\
\end{align*} \]
13. Compare. Choose <, =, or >.

58 fl oz ? 8 c

a. <    b. =    c. >

14. There are 3 blue cubes and 2 red cubes in a bag. What is the probability of picking a red cube?

a. \( \frac{1}{2} \)    b. \( \frac{2}{3} \)    c. \( \frac{3}{4} \)    d. \( \frac{2}{5} \)

15. Choose the equivalent fraction.

\( \frac{3}{6} \)

a. \( \frac{9}{12} \)    b. \( \frac{6}{18} \)    c. \( \frac{9}{18} \)    d. \( \frac{12}{18} \)

16. Choose the fraction for the letter A.

a. \( \frac{2}{5} \)    b. \( \frac{3}{6} \)    c. \( \frac{3}{5} \)    d. \( \frac{4}{5} \)

17. Choose the fraction in lowest terms.

a. \( \frac{4}{8} \)    b. \( \frac{6}{7} \)    c. \( \frac{2}{6} \)    d. \( \frac{2}{4} \)

18. Compare. Choose <, =, or >.

70 dm ? 6 m

a. <    b. =    c. >

19. At 1:00 A.M. the temperature was 2°C. By 4:00 A.M. it was –5°C. How many degrees did the temperature drop?

a. 7 degrees    b. 5 degrees    c. 3 degrees    d. 2 degrees

20. Choose the missing denominator.

\( \frac{3}{7} = \frac{12}{n} \)

a. \( n = 7 \)    b. \( n = 21 \)    c. \( n = 24 \)    d. \( n = 28 \)

21. Which fraction is closer to \( \frac{1}{2} \)?

a. \( \frac{14}{20} \)    b. \( \frac{12}{20} \)    c. \( \frac{9}{20} \)    d. \( \frac{8}{20} \)

22. Which fraction completes the analogy?

5 is to \( \frac{15}{20} \) as 7 is to \( \frac{?}{?} \)

a. \( \frac{21}{28} \)    b. \( \frac{20}{25} \)    c. \( \frac{14}{21} \)    d. \( \frac{28}{35} \)

Tell About It

Draw a picture to help solve the problem.

23. Amy has a 1-foot plank of wood. She cuts the plank into 8 equal parts. Write the fraction which names, in feet, 2 pieces of Amy’s cut plank of wood. Explain how you found the numerator and the denominator.
LITTLE BITS

“Will you have some pie?”
Said Jane. Said I,
“Well, just a little. Just a bit.”
But I found when I had eaten it
That just one little-bit wouldn’t do.
So I told Jane to make it two.

Then was I happy with what I got?
Well, little-bits can’t make a lot.
For little-bits are small, you see.
So I told Jane to make it three.

Three little-bits are not much more
Than two. So I said, “Make it four.”

And I ate them up. Then asked for five.
Then six. Till Jane said, “Sakes alive,
Here are two more and that makes eight.
If you don’t stop you’ll eat the plate!”
“Eight little-bits.” I said, “are fine.
But would you care to make it nine?”

From “Little Bits” by John Ciardi.

In this chapter you will:
Add and subtract fractions and mixed numbers
Estimate sums and differences of mixed numbers
Explore multiples
Relate fractions and probability
Find fractional parts of numbers
Solve problems by using simpler numbers

Critical Thinking/ Finding Together
Suppose Jane’s pie was cut into 10 equal pieces. Name in lowest terms each fractional part of the pie that was eaten. What fractional part of the pie is left?
Add Fractions: Like Denominators

Pam walked \(\frac{3}{10}\) mile from her house to school. Then she walked \(\frac{5}{10}\) mile from school to the bus stop. How far did Pam walk?

To find how far Pam walked, add: \(\frac{3}{10} + \frac{5}{10}\)

The denominators are the same.

To add fractions with like denominators:

- Add the numerators. \(\frac{3}{10} + \frac{5}{10} = \frac{8}{10}\)
- Write the like denominator. \(\frac{3}{10} + \frac{5}{10} = \frac{8}{10}\)
- Write the sum in simplest form. \(\frac{8}{10} = \frac{8}{2} = \frac{4}{5}\)

Factors of 8: 1, 2, 4, 8
Factors of 10: 1, 2, 5, 10
GCF: 2

Pam walked \(\frac{4}{5}\) mile.

Study these examples.

\[
\begin{align*}
\frac{4}{9} + \frac{5}{9} &amp;= \frac{9}{9} = 1 \\
\frac{2}{7} + \frac{3}{7} &amp;= \frac{5}{7} \\
\frac{1}{10} + \frac{2}{10} + \frac{4}{10} &amp;= \frac{7}{10}
\end{align*}
\]

Add. Write the sum in simplest form.

You can use a number line to help.

1. \(\frac{1}{4} + \frac{2}{4}\)  
2. \(\frac{5}{8} + \frac{2}{8}\)  
3. \(\frac{1}{3} + \frac{1}{3}\)  
4. \(\frac{2}{7} + \frac{4}{7}\)
Find the sum in simplest form.

5. \( \frac{2}{9} + \frac{1}{9} \)
6. \( \frac{1}{6} + \frac{2}{6} \)
7. \( \frac{2}{10} + \frac{4}{10} \)
8. \( \frac{2}{5} + \frac{3}{5} \)

9. \( \frac{1}{8} + \frac{5}{8} \)
10. \( \frac{3}{7} + \frac{4}{7} \)
11. \( \frac{4}{12} + \frac{6}{12} \)
12. \( \frac{2}{6} + \frac{2}{6} \)

13. \( \frac{3}{4} + \frac{1}{4} \)
14. \( \frac{2}{9} + \frac{4}{9} \)
15. \( \frac{4}{10} + \frac{4}{10} \)
16. \( \frac{2}{8} + \frac{2}{8} \)

17. \( \frac{1}{9} \)+ \( \frac{3}{9} \)
18. \( \frac{3}{5} + \frac{1}{5} \)
19. \( \frac{2}{10} + \frac{3}{10} \)
20. \( \frac{3}{8} + \frac{5}{8} \)
21. \( \frac{5}{12} + \frac{3}{12} \)

22. \( \frac{1}{2} + \frac{1}{2} \)
23. \( \frac{5}{7} + \frac{2}{7} \)
24. \( \frac{2}{8} + \frac{4}{8} \)
25. \( \frac{3}{12} + \frac{3}{12} \)
26. \( \frac{1}{12} + \frac{3}{12} \)

27. \( \frac{2}{12} + \frac{1}{12} + \frac{7}{12} \)
28. \( \frac{3}{10} + \frac{2}{10} + \frac{5}{10} \)
29. \( \frac{1}{8} + \frac{5}{8} + \frac{2}{8} \)

Problem Solving

Write each answer in simplest form.

30. Mr. Lom rode his bicycle for \( \frac{1}{4} \) hour before breakfast and \( \frac{1}{4} \) hour after supper. 
   For how much time did he ride his bicycle?

31. Jake cycled \( \frac{3}{8} \) mile from his house to Rick's. Then he cycled \( \frac{5}{8} \) mile from Rick's to Hal's. How far did Jake cycle?

Test Preparation

32. For every \( \frac{1}{10} \) mile that an adult walks, he or she burns about 10 calories. About how many calories would an adult burn walking \( \frac{2}{10} \) mile in the morning and \( \frac{7}{10} \) mile in the evening? 
   A 10 calories   B 20 calories  
   C 70 calories   D 90 calories
Kevin had \(\frac{7}{8}\) yard of felt. He used \(\frac{3}{8}\) yard to make a pirate’s hat.

How much felt was left?

To find how much was left, subtract: \(\frac{7}{8} - \frac{3}{8}\)

To subtract fractions with like denominators:

- Subtract the numerators.
  \(\frac{7}{8} - \frac{3}{8} = \frac{4}{8}\)
  \(7 - 3 = 4\)

- Write the like denominator.
  \(\frac{7}{8} - \frac{3}{8} = \frac{4}{8}\)

- Write the difference in simplest form.
  \(\frac{4}{8} = \frac{4 \div 4}{8 \div 4} = \frac{1}{2}\)

There was \(\frac{1}{2}\) yard of felt left.

Study these examples.

\[
\begin{align*}
\frac{3}{4} - \frac{3}{4} &= \frac{0}{4} = 0 \\
\frac{7}{9} - \frac{5}{9} &= \frac{2}{9}
\end{align*}
\]

Find the difference in simplest form.
You can use a number line to help.

1. \(\frac{9}{10} - \frac{2}{10}\)  
2. \(\frac{3}{5} - \frac{2}{5}\)  
3. \(\frac{4}{7} - \frac{2}{7}\)  
4. \(\frac{3}{4} - \frac{1}{4}\)
Subtract. Write the difference in simplest form.

5. \( \frac{6}{9} - \frac{3}{9} \)
6. \( \frac{2}{3} - \frac{1}{3} \)
7. \( \frac{5}{6} - \frac{4}{6} \)
8. \( \frac{5}{8} - \frac{5}{8} \)

9. \( \frac{11}{12} - \frac{5}{12} \)
10. \( \frac{8}{10} - \frac{2}{10} \)
11. \( \frac{4}{5} - \frac{4}{5} \)
12. \( \frac{6}{8} - \frac{2}{8} \)

13. \( \frac{8}{9} - \frac{2}{9} \)
14. \( \frac{10}{12} - \frac{1}{12} \)
15. \( \frac{3}{6} - \frac{1}{6} \)
16. \( \frac{7}{10} - \frac{3}{10} \)

17. \[ \frac{3}{4} - \frac{2}{4} \]
18. \[ \frac{7}{9} - \frac{1}{9} \]
19. \[ \frac{11}{12} - \frac{8}{12} \]
20. \[ \frac{9}{10} - \frac{7}{10} \]

21. \( \frac{1}{2} - \frac{1}{2} \)
22. \( \frac{2}{7} - \frac{2}{7} \)
23. \( \frac{4}{5} - \frac{1}{5} \)
24. \( \frac{5}{6} - \frac{1}{6} \)
25. \( \frac{10}{12} - \frac{6}{12} \)

26. \( \frac{6}{10} - \frac{2}{10} \)

Problem Solving

Write the answer in simplest form.

27. Nora bought \( \frac{5}{6} \) yard of calico. Wayne bought \( \frac{2}{6} \) yard of calico. How much more calico did Nora buy than Wayne?

28. Jo used \( \frac{5}{8} \) yard of red linen to make a skirt. She used \( \frac{1}{8} \) yard of blue linen for a scarf. Did she use more red or blue linen? How much more?

29. Ben has \( \frac{1}{4} \) yard of denim. He needs \( \frac{3}{4} \) yard for a school project. How much more denim does he need?

DO YOU REMEMBER?

Divide.

30. \( \frac{6}{8} \)
31. \( \frac{4}{13} \)
32. \( \frac{8}{43} \)
33. \( \frac{5}{27} \)
34. \( \frac{2}{11} \)
35. \( \frac{3}{20} \)

36. \( 48 \div 7 \)
37. \( 89 \div 9 \)
38. \( 65 \div 9 \)
39. \( 76 \div 8 \)
An improper fraction is a fraction greater than or equal to one. Its numerator is greater than or equal to its denominator.

\[ \frac{20}{8} \] is an improper fraction since \( 20 > 8 \).

Write \( \frac{20}{8} \) as a mixed number in simplest form: \( \frac{20}{8} = n \)

To write an improper fraction as a mixed number:

1. Divide the numerator by the denominator.
2. Write the quotient as the whole number.
3. Write the remainder over the divisor.

\[ \frac{20}{8} = 8 \div 20 \]

So \( \frac{20}{8} = 2 \frac{4}{8} = 2 \frac{1}{2} \).

You can also break apart an improper fraction.

\[ \frac{20}{8} = \frac{8}{8} + \frac{8}{8} + \frac{4}{8} = 2 \frac{1}{2} \]

You can use a number line to model an improper fraction.
Write as a whole number or mixed number in simplest form.
Use division, models, or number lines to help.

1. \( \frac{12}{3} = 12 \div 3 = 4 \) simplest form
2. \( \frac{9}{4} \)
3. \( \frac{13}{6} \)
4. \( \frac{27}{3} \)
5. \( \frac{30}{10} \)
6. \( \frac{15}{9} \)
7. \( \frac{32}{8} \)
8. \( \frac{20}{6} \)
9. \( \frac{10}{5} \)
10. \( \frac{14}{4} \)
11. \( \frac{70}{12} \)
12. \( \frac{58}{6} \)
13. \( \frac{42}{8} \)
14. \( \frac{33}{6} \)
15. \( \frac{92}{8} \)
16. \( \frac{26}{10} \)

Add. Write each sum in simplest form.

17. \( \frac{3}{5} + \frac{4}{5} \)
18. \( \frac{2}{3} + \frac{2}{3} \)
19. \( \frac{4}{6} + \frac{2}{6} \)
20. \( \frac{2}{4} + \frac{3}{4} \)
21. \( \frac{4}{6} + \frac{5}{6} \)
22. \( \frac{7}{8} + \frac{5}{8} \)
23. \( \frac{4}{7} + \frac{5}{7} \)
24. \( \frac{7}{9} + \frac{8}{9} \)
25. \( \frac{10}{12} + \frac{8}{12} \)
26. \( \frac{3}{10} + \frac{7}{10} \)
27. \( \frac{1}{2} + \frac{1}{2} \)
28. \( \frac{7}{8} + \frac{3}{8} \)
29. \( \frac{14}{5} + \frac{16}{5} \)
30. \( \frac{20}{8} + \frac{30}{8} \)
31. \( \frac{25}{3} + \frac{20}{3} \)
32. \( \frac{23}{9} + \frac{57}{9} \)

Problem Solving

33. Max cut \( \frac{125}{7} \) feet of wood. Did he cut more or less than 18 feet of wood?
34. Pat put \( \frac{94}{6} \) liters of water in her fish tank. Was this more or less than 16 liters?
35. Steve walked \( \frac{10}{4} \) miles to the county fair. Did he walk more or less than 2 miles?
36. Kelvin sold \( \frac{164}{8} \) gal of cider at the fair. Did he sell more or less than 22 gallons?
37. Sue ate \( \frac{5}{2} \) pies in the pie-eating contest. Was this more or less than 3 pies?
38. Mia has \( \frac{7}{4} \) yards of fabric. Does she have more or less than 2 yards of fabric?
There are $5\frac{1}{8}$ lb of apples, $2\frac{3}{4}$ lb of bananas, and $8\frac{1}{5}$ lb of melons at a picnic. About how many pounds of fruit are at the picnic?

To find about how many pounds, estimate the sum: $5\frac{1}{8} + 2\frac{3}{4} + 8\frac{1}{5}$

To estimate sums of mixed numbers, use front-end estimation.
- Add the whole number parts. $5 + 2 + 8 \rightarrow 15$
- Adjust the estimate with the fraction parts. $\frac{1}{8} + \frac{3}{4} + \frac{1}{5} \rightarrow \frac{1}{16}$

Adjusted estimate: $15 + 1 = 16$

There are about 16 lb of fruit at the picnic.

About how many more pounds of melons than bananas are there?

To find about how many more, estimate the difference: $8\frac{1}{5} - 2\frac{3}{4}$

To estimate differences of mixed numbers, use front-end estimation.
- Subtract the whole number parts. $8 - 2 \rightarrow 6$

There are about 6 more pounds of melons than bananas.

Estimate. Use front-end estimation.

1. $6\frac{1}{5} + 9\frac{8}{10}$
2. $8\frac{1}{4} + 8\frac{9}{12}$
3. $3\frac{1}{2} + 7\frac{1}{6}$
4. $1\frac{4}{9} + 4\frac{5}{6}$
5. $5\frac{2}{3} - 2\frac{4}{9}$
6. $9\frac{3}{4} - 4\frac{3}{8}$
7. $7\frac{2}{10} - 5\frac{1}{2}$
8. $6\frac{3}{8} - 4\frac{1}{4}$
### Estimate the Sum. Use Front-End Estimation.

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### Estimate the Difference. Use Front-End Estimation.

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### Problem Solving

33. David brought \(5\frac{2}{10}\) lb of potato salad to the picnic. Sue brought \(7\frac{1}{2}\) lb of potato salad. About how many pounds of potato salad were there?  

34. Jerry traveled \(15\frac{3}{4}\) mi to get to the picnic. Emmy traveled \(6\frac{1}{2}\) mi less. About how far did Emmy have to travel?  

35. Nan brought a watermelon that weighed \(20\frac{1}{4}\) lb. The picnickers ate \(15\frac{3}{4}\) lb of watermelon. About how many pounds of watermelon were left?  

36. Sal needed \(37\) lb of turkey to feed the picnickers. He bought turkeys that weighed \(10\frac{7}{10}\) lb, \(16\frac{1}{10}\) lb, and \(11\frac{3}{10}\) lb. Did Sal buy enough turkey?
To find how many they buy in all,
add: \(2 \frac{6}{10} + 1 \frac{2}{10}\)

\[
\begin{align*}
\text{Add the} & \quad \text{whole numbers.} \\
\text{fractions.} & \quad \text{Write in} \\
2 \frac{6}{10} & \quad \text{simplest form.} \\
+ 1 \frac{2}{10} & \quad 2 \frac{6}{10} \\
\frac{8}{10} & + 1 \frac{2}{10} \\
3 \frac{8}{10} & \quad 3 \frac{4}{5}
\end{align*}
\]

They buy \(3 \frac{4}{5}\) trays in all.

To find how many more trays Lucy buys,
subtract: \(2 \frac{6}{10} - 1 \frac{2}{10}\)

\[
\begin{align*}
\text{Subtract the} & \quad \text{whole numbers.} \\
\text{fractions.} & \quad \text{Write in} \\
2 \frac{6}{10} & \quad \text{simplest form.} \\
- 1 \frac{2}{10} & \quad 2 \frac{6}{10} \\
\frac{4}{10} & - 1 \frac{2}{10} \\
1 \frac{4}{10} & \quad 1 \frac{2}{5}
\end{align*}
\]

Lucy buys \(1 \frac{2}{5}\) more trays than her brother.
Add. Write the sum in simplest form.

1. \( \frac{6}{5} + \frac{7}{6} \)  
2. \( \frac{8}{4} + \frac{5}{4} \)  
3. \( \frac{4}{5} + \frac{3}{5} \)  
4. \( \frac{2}{8} + 1 \frac{5}{8} \)  
5. \( 9 \frac{2}{7} + 6 \frac{4}{7} \)

6. \( \frac{5}{12} + \frac{6}{12} \)  
7. \( \frac{7}{9} + \frac{8}{9} \)  
8. \( 26 \frac{3}{4} + 17 \frac{1}{4} \)  
9. \( 36 \frac{3}{10} + 28 \frac{5}{10} \)  
10. \( 47 \frac{3}{8} + 54 \frac{3}{8} \)

Subtract. Write the difference in simplest form.

11. \( 9 \frac{10}{12} - 7 \frac{7}{12} \)  
12. \( 5 \frac{2}{3} - 1 \frac{1}{3} \)  
13. \( 8 \frac{3}{4} - 3 \frac{1}{4} \)  
14. \( 6 \frac{4}{5} - 4 \frac{2}{5} \)  
15. \( 10 \frac{7}{8} - 2 \frac{5}{8} \)

16. \( 57 \frac{5}{6} - 48 \frac{2}{6} \)  
17. \( 32 \frac{6}{7} - 27 \frac{1}{7} \)  
18. \( 40 \frac{8}{9} - 18 \frac{5}{9} \)  
19. \( 23 \frac{9}{10} - 23 \frac{3}{10} \)  
20. \( 12 \frac{1}{2} - 7 \frac{1}{2} \)

Align and add or subtract. Watch the signs.

21. \( 18 \frac{11}{12} - 9 \frac{1}{12} \)  
22. \( 14 \frac{7}{10} - 8 \frac{3}{10} \)  
23. \( 21 \frac{2}{6} + 5 \frac{2}{6} \)  
24. \( 31 \frac{6}{8} - 9 \frac{2}{8} \)

25. \( 1 \frac{6}{8} + 19 \frac{2}{8} \)  
26. \( 6 \frac{2}{9} + 17 \frac{1}{9} \)  
27. \( 30 \frac{9}{10} - 2 \frac{1}{10} \)  
28. \( 42 \frac{1}{5} + 8 \frac{3}{5} \)

**Problem Solving**

29. The fence around Lucy’s garden was \( 7 \frac{4}{12} \) ft high. She put chicken wire at the top so it is now \( 10 \frac{7}{12} \) ft high. How many feet of wire did she add to the height of the fence?

**MENTAL MATH**

Add or subtract. Watch the signs.

30. \( 8 \frac{7}{8} - 4 \)  
31. \( 9 + 5 \frac{2}{3} \)  
32. \( 7 \frac{9}{10} + 6 \)  
33. \( 10 \frac{3}{4} - 9 \)
The multiples of a number are all the products that have that number as a factor.

Factors of 2:

\[ \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \]

Multiples of 2:

\[ 0 \ 2 \ 4 \ 6 \ 8 \ 10 \ 12 \ 14 \ 16 \ 18 \ldots \]

Factors of 3:

\[ \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \]

Multiples of 3:

\[ 0 \ 3 \ 6 \ 9 \ 12 \ 15 \ 18 \ 21 \ 24 \ 27 \ldots \]

You can find the multiples of a number by multiplying or by skip counting.

Common multiples are all the numbers other than 0 that are multiples of two or more numbers.

Multiples of 2: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, \ldots 

Multiples of 3: 0, 3, 6, 9, 12, 15, 18, 21, 24, \ldots 

Common multiples of 2 and 3: 6, 12, 18, 24, \ldots 

The least common multiple (LCM) of two or more numbers is the least number that is a multiple of those numbers.

Least common multiple (LCM) of 2 and 3: 6

Is each a multiple of 2? Write yes or no.

1. 5    2. 40    3. 62    4. 0    5. 29    6. 88

Is each a multiple of 3? Write yes or no.

7. 33    8. 1    9. 29    10. 60    11. 48    12. 100
Is each a multiple of 4? Write yes or no.
13. 16 14. 7 15. 32 16. 18 17. 42 18. 36

Is each a multiple of 5? Write yes or no.
19. 24 20. 15 21. 70 22. 54 23. 30 24. 48

List the first eleven multiples of each.
25. 6 26. 4 27. 9 28. 10 29. 8 30. 5

Write the first four common multiples for each set of numbers. Then write the least common multiple (LCM).
31. 2, 4 32. 3, 9 33. 4, 8 34. 6, 3 35. 5, 10
36. 2, 8 37. 6, 9 38. 8, 12 39. 7, 2 40. 2, 10
41. 4, 5 42. 8, 10 43. 4, 6 44. 9, 12 45. 3, 5
46. 2, 4, and 10 47. 3, 9, and 12 48. 2, 3, and 9
49. 6, 8, and 12 50. 4, 6, and 8 51. 5, 6, and 10

CRITICAL THINKING

Write true or false for each statement. If true, give an example. If false, explain why.
52. All multiples of 3 are divisible by 3.
53. All multiples of 4 are multiples of 8.
54. No multiples of 9 are multiples of 3.
55. Some multiples of 6 are multiples of 12.
56. All multiples of 2 are even numbers.
57. No multiples of 5 are even numbers.
58. Some multiples of 3 are odd numbers.
59. All multiples of 7 are odd numbers.
Mitchell hiked from camp to Crystal Cave and then to Cedar Lake. How far did Mitchell hike?

To find how far he hiked, add: \( \frac{7}{10} + \frac{1}{2} \)

To add fractions with unlike denominators:
- First find the LCM.
- Use the LCM to rename as fractions with like denominators.
- Then add the like fractions.

Multiples of 2: 2, 4, 6, 8, 10, 12 . . .
Multiples of 10: 10, 20, . . .
LCM of 2 and 10: 10

\[
\begin{align*}
\frac{7}{10} + \frac{1}{2} & = \frac{7}{10} + \frac{1 \times 5}{2 \times 5} \\
& = \frac{7}{10} + \frac{5}{10} \\
& = \frac{12}{10} \\
& = 1\frac{2}{10} = 1\frac{1}{5}
\end{align*}
\]

Mitchell hiked 1\(\frac{1}{5}\) miles.

Study these examples.

\[
\begin{align*}
\frac{1}{4} + \frac{3}{8} & = \frac{1 \times 2}{4 \times 2} + \frac{3}{8} \\
& = \frac{2}{8} + \frac{3}{8} \\
& = \frac{5}{8}
\end{align*}
\]

\[
\begin{align*}
\frac{4}{6} + \frac{1}{3} & = \frac{4 \times 2}{6 \times 2} + \frac{1 \times 2}{3 \times 2} \\
& = \frac{8}{12} + \frac{2}{6} \\
& = \frac{6}{6} = 1
\end{align*}
\]

\[
\begin{align*}
\frac{3}{4} + \frac{1}{12} & = \frac{3 \times 3}{4 \times 3} + \frac{1}{12} \\
& = \frac{9}{12} + \frac{1}{12} \\
& = \frac{10}{12} = \frac{5}{6}
\end{align*}
\]
Find the sum in simplest form.

1. \( \frac{6}{8} + \frac{1}{4} = \frac{7}{8} \)
2. \( \frac{1}{3} + \frac{5}{12} = \frac{5}{4} \)
3. \( \frac{2}{3} + \frac{4}{9} = \frac{10}{9} \)
4. \( \frac{1}{2} + \frac{5}{8} = \frac{7}{8} \)
5. \( \frac{3}{5} + \frac{3}{10} = \frac{9}{10} \)

6. \( \frac{7}{9} + \frac{1}{3} = \frac{4}{3} \)
7. \( \frac{8}{10} + \frac{1}{5} = \frac{3}{2} \)
8. \( \frac{7}{8} + \frac{3}{4} = \frac{5}{8} \)
9. \( \frac{5}{12} + \frac{1}{6} = \frac{1}{2} \)
10. \( \frac{2}{3} + \frac{5}{6} = \frac{3}{2} \)

11. \( \frac{1}{4} + \frac{5}{12} = \frac{7}{6} \)
12. \( \frac{6}{9} + \frac{1}{3} = \frac{3}{2} \)
13. \( \frac{11}{12} + \frac{3}{4} = \frac{11}{6} \)
14. \( \frac{1}{2} + \frac{4}{8} = \frac{3}{4} \)
15. \( \frac{4}{5} + \frac{6}{10} = \frac{3}{2} \)

16. \( \frac{2}{3} + \frac{1}{6} = \frac{5}{6} \)
17. \( \frac{1}{2} + \frac{5}{10} = \frac{1}{2} \)
18. \( \frac{1}{3} + \frac{5}{9} = \frac{1}{3} \)
19. \( \frac{3}{4} + \frac{2}{12} = \frac{5}{6} \)

20. \( \frac{2}{5} + \frac{9}{10} = \frac{11}{10} \)
21. \( \frac{5}{8} + \frac{1}{4} = \frac{3}{2} \)
22. \( \frac{3}{4} + \frac{7}{12} = \frac{11}{6} \)
23. \( \frac{2}{9} + \frac{2}{3} = \frac{4}{9} \)

**Problem Solving**

24. At camp, campers play water polo, play soccer, swim, and hike. What fraction of the campers play water sports?

**DO YOU REMEMBER?**

Match each definition to the correct term in the box.

25. names the number of equal parts
26. made up of a whole number and a fraction
27. names the total number of parts in the whole or set

denominator numerator common factor mixed number
Lila had $\frac{11}{12}$ ft of balsa wood. She used $\frac{1}{4}$ ft of the wood to make a miniature chair for her dollhouse. How much wood did Lila have left?

To find how much she had left, subtract: $\frac{11}{12} - \frac{1}{4}$

To subtract fractions with unlike denominators:

- First find the LCM.
- Use the LCM to rename as fractions with like denominators.
- Then subtract the like fractions.

Multiples of 4: 4, 8, 12, 16, 20, . . .
Multiples of 12: 12, 24, 36, . . .
LCM of 4 and 12: 12

Study these examples.

$$\frac{3}{4} - \frac{1}{2} = \frac{3}{4} - \frac{1 \times 2}{2 \times 2} = \frac{2}{4} = \frac{1}{2}$$

$$\frac{2}{3} - \frac{6}{9} = \frac{2 \times 3}{3 \times 3} - \frac{6}{9} = \frac{6}{9} - \frac{6}{9} = 0$$

Lila had $\frac{2}{3}$ ft of wood left.

\[ \text{310 Chapter 9} \]
Find the difference in simplest form.

1. \(\frac{2}{3} \quad \frac{1}{6}
\)

2. \(\frac{9}{10} \quad \frac{1}{2}
\)

3. \(\frac{7}{9} \quad \frac{2}{3}
\)

4. \(\frac{9}{12} \quad \frac{3}{4}
\)

5. \(\frac{7}{8}
\)

6. \(\frac{7}{10} \quad \frac{1}{5}
\)

7. \(\frac{7}{8} \quad \frac{3}{4}
\)

8. \(\frac{5}{6} \quad \frac{2}{12}
\)

9. \(\frac{2}{3} \quad \frac{2}{9}
\)

10. \(\frac{3}{4} \quad \frac{6}{8}
\)

11. \(\frac{10}{12} \quad \frac{2}{6}
\)

12. \(\frac{6}{8} \quad \frac{3}{2}
\)

13. \(\frac{1}{2} \quad \frac{2}{3}
\)

14. \(\frac{3}{5} \quad \frac{1}{10}
\)

15. \(\frac{8}{9} \quad \frac{3}{9}
\)

16. \(\frac{3}{4} \quad \frac{8}{12}
\)

17. \(\frac{9}{10} \quad \frac{3}{5}
\)

18. \(\frac{8}{9} \quad \frac{1}{3}
\)

19. \(\frac{7}{10} \quad \frac{2}{2}
\)

20. \(\frac{1}{3} \quad \frac{6}{6}
\)

Write each answer in simplest form.

21. Kyle worked on his model airplane for \(\frac{3}{4}\) hour. Lief worked on his model ship for \(\frac{1}{2}\) hour. How much longer did Kyle work than Lief?

22. Sharon decorated a valentine with pieces of ribbon. She used \(\frac{2}{6}\) ft of red ribbon and \(\frac{8}{12}\) ft of white ribbon. How much more white than red ribbon did Sharon use?

23. Clint had a large sheet of paper that was \(\frac{9}{12}\) yd long. He trimmed \(\frac{1}{3}\) yd from it. How long was the sheet of paper after trimming?

CHALLENGE

Write the addition or the subtraction shown.

24. \(\frac{1}{4} - \frac{1}{3}\)

25. \(\frac{1}{2} + \frac{1}{5\ }\ )
There are 10 marbles in the jar: 1 is purple, 2 are white, 3 are red, and 4 are yellow. What is the probability that, without looking, you would pick a marble of each color?

- The probability that you would pick:
  - purple is 1 out of 10, or \( \frac{1}{10} \).
  - white is 2 out of 10, or \( \frac{2}{10} \).
  - red is 3 out of 10, or \( \frac{3}{10} \).
  - yellow is 4 out of 10, or \( \frac{4}{10} \).

Probability of picking a red marble: \( \frac{3}{10} \)

What is the probability that you would pick a red or a purple marble?

To find the probability of picking red or purple, add the two probabilities by adding the fractions.

Probability of picking red or purple: \( \frac{4}{10} \)

Find the probability of each event. Use the spinner.

1. \( P(\text{green}) \)
2. \( P(\text{yellow}) \)
3. \( P(\text{blue}) \)
4. \( P(\text{green or yellow}) \)
5. \( P(\text{red or blue}) \)
6. \( P(\text{green or yellow or red}) \)
7. \( P(\text{red}) \)
Find the probability of each event.
Use the cards.
8. \( P(B) \)
9. \( P(E) \)
10. \( P(C) \)
11. \( P(D) \)
12. \( P(A \text{ or } C) \)
13. \( P(B \text{ or } D) \)
14. \( P(A \text{ or } B \text{ or } E) \)
15. \( P(B \text{ or } C \text{ or } D) \)
16. \( P(\text{not } D) \)

Find the probability of each event. Use the shapes.
17. \( P(\text{circle}) \)
18. \( P(\text{triangle}) \)
19. \( P(\text{square or triangle}) \)

Certain and Impossible

What is the probability of spinning red or white or blue?

It is certain that the spinner will land on red or white or blue.

\[
P(\text{red or white or blue}) = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} = 1 \quad P(\text{certain}) = 1
\]

What is the probability of spinning green?

It is impossible that the spinner will land on green.

\[
P(\text{green}) = \frac{0}{3} = 0 \quad P(\text{impossible}) = 0
\]

Find the probability of each event.
Use the marbles on page 312.
20. \( P(\text{red or yellow or white}) \)
21. \( P(\text{orange or green}) \)
22. \( P(\text{red or purple or white or yellow}) \)
### Find Part of a Number

There are 12 kittens at the animal shelter. How many kittens are white? How many kittens are gray?

- To find how many of each, use the circle graph to find the fractional parts of the whole.

Since the graph shows that \( \frac{1}{3} \) of the kittens is white, find \( \frac{1}{3} \) of 12.

1. Divide 12 into 3 equal parts, or thirds.
   
   \[
   12 \div 3 = 4 \quad \text{How many are in two thirds?} \\
   \text{There are 4 in each third.} \quad 2 \times 4 = 8 \\
   \text{So } \frac{1}{3} \text{ of 12} = 4 \quad \text{So } \frac{2}{3} \text{ of 12} = 8
   \]

   - To find a fractional part of a number:
     - **Divide** the whole number by the denominator.
     - **Multiply** the quotient by the numerator.

   \[
   \frac{1}{3} \text{ of 12: } 12 \div 3 = 4 \rightarrow 1 \times 4 = 4 \quad \text{So } \frac{1}{3} \text{ of 12} = 4. \\
   \frac{2}{3} \text{ of 12: } 12 \div 3 = 4 \rightarrow 2 \times 4 = 8 \quad \text{So } \frac{2}{3} \text{ of 12} = 8.
   \]

   Of the kittens, 4 are white and 8 are gray.

### Find the part of each number

You may draw a picture.

1. \( \frac{1}{5} \) of 15
2. \( \frac{1}{3} \) of 9
3. \( \frac{1}{2} \) of 14
4. \( \frac{1}{8} \) of 40
5. \( \frac{1}{4} \) of 24
6. \( \frac{1}{9} \) of 36
7. \( \frac{1}{7} \) of 42
8. \( \frac{1}{5} \) of 50
9. \( \frac{1}{6} \) of 30
10. \( \frac{1}{6} \) of 24
11. \( \frac{1}{8} \) of 16
12. \( \frac{1}{2} \) of 8
Find the value of each variable.

13. \( \frac{2}{3} \) of 15 = \( n \)  
14. \( \frac{5}{8} \) of 16 = \( a \)  
15. \( \frac{5}{6} \) of 18 = \( x \)  
16. \( \frac{3}{7} \) of 21 = \( b \)  
17. \( \frac{3}{8} \) of 40 = \( v \)  
18. \( \frac{2}{5} \) of 25 = \( d \)  
19. \( \frac{3}{4} \) of 32 = \( s \)  
20. \( \frac{2}{9} \) of 27 = \( c \)  
21. \( \frac{5}{7} \) of 14 = \( u \)  
22. \( \frac{4}{5} \) of 45 = \( m \)  
23. \( \frac{3}{8} \) of 64 = \( p \)  
24. \( \frac{8}{9} \) of 9 = \( t \)

Problem Solving

25. There are 16 fish in Fiona’s fish tank. How many mollies and swordtails does Fiona have in her tank?

26. Jim raised 28 rabbits. Of these, \( \frac{3}{4} \) were black and white. How many were not black and white?

27. Of 30 retrievers at the kennel, \( \frac{4}{5} \) were golden retrievers. How many were golden retrievers?

28. Mr. Green has 64 chickens. Of these, \( \frac{3}{8} \) are Rhode Island Reds. How many are Rhode Island Reds?

29. Of 150 birds that came to the feeder, \( \frac{2}{3} \) were finches. How many were not finches?

Challenge

Find the original number.

\( \frac{1}{2} \) of \( n \) = 6

Think: Halves mean 2 equal groups.

To find the original number, multiply the whole number by the denominator.

\( 2 \times 6 = 12 \)

So, \( \frac{1}{2} \) of 12 = 6.

Number of groups Number in each group

Find the original number.

30. \( \frac{1}{2} \) of \( n \) = 14  
31. \( \frac{1}{4} \) of \( n \) = 24  
32. \( \frac{1}{5} \) of \( n \) = 10
Problem-Solving Strategy: Use Simpler Numbers

A piece of ribbon is $12\frac{7}{8}$ ft long. Kim cuts off two pieces that are $4\frac{3}{8}$ ft each. Does she have enough ribbon left to cut one more piece the same length?

**Read**

Visualize the facts of the problem as you reread it.

**Facts:**
- $12\frac{7}{8}$ ft of ribbon
- Two $4\frac{3}{8}$ ft pieces cut from it

**Question:** Is there $4\frac{3}{8}$ ft left?

**Plan**

Use simpler numbers to help choose the operation.

Use 12 for the $12\frac{7}{8}$ ft length.

Use 4 for the $4\frac{3}{8}$ ft length.

Add to find the amount of ribbon cut: $4 \text{ ft} + 4 \text{ ft} = 8 \text{ ft}$

Subtract to find the amount of ribbon left: $12 \text{ ft} - 8 \text{ ft} = 4 \text{ ft}$

**Solve**

Now use the same operations with the numbers in the problem.

$4\frac{3}{8}$ ft

$\begin{array}{c}
+ 4\frac{3}{8} \\
8\frac{6}{8} \text{ ft cut}
\end{array}$

$\begin{array}{c}
12\frac{7}{8} \\
- 8\frac{6}{8}
\end{array}$

$4\frac{1}{8}$ ft left

Compare: $4\frac{1}{8} < 4\frac{3}{8}$. So Kim does not have enough ribbon to cut another piece of the same length.

**Check**

Add the lengths of the pieces.

Do they equal $12\frac{7}{8}$ ft?

$4\frac{3}{8} + 4\frac{3}{8} + 4\frac{1}{8} = 12\frac{7}{8}$ ✔
Use simpler numbers to solve each problem.

1. Frank checked his kitten’s weight on the first day of each month. He kept the information on a chart. How much weight did the kitten gain between April 1 and June 1?

   **Facts:**
   - April 1: $6\frac{4}{8}$ lb
   - June 1: $7\frac{5}{8}$ lb

   **Question:** How much weight did the kitten gain between April 1 and June 1?

   **Plan**
   - Use 6 for $6\frac{4}{8}$ and 7 for $7\frac{5}{8}$.
   - Subtract to find the difference: $7 - 6 = ?$
   - Then use the same operation with the numbers in the problem.

2. One paper-clip chain is $24\frac{1}{4}$ in. long. Another is $41\frac{1}{4}$ in. long. How long will the chain be if the two chains are connected?

3. Ms. Hanley is running a $26\frac{5}{10}$ mile race. She stops for water after $7\frac{3}{10}$ miles. How much farther does she have to run?

4. A bread recipe calls for $4\frac{3}{8}$ c of white flour, $2\frac{1}{8}$ c of wheat flour, and 1 c of rye flour. How much flour does this recipe use?

5. Write a problem with fractions or mixed numbers. Use simpler numbers. Then solve it using the original numbers.
Problem-Solving Applications: Mixed Review

Solve each problem and explain the method you used.

1. An oatmeal bar weighs $4\frac{1}{4}$ oz. How much do two oatmeal bars weigh?

2. Bags of granola weigh $6\frac{1}{8}$ oz and $12\frac{3}{8}$ oz. How much heavier is the larger bag?

3. An apple weighs $3\frac{3}{4}$ oz. A pear weighs $4\frac{1}{4}$ oz. About how much do they weigh together?

4. Todd uses 16 tablespoons of jam to make sandwiches. If he spreads each sandwich with $\frac{1}{8}$ of the jam, does he have enough for 10 sandwiches?

5. Of 10 loaves of bread, $\frac{1}{5}$ have sesame seeds. How many loaves have sesame seeds?

6. Carrot bread has 100 calories per slice. Seven tenths of the calories come from carbohydrates. How many calories come from carbohydrates?

7. Nan bought $\frac{1}{8}$ lb of pecans and $\frac{1}{4}$ lb of walnuts. Did she buy more than $\frac{1}{2}$ lb of nuts?

8. A carrot is 9 in. long. Regina cuts it in thirds. How long is each piece?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. Of 24 muffins for sale, \( \frac{1}{2} \) are bran, \( \frac{1}{4} \) are corn, and the rest are oat. How many oat muffins are for sale?

10. Jan bought half a loaf of rye bread. She gave half of her piece to Ramon. Ramon’s piece weighs \( \frac{1}{4} \) lb. How much did the original loaf of bread weigh?

11. A carrot has fewer calories than an apple. An oat bar has more calories than an apple. Does a carrot or an oat bar have more calories?

12. Sue’s trail mix is \( \frac{1}{2} \) toasted oats, \( \frac{1}{4} \) raisins, and \( \frac{1}{4} \) carob drops. She has 3 oz of raisins. Does she have enough raisins to make 16 oz of mix?

13. Wes ate a snack of 150 calories. The low-fat yogurt he ate had half the calories of the oatmeal cookie. How many calories did the yogurt have?

Use the pictograph for problems 14–16.

14. What fractional part of the mini-muffins were blueberry muffins?

15. How many more apple muffins than blueberry muffins were there?

16. Liu bought \( \frac{1}{2} \) of the cinnamon muffins. How many muffins did she buy?
Add or subtract. Write the answer in simplest form.  
1. \( \frac{1}{5} + \frac{2}{5} \)  
2. \( \frac{5}{8} - \frac{3}{8} \)  
3. \( \frac{5}{6} + \frac{1}{2} \)  
4. \( \frac{8}{9} - \frac{2}{3} \)  
5. \( \frac{7}{10} - \frac{2}{20} \)  
6. \( 4 \frac{1}{10} + 3 \frac{1}{10} \)  
7. \( 8 \frac{2}{6} - 4 \frac{1}{6} \)  
8. \( 5 \frac{3}{16} - 3 \frac{3}{16} \)  
9. \( 12 \frac{1}{8} + 2 \frac{1}{8} \)  
10. \( 5 \frac{3}{8} + 4 \frac{1}{8} \)  
11. \( \frac{1}{2} + \frac{1}{2} \)  
12. \( \frac{6}{10} - \frac{1}{5} \)  
13. \( \frac{1}{4} + \frac{7}{8} \)  
14. \( \frac{5}{6} - \frac{1}{3} \)  

Write as a whole number or mixed number in simplest form.  
15. \( 16 \frac{6}{8} \)  
16. \( 13 \frac{3}{4} \)  
17. \( 15 \frac{5}{6} \)  
18. \( 20 \frac{7}{5} \)  
19. \( 17 \frac{1}{3} \)  

Write the least common multiple (LCM) of each set.  
20. 4, 10  
21. 9, 12  
22. 9, 6  
23. 5, 6  

Estimate the sum or difference.  
24. \( 11 \frac{5}{9} - 4 \frac{2}{3} \)  
25. \( 2 \frac{1}{3} + 3 \frac{5}{6} + 1 \frac{1}{9} \)  

Find the part of each number.  
26. \( \frac{1}{3} \) of 18  
27. \( \frac{1}{8} \) of 24  
28. \( \frac{3}{4} \) of 40  
29. \( \frac{5}{8} \) of 24  

**Problem Solving**  
30. Of 24 apples, \( \frac{1}{3} \) are green. How many are not green?  
31. There are 7 marbles in a bag. Four are red, 2 are blue and 1 is green. What is the probability that the first one picked will be red?
Least Common Denominator

Rafael’s cookie recipe called for $\frac{1}{3}$ cup of brown sugar and $\frac{3}{4}$ cup of white sugar. How much sugar did Rafael use?

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

To add $\frac{1}{3} + \frac{3}{4}$, rename both fractions as fractions with the least common denominator.

The least common denominator (LCD) is the least common multiple of the denominators.

Multiples of 3: 0, 3, 6, 9, 12, 15, 18, 21, 24, . . .
Multiples of 4: 0, 4, 8, 12, 16, 20, 24, . . .
So the LCD of $\frac{1}{3}$ and $\frac{3}{4}$ is 12.

Rename the fractions. Add.

\[
\frac{1}{3} = \frac{1 \times 4}{3 \times 4} = \frac{4}{12}
\]
\[
+ \frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}
\]
\[
\frac{13}{12} = 1 \frac{1}{12} \quad \text{simplest form}
\]

Rafael used $1 \frac{1}{12}$ cups of sugar.

Write the LCD for each set of fractions.

1. $\frac{1}{2}, \frac{2}{5}$
2. $\frac{3}{4}, \frac{1}{6}$
3. $\frac{2}{3}, \frac{3}{8}$
4. $\frac{1}{5}, \frac{1}{6}$

5. $\frac{3}{10}, \frac{1}{4}$
6. $\frac{4}{5}, \frac{3}{4}$
7. $\frac{1}{3}, \frac{1}{5}, \frac{1}{6}$
8. $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$

Add or subtract. Write the answer in simplest form.

9. $\frac{1}{2} + \frac{2}{7}$
10. $\frac{1}{4} + \frac{3}{5}$
11. $\frac{5}{6} - \frac{1}{9}$
12. $\frac{2}{3} - \frac{1}{2}$

13. $\frac{7}{8} - \frac{3}{10}$
14. $\frac{9}{10} + \frac{1}{6}$
15. $\frac{7}{9} - \frac{3}{8}$
16. $\frac{5}{8} + \frac{2}{3}$
Chapter 9 Test

Add or subtract. Write the answer in simplest form.

1. \( \frac{3}{10} + \frac{1}{5} \)  2. \( \frac{1}{6} + \frac{2}{6} \)  3. \( \frac{7}{8} - \frac{5}{8} \)  4. \( \frac{2}{3} - \frac{1}{6} \)

5. \( \frac{4}{5} - \frac{3}{10} \)  6. \( \frac{7}{8} + \frac{1}{4} \)  7. \( \frac{8}{10} - \frac{1}{2} \)  8. \( \frac{2}{3} + \frac{11}{12} \)

Write as a whole number or mixed number in simplest form.

9. \( \frac{7}{2} \)  10. \( \frac{16}{5} \)  11. \( \frac{21}{8} \)  12. \( \frac{30}{6} \)  13. \( \frac{38}{7} \)

Write the least common multiple (LCM).

14. 2, 6  15. 4, 3  16. 4, 12  17. 5, 7

Find the part of each number.

18. \( \frac{1}{2} \) of 26  19. \( \frac{2}{3} \) of 21  20. \( \frac{3}{5} \) of 25  21. \( \frac{5}{8} \) of 64

Problem Solving

Use a strategy you have learned.

22. One necklace is 30\( \frac{1}{4} \) in. long. Another is 36\( \frac{1}{2} \) in. long. If the two necklaces are connected, how long will the necklace be?

Tell About It

23. Of 32 apples \( \frac{1}{4} \) are red. How many are not red?

Performance Assessment

Use these rule cards. Match the rule card to each pattern, then tell the next number.

Add \( \frac{1}{6} \)  Add \( 2\frac{1}{4} \)  Subtract \( \frac{1}{5} \)

24. \( \frac{9}{10}, \frac{7}{10}, \frac{5}{10}, ? \)  25. \( \frac{5}{12}, \frac{7}{12}, \frac{9}{12}, ? \)  26. \( 1\frac{3}{4}, 4, 6\frac{1}{4}, ? \)
## Test Preparation

### Choose the best answer.

1. What is the value of the underlined digit in 68,325,784?
   - a. 800,000
   - b. 1,000,000
   - c. 8,000,000
   - d. 80,000,000

2. What is the cost of 32 CDs at $9.79 each?
   - a. $19.58
   - b. $48.95
   - c. $312.28
   - d. $313.28

3. How much more than 4000 – 1967 is 1267 + 1967?
   - a. 101
   - b. 201
   - c. 1091
   - d. none of these

4. 465 is divisible by which number?
   - a. 2
   - b. 5
   - c. 10
   - d. none of these

5. What fractional part is shaded?
   - a. \( \frac{1}{3} \)
   - b. \( \frac{7}{15} \)
   - c. \( \frac{8}{15} \)
   - d. \( \frac{3}{4} \)

6. \( \frac{7}{8} - \frac{3}{8} \)
   - a. \( \frac{1}{3} \)
   - b. \( \frac{1}{2} \)
   - c. \( \frac{3}{4} \)
   - d. not given

7. \( 3\frac{1}{7} + 2\frac{4}{7} \)
   - a. \( 5\frac{5}{14} \)
   - b. \( 5\frac{4}{7} \)
   - c. \( 6\frac{5}{7} \)
   - d. not given

8. How many minutes have passed from 6:45 P.M. to 7:12 P.M.?
   - a. 15 min
   - b. 27 min
   - c. 42 min
   - d. 47 min

9. Find the mean of 498, 636, and 714.
   - a. 507
   - b. 612
   - c. 616
   - d. 1848

10. How many liters of water are there in 8 containers of 750 mL each?
    - a. 6 L
    - b. 60 L
    - c. 600 L
    - d. 6000 L

11. Add: 4 ft 6 in. + 3 ft 8 in.
    - a. 7 ft 2 in.
    - b. 7 ft 4 in.
    - c. 8 ft
    - d. 8 ft 2 in.

12. What mixed number is shown?
    - a. \( 4\frac{1}{3} \)
    - b. \( 4\frac{1}{2} \)
    - c. \( 5\frac{1}{3} \)
    - d. \( 5\frac{1}{2} \)

13. \( \frac{1}{3} + \frac{4}{9} \)
    - a. \( \frac{5}{12} \)
    - b. \( \frac{5}{9} \)
    - c. \( \frac{7}{9} \)
    - d. not given

14. \( \frac{3}{4} \) of 36 = ?
    - a. 9
    - b. 27
    - c. 48
    - d. not given
15. Solve: \( n - 11 \), when \( n = 19 \)

<table>
<thead>
<tr>
<th></th>
<th>a. 8</th>
<th>b. 10</th>
<th>c. 19</th>
<th>d. 30</th>
</tr>
</thead>
</table>

19. Divide.

\[
\frac{9}{152} \]

<table>
<thead>
<tr>
<th></th>
<th>a. 105 R7</th>
<th>b. 107</th>
<th>c. 115 R7</th>
<th>d. 15 R7</th>
</tr>
</thead>
</table>

16. Beth baby-sits for $4 an hour. She needs $112.00 for a new CD player. How many hours does she need to baby-sit?

<table>
<thead>
<tr>
<th></th>
<th>a. 112 hours</th>
<th>b. 28 hours</th>
<th>c. 108 hours</th>
<th>d. 116 hours</th>
</tr>
</thead>
</table>

20. Pedro writes 4 pages of a story every hour. By 2:15 P.M. he has written 16 pages. What time did he start writing?

<table>
<thead>
<tr>
<th></th>
<th>a. 6:15 P.M.</th>
<th>b. 10:15 P.M.</th>
<th>c. 10:15 A.M.</th>
</tr>
</thead>
</table>

17. Rename the unit of capacity.

\[ 32 \text{ fl oz} = \, ? \text{ pt} \]

<table>
<thead>
<tr>
<th></th>
<th>a. 2</th>
<th>b. 4</th>
<th>c. 6</th>
<th>d. 8</th>
</tr>
</thead>
</table>

21. Find the quotient.

\[ 84 \div 6 \]

<table>
<thead>
<tr>
<th></th>
<th>a. 78</th>
<th>b. 90</th>
<th>c. 16</th>
<th>d. 14</th>
</tr>
</thead>
</table>

18. Lisa bikes \( 17 \frac{2}{3} \) miles on Saturday. On Sunday, she bikes \( 4 \frac{1}{3} \) miles less than that. How many miles did she ride on the weekend?

<table>
<thead>
<tr>
<th></th>
<th>a. ( 13 \frac{1}{3} ) mi</th>
<th>b. ( 30 \frac{2}{3} ) mi</th>
<th>c. 31 mi</th>
<th>d. ( 4 \frac{1}{3} ) mi</th>
</tr>
</thead>
</table>

22. A certain fraction has a denominator that is 4 more than its numerator. It is equivalent to \( \frac{2}{3} \). What is the fraction?

<table>
<thead>
<tr>
<th></th>
<th>a. ( \frac{10}{14} )</th>
<th>b. ( \frac{8}{12} )</th>
<th>c. ( \frac{6}{10} )</th>
<th>d. ( \frac{4}{6} )</th>
</tr>
</thead>
</table>

23. Which 2 pets make up one half of the students’ pets?

<table>
<thead>
<tr>
<th></th>
<th>a. hamsters and fish</th>
<th>b. cats and birds</th>
<th>c. fish and cats</th>
<th>d. dogs and birds</th>
</tr>
</thead>
</table>

Tell About It

Explain how you solved the problem.
Show all your work.

24. Write a question that you are not able to ask using the line graph. Explain why the line graph cannot answer the question. Then draw a diagram or graph that can answer your question.
Sheepshapec

I shear sheep in all sorts of shapes
Like shooting stars and spangles.
I shear them in the shape of apes.
My ewe has four right angles.

I give some sheep a camel’s back,
Two mountains and a valley.
I make short shrift of them with shears.
Me, I don’t shilly-shally.

I shear sheep short. Their wiry wool
Is well worthwhile to save.
Oh, what sheer joy it is to give
A shaggy sheep a shave!

XJ Kennedy

In this chapter you will:
Draw and identify parts of polygons
Classify angles, polygons, quadrilaterals, and triangles
Investigate similar figures, transformations, and coordinate geometry
Solve problems by finding a pattern

Critical Thinking/Finding Together
Use dot paper to create a design of polygons that you would like to shear in sheep. Name each polygon and identify the number of right angles, if any, and sides each figure has.
A plane is a flat surface that extends indefinitely in all directions. The surface of a table or a sheet of paper are both parts of planes.

A point names a location in space. $A$, $B$, and $X$ are points in a plane.

A line is straight. It is a set of points that extends forever in opposite directions.

A line segment is the part of a line between two endpoints.

Identify each as a point, line, or line segment. Use symbols.

1. $\bullet R$
2. $YZ$
3. $FG$
4. $MN$
5. $HJ$
6. $LM$
7. $PQ$
8. $VW$
Draw and label each.

9. $\overline{TV}$  
10. $K$  
11. $\overrightarrow{ST}$  
12. $\overline{FG}$  
13. $D$  
14. $\overrightarrow{PQ}$  
15. $\overline{LM}$  
16. $Z$

Which figures are line segments?

17. a. 
18. a. 

17. b. 
18. b. 

17. c. 
18. c. 

17. d. 
18. d. 

Name each line two ways.

19. $\overrightarrow{CD}$  
20. $\overrightarrow{KL}$  
21. $\overrightarrow{RS}$

Name each line segment two ways.

22. $\overline{WX}$  
23. $\overline{ST}$  
24. $\overline{QR}$

You can name a line by naming any two points on the line in any order.

25. Write 6 names for this line: $\overrightarrow{MNO}$

26. Write 12 names for this line: $\overrightarrow{RXYS}$
10-2 Rays and Angles

A ray is the part of a line that starts at an endpoint.
A ray goes on forever in one direction.

Read: ray $kj$
Write: $kj$

An angle is formed by two rays with the same endpoint.

The rays form the sides of the angle.
The common endpoint is the vertex of the angle.

Read: angle $q$, angle $pqr$, or angle $rqp$
Write: $\angle q$ or $\angle pqr$ or $\angle rqp$

When you name an angle with three letters, the vertex is always the middle letter.

Draw and label each figure.

1. $\angle def$
2. $\overrightarrow{ed}$
3. $\angle fed$
4. $\angle h$
5. ray $ef$

Name each figure.

6.

7.

8.

Name each angle three ways.

9. $\angle jkl$
10. $\angle lmn$
11. $\angle mop$

328 Chapter 10
You can measure angles in degrees (°) using a protractor. Measure an angle by measuring the distance between its sides.

- **Right Angle**
  - forms a square corner
  - measures 90°

- **Acute Angle**
  - measures less than 90°

- **Obtuse Angle**
  - measures more than 90°, but less than 180°

- **Straight Angle**
  - measures 180°

Use a protractor to tell whether each angle is right, acute, obtuse, or straight.

12. S R T
13. U V W
14. X Y Z
15. A B C
16. D E F
17. G H I
18. J K L
**Intersecting lines** are lines that meet or cross at a common point.

\[ \overrightarrow{AB} \text{ and } \overrightarrow{CD} \text{ intersect at point } E. \]

**Perpendicular lines** are intersecting lines that form four right angles.

Read: line \( \overrightarrow{FG} \) is perpendicular to line \( \overrightarrow{HI} \)

Write: \( \overrightarrow{FG} \perp \overrightarrow{HI} \)

**Parallel lines** are lines in the same plane that never intersect.

Read: line \( \overrightarrow{KL} \) is parallel to line \( \overrightarrow{MN} \)

Write: \( \overrightarrow{KL} \parallel \overrightarrow{MN} \)

Line segments can also be intersecting, perpendicular, or parallel.

**Write** intersecting or parallel to describe each pair of lines.

1. 
2. 
3. 

---

330 Chapter 10
Use the figure at the right.

4. At what point does $\overrightarrow{EH}$ intersect $\overrightarrow{KL}$?

5. Name the lines that appear to be parallel lines.

6. What kind of angle is $\angle IBA$?

7. Name two pairs of perpendicular lines.

8. Is $\angle FGL$ acute or obtuse?

Copy these lines on dot paper. Use these lines for exercises 9–12.

Draw a line segment that:

9. is perpendicular to both red lines.

10. is parallel to the green line and intersects the blue line.

11. intersects one red line but not the other.

12. is perpendicular to the green line.

13. Are $\overrightarrow{RS}$ and $\overrightarrow{XY}$ parallel, intersecting, or neither? Explain your answer in your Math Journal.
A circle is a plane figure. All the points on the circle are the same distance from a given point, called the center.

Point A is the center of circle A.

The parts of a circle have special names.

Any line segment with endpoints at the center of the circle and on the circle is a radius.

\( \overline{BE} \) is a radius of circle B. \( \overline{BC} \) and \( \overline{BD} \) are also radii (plural of radius) of circle B.

Any line segment that passes through the center of the circle and has both endpoints on the circle is a diameter.

\( \overline{CD} \) is a diameter.

Any line segment with both endpoints on the circle is a chord.

\( \overline{FG} \) is a chord.

Use circle \( H \).

1. Name six points on the circle.

2. Name five line segments that are radii.

3. Name three line segments that are chords. Which one is not a diameter?
A simple closed curve is a path that begins and ends at the same point and does not cross itself.

Use the circle at the right.

4. Name the circle and its center.

5. How many diameters are shown? Name the diameters.

6. Is $TR$ a radius? Explain why or why not.

7. Is $ VX$ a radius? Explain why or why not.

8. How many radii are shown? Name the radii.

Write true or false. Use the picture below.

9. Some of the simple closed curves are green.

10. None of the simple closed curves are blue.

11. All circles are simple closed curves.

12. None of the simple closed curves are red.
These figures are all polygons:

- The sides of a polygon are line segments that do not cross.
- Two sides of a polygon form an angle when they meet at a common endpoint called a vertex (plural: vertices).

Most polygons are named for the number of angles they have.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Number of Angles</th>
<th>Polygon Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>tri-</td>
<td>3</td>
<td>triangle</td>
</tr>
<tr>
<td>quadri-</td>
<td>4</td>
<td>quadrilateral</td>
</tr>
<tr>
<td>penta-</td>
<td>5</td>
<td>pentagon</td>
</tr>
<tr>
<td>hexa-</td>
<td>6</td>
<td>hexagon</td>
</tr>
<tr>
<td>octa-</td>
<td>8</td>
<td>octagon</td>
</tr>
</tbody>
</table>

Remember: Polygons are closed plane figures with straight sides.

These are regular polygons, because they each have sides of equal length and angles of equal measures.

Polygon means “many angles.”
Use dot paper for problems 1–8.

1. Draw a polygon that has 8 sides and 8 vertices. What is its name?

2. Draw a polygon that has 5 sides and 5 vertices. What is its name?

3. Draw a polygon that has 3 sides. How many vertices does it have? What is its name?

4. Draw a polygon that has 6 vertices. How many sides does it have? What is its name?

5. Draw five different quadrilaterals. How many of them have at least one right angle?

6. Draw four different hexagons.

7. Draw an octagon with all right angles. Is this a regular octagon?

8. Do you think the number of sides a polygon has is always equal to the number of its vertices? Use drawings to justify your answer.

DO YOU REMEMBER?

Match each definition with a term in the box.

9. the numbers other than 0 that are multiples of two or more numbers

10. all the products that have a particular number as a factor

- multiples
- least common multiple
- common multiples
Some quadrilaterals have special names.

- A **parallelogram** has opposite sides that are parallel and that are the same length. Quadrilateral $ABCD$ is a parallelogram.

- A **rectangle** also has opposite sides that are parallel and that are the same length. All the angles of a rectangle are right angles. Quadrilateral $EFGH$ is a rectangle.

- A **square** has opposite sides that are parallel. All its sides are the same length. All the angles of a square are right angles. Quadrilateral $JKLM$ is a square.

- A **rhombus** has opposite sides that are parallel. All four sides are the same length. Quadrilateral $QRST$ is a rhombus.

- A **trapezoid** has exactly one pair of parallel sides. Quadrilateral $WXYZ$ is a trapezoid.
Use the figure at the right.

1. What kind of quadrilateral is figure $DEFL$?

2. What is the special name for figure $BDLK$? figure $JLGI$? figure $ACEM$?

3. Identify 4 quadrilaterals other than those identified in questions 1 and 2. What are their special names?

Use dot paper to draw a quadrilateral:

4. a. with 4 right angles. b. with 2 right angles. c. with 1 right angle.

6. whose sides are all equal in length and is *not* a square.

5. with 0 right angles and 1 pair of opposite sides that are parallel.

7. with 0 right angles and 0 pairs of opposite sides that are parallel.

8. How are a rectangle and a trapezoid alike? How are they different?

9. Explain why a square is a rectangle, but a rectangle is not a square.

Write *true* or *false* for each statement. If a statement is false, explain why.

10. A square is never a rhombus.

11. All trapezoids are parallelograms.

12. All rectangles are parallelograms.

13. A square always has 4 right angles.

14. All quadrilaterals are parallelograms.

15. Some parallelograms are also squares.
These polygons are all triangles. You can classify triangles by their angles and their sides.

- These triangles are all **right triangles**.

All right triangles have 1 right angle.

- These triangles are all **isosceles triangles**.

Some isosceles triangles are also right triangles.

All isosceles triangles have at least 2 sides equal in length.

- These triangles are all **equilateral triangles**.

All the sides of an equilateral triangle are equal in length.

- These triangles are all **scalene triangles**.

None of the sides of a scalene triangle are equal in length to each other.
Classify each triangle as *right*, *isosceles*, *equilateral*, or *scalene*. Some triangles may be named in more than one way.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9.

**Problem Solving**

10. Suppose you wanted to draw an equilateral triangle, and you drew one side that measured 5 cm. How long would you draw each of the other sides? What would be the total length of all the sides?

**More Triangles**

Here are some more triangles that you can classify by the measure of their angles.

- An **obtuse triangle** has one obtuse angle.
- An **acute triangle** has three acute angles.

Classify each triangle as **obtuse** or **acute**. Use a protractor to help you.

11. 
12. 
13. 
14.
Similar Figures

Billy used similar figures to make this pattern.

Similar figures have exactly the same shape. They may or may not be the same size.

- same shape, different sizes
- same shape, different sizes
- same shape, same size

All congruent figures are also similar.

Remember: Congruent figures have the same size and the same shape.

Does each set of figures appear to be similar? Write yes or no.

1. yes
2. yes
3. no
4. no
5. yes
6. no
7. yes
8. yes
9. yes
Choose the letter of the figure that appears to be similar to the first figure.

10. a. b. c.

11. a. b. c.

12. a. b. c.

13. a. b. c.

Copy each figure onto dot paper. Then double each side to draw a similar figure.

14. 15. 16.

Copy and cut out four of these triangles.

17. Fit the triangles together to form a similar triangle.
Chapter 10342

Transformations: Slides and Flips

Noah and Nicole made these patterns.

Noah:

Nicole:

Materials: dot paper, pencil, scissors, ruler

Copy the triangle at the right onto dot paper. Then cut it out.

Place your triangle on another sheet of dot paper. Trace around the triangle to make a pattern in the same way that Noah made his.

1. How did you move the triangle to make the pattern?

Now place the triangle on a third sheet of dot paper. Trace around the triangle to make a pattern in the same way that Nicole made hers.

2. How did you move the triangle to make the pattern?

3. How are your two patterns alike? How are they different?

4. Explain how you know that your patterns are alike and different in the same way as Noah’s and Nicole’s.
A **slide**, or **translation**, is a movement of a figure along a line without flipping or turning.

A **flip**, or **reflection**, is a movement of a figure over a line so that the figure faces in the opposite direction. The line may be imaginary.

5. Is one of your patterns a translation pattern? Which one?

6. Is one of your patterns a reflection pattern? Which one?

Copy the figures and movements below onto dot paper.

A. B. C. D. E. F. G. H.

7. Which of the movements are translations? Which are reflections? You may draw lines to help you decide.

8. In the figures A and B, what movement would you use to tell whether the figures are congruent?

9. In the figures A–H, are the figures congruent after each transformation? Explain why or why not.

10. Can you slide a figure in any direction? Explain your answer.

11. Can you flip a figure in any direction? Explain your answer.
A turn, or rotation, is the movement of a figure around a point.

A full turn measures $360^\circ$.

You can turn a figure in either direction, clockwise or counterclockwise.

Each new position is a turn image of the figure.

If you can turn a tracing of a figure halfway around so that the tracing and the figure match exactly, the figure has half-turn symmetry.

This figure has half-turn symmetry.
Which figures are turn images of the first figure?

1. [Images of figures]
   - a. 
   - b. 
   - c. 
   - d. 

2. [Images of figures]
   - a. 
   - b. 
   - c. 
   - d. 

3. [Images of figures]
   - a. 
   - b. 
   - c. 
   - d. 

4. [Images of figures]
   - a. 
   - b. 
   - c. 
   - d. 

5. [Images of figures]
   - a. 
   - b. 
   - c. 
   - d. 

Draw the next three figures in the pattern.

6. [Pattern shown]
   - ?
   - ?
   - ?

Does each figure have half-turn symmetry? Write yes or no.
You may use tracing paper or dot paper and scissors.

7. [Pattern shown]
8. [Pattern shown]
9. [Pattern shown]

TEST PREPARATION

10. Which of these statements is not true?
   - A If you rotate a figure 360°, the figure ends up in its original position.
   - B A rotation is the movement of a figure over a line.
   - C When a figure rotates, it turns.
   - D Rotating a figure means turning a figure around a point.
A coordinate grid has two axes: a horizontal axis called the x-axis, and a vertical axis called the y-axis.

You can use an ordered pair of numbers \((x, y)\) to locate points on a coordinate grid.

The \(x\)-coordinate tells how many spaces to move horizontally along the x-axis.
The \(y\)-coordinate tells how many spaces to move vertically along the y-axis.

The coordinates of point \(A\) are \((4, 2)\).

The point where the \(x\) - and \(y\) -axes intersect is called the origin. The coordinates of the origin are \((0, 0)\).

### Practice

Name the \(x\) - and \(y\) -coordinates in each ordered pair.

1. \((4, 2)\)  
2. \((5, 1)\)  
3. \((3, 0)\)  
4. \((1, 1)\)  
5. \((2, 3)\)  
6. \((0, 4)\)
Use the graph at the right for exercises 7–18.

Write the letter of the point for each ordered pair.
7. (0, 0) 8. (6, 0) 9. (3, 4)
10. (4, 3) 11. (2, 2) 12. (1, 3)

Write the ordered pair for each point.

Graph each ordered pair on a coordinate grid.
19. C (6, 2) 20. D (5, 5) 21. E (4, 0) 22. F (1, 3) 23. G (0, 4)

Graph each point on a coordinate grid. Then use line segments to connect the points in order for each pair of figures.
24. A: (1, 2) (4, 2) (1, 7) (1, 2) B: (6, 2) (9, 2) (6, 7) (6, 2)
25. A: (1, 6) (8, 6) (8, 9) (1, 6) B: (1, 5) (8, 5) (8, 2) (1, 5)
26. A: (1, 1) (5, 1) (1, 4) (1, 1) B: (5, 3) (9, 3) (5, 6) (5, 3)
27. A: (4, 4) (4, 8) (1, 8) (4, 4) B: (5, 3) (9, 3) (9, 6) (5, 3)
28. Name each movement of the figures in exercises 24–27.

29. Explain how you found the coordinates for point E in exercise 13.

30. Explain the difference between locating a point at (3, 4) and locating a point at (4, 3).

31. If the x-coordinate is 2 and no further movement is made, then what is the y-coordinate? How do you know?

32. If there is no movement for the x-coordinate and the y-coordinate is 5, then what is the x-coordinate? How do you know?
Problem-Solving Strategy:
Find a Pattern

Tyrell draws a spiral on grid paper. He draws 4 line segments. Then he draws 5 more line segments to continue and finish the pattern. How long is the spiral?

Read
Visualize the facts of the problem as you reread it.

Facts: The spiral has 4 line segments. The spiral will have 5 more.

Question: How long is the spiral?

Plan
Measure the length of each segment. Look for a pattern.

1 cm, 2 cm, 3 cm, 4 cm, ... +1 cm +1 cm +1 cm

Solve
Add to find the total length. Look for sums of ten.

\[ 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45 \]

The spiral is 45 cm long.

Check
Cut a 45-cm string and use it to measure the spiral. Check the addition.
Find a pattern to solve each problem. You may use grid paper.

1. Jessie adds one more square to this drawing. It now has 2 lines of symmetry. Where does she add the square? (Hint: See page 22.)

   **Original Drawing**

   Visualize the facts of the problem as you reread it.

   **Facts:** Jessie draws this shape. She adds one square. The finished shape has 2 lines of symmetry.

   **Question:** Where does she add the last square?

2. Jacques paints these shapes in order on a belt: triangle, square, triangle, pentagon, triangle, hexagon. What are the ninth and tenth shapes?

3. Can you cut this shape into 2 congruent hexagons? 2 congruent octagons? (Hint: See page 21.)

4. Troy makes a gerbil cage. The floor of the cage must have an area of 4 square units. How many different shapes can the floor be?

5. A brick border follows this pattern. How many bricks are used in a 10-ft border?

6. Write a problem that uses a pattern. Have a classmate solve it.
Solve each problem and explain the method you used.

1. Sylvia’s Sign Shop made an octagonal sign. How many sides does it have? how many angles?

2. Val uses a rope to tie her horse to a post in the middle of a corral. What shape describes the region where the horse can move? Use the shapes at the right to help you.

3. The Dilly Deli ordered a sign in the shape of a pickle outline. Is the sign a simple closed curve?

4. Roy orders a square sign from the sign shop. Does his sign have half-turn symmetry?

5. 4 is to square as 8 is to ____.

6. Name the radii shown on circle A at the right.

7. On grid paper draw different figures using 5 squares so that the squares touch along at least one entire side. In how many different ways can the squares be arranged?

Use the table for problems 8–10.

8. How much does a hexagonal sign cost?

9. How much more expensive is a pentagonal sign than a triangular sign?

10. What is the cost of 2 rectangular signs and 1 triangular sign?

<table>
<thead>
<tr>
<th>Number of Sides (4 ft each)</th>
<th>Price per Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>$25</td>
</tr>
<tr>
<td>4</td>
<td>$20</td>
</tr>
<tr>
<td>5</td>
<td>$45</td>
</tr>
<tr>
<td>6</td>
<td>$60</td>
</tr>
</tbody>
</table>
Choose a strategy from the list or use another strategy you know to solve each problem.

11. Hank, Don, and Ned are waiting in line. Don is ahead of Ned. Hank has been waiting longer than the others. What is their order in line?

12. A tool measures 16 cm. A plastic tube measures 71 cm. How much longer is the plastic tube?

13. Sylvia cuts a triangle, a square, and a pentagon out of wood. The first shape she cuts has more sides than the second but fewer sides than the third. In what order does she cut the shapes?

14. Marcy cut an equilateral triangle to make 4 congruent signs. Each side of the triangle is 2 ft long. How did Marcy cut the triangle?

15. Sylvia’s shop has 8 rows of paint cans. There are 10 cans in the first row, 9 cans in the second row, 8 in the third, and so on. How many cans of paint are there in all?

16. How would you describe the shape of this sign for Farmer Foods? How many angles does it have? What other questions can you answer about this sign?

17. Write a problem modeled on problem 12. Have a classmate solve it.
Check Your Progress
Lessons 1–13

Identify each.

1. ray
   a. b. c.
2. line segment
3. perpendicular lines
4. vertex
d. e. f.
5. line
6. acute triangle
7. circle
g. h. i.
8. parallel lines
9. point

Draw these.
10. AX
11. \( \triangle RST \)
12. \( \overline{XY} \)
13. right angle \( \triangle DEF \)

Which figure appears to be similar to the first figure? (See pp. 340–341.)

14. a. b. c.

Name the transformation shown. Write reflection, rotation, or translation. (See pp. 342–343.)

15.
16.
17.
18.

(See Still More Practice, pp. 469–470.)
Coordinate Geometry: Distance

How far is point \( A \) from point \( B \)?
How far is point \( B \) from point \( C \)?

- To find the length of a vertical line segment, find the difference between \( y \)-coordinates.
  
  \[
  \begin{align*}
  A \ (2, 7) \\
  B \ (2, 3) \\
  7 - 3 = 4 \quad & A \text{ and } B \text{ are 4 units apart.} \\
  \text{So, line segment } AB \text{ is 4 units long.}
  \end{align*}
  \]

- To find the length of a horizontal line segment, find the difference between \( x \)-coordinates.
  
  \[
  \begin{align*}
  B \ (2, 3) \\
  C \ (5, 3) \\
  5 - 2 = 3 \quad & B \text{ and } C \text{ are 3 units apart.} \\
  \text{So, line segment } BC \text{ is 3 units long.}
  \end{align*}
  \]

Give the length of the line segment that connects each set of points. Tell whether the line is vertical or horizontal.

1. \((3,8)\) and \((3,4)\)  
2. \((2,8)\) and \((2,4)\)  
3. \((3,5)\) and \((6,5)\)  
4. \((3,6)\) and \((3,5)\)  
5. \((2,8)\) and \((5,8)\)  
6. \((1,4)\) and \((9,4)\)  
7. \((2,2)\) and \((7,2)\)  
8. \((3,8)\) and \((3,2)\)

Problem Solving

9. Name two points that form a 5-unit vertical line segment when they are connected.

10. Name two points that form a 3-unit horizontal line segment when they are connected.
Chapter 10 Test

Identify each.
1. __ perpendicular lines
2. __ diameter
3. __ radius
4. __ reflection
5. __ ray
6. __ equilateral triangle

Use the grid to answer each question.
7. What are the $x$- and $y$-coordinates of point $C$?
8. What point is located at $(4, 0)$?
9. Graph the points $G(0, 0)$ and $H(3, 3)$ on the grid at the right.

Problem Solving

Use a strategy you have learned.
10. Does each figure have half-turn symmetry?
   a. b.

Tell About It

Explain your answer.
11. There are 5 special quadrilaterals. Name, describe, and draw a picture of each kind.

Performance Assessment

Draw each.
12. $\overline{LM}$
13. $\overline{BA}$
14. point $R$
15. a scalene triangle
16. $\triangle DEF$
17. circle $A$
18. $\overline{RS}$
19. an isosceles triangle
Test Preparation

Choose the best answer.

1. $90.05 - 58.93$
   a. $32.12$  
   b. $31.12$  
   c. $41.12$  
   d. $31.02$

2. Choose the standard form of two hundred ninety-seven million.
   a. 200,970  
   b. 2,000,970  
   c. 20,970,000  
   d. 297,000,000

3. Choose the fraction.
   nine elevenths
   a. $\frac{11}{9}$  
   b. $\frac{9}{10}$  
   c. $\frac{9}{9}$  
   d. $\frac{9}{11}$

4. Estimate by rounding.
   $244 + 1749 + 756$
   a. 2700  
   b. 3000  
   c. 2600  
   d. 2800

5. $11 \text{ ft } 3 \text{ in.} + 3 \text{ ft } 10 \text{ in.}$
   a. 14 ft 1 in.  
   b. 15 ft  
   c. 15 ft 1 in.  
   d. 14 ft 14 in.

6. Which fraction is less than $\frac{5}{9}$?
   a. $\frac{5}{8}$  
   b. $\frac{6}{9}$  
   c. $\frac{7}{9}$  
   d. $\frac{4}{9}$

7. $37.09 \times 8$
   a. $246.72$  
   b. $296.02$  
   c. $296.72$  
   d. $37.17$

8. Choose the compatible numbers to estimate $67 \div 9$.
   a. $70 \div 9$  
   b. $65 \div 9$  
   c. $63 \div 9$  
   d. $54 \div 9$

9. When the dividend is zero, the quotient is:
   a. never zero.  
   b. always zero.  
   c. always one.  
   d. none of these

10. A week has 7 days. Each day is 24 hours. How many hours is a week?
    a. 31  
    b. 148  
    c. 168  
    d. 228

11. $2 \text{ dm} = ?$
    a. 200 cm  
    b. 200 mm  
    c. 20 m  
    d. 20 km

12. Choose the sum in simplest form.
    $\frac{4}{8} + \frac{2}{8}$
    a. $\frac{6}{8}$  
    b. $\frac{2}{4}$  
    c. $\frac{3}{4}$  
    d. $\frac{2}{3}$
Use the line plot for exercises 13 and 14.

**Favorite Odd Numbers**

1. What is the mode of the data?
   - a. 11  b. 7  c. 3  d. 1

2. What is the outlier of the data?
   - a. 11  b. 7  c. 3  d. 1

3. Which part of the line graph is labeled **Days**?
   - a. vertical axis  b. horizontal axis  c. line of increase  d. line of decrease

4. Use the figure for exercises 16–18.

5. Which angle is obtuse?
   - a. ∠ABI  b. ∠FBA  c. ∠CDK  d. ∠FBC

6. Which names the parallel lines?
   - a. \( \overline{FI} \) and \( \overline{AE} \)  b. \( \overline{AE} \) and \( \overline{HK} \)  c. \( \overline{GJ} \) and \( \overline{HK} \)  d. \( \overline{GC} \) and \( \overline{HD} \)

7. Choose the sum in simplest form.
   - \( \frac{9}{12} + \frac{3}{4} \)
   - a. \( 1 \frac{1}{2} \)  b. \( 1 \frac{2}{6} \)  c. \( \frac{12}{16} \)  d. \( 1 \frac{2}{4} \)

8. Show all your work. Explain your answer.

9. Explain how to find the x- and y-coordinates for the points plotted on the coordinate grid. Name the coordinates of the points.
POPSICLE STICKS AND GLUE

We’re building a village of popsicle sticks,
Just popsicle sticks and glue:
Houses and fences, sidewalks and streets,
A school and a library, too;
Museums, churches, temples, shops,
A playground, a park, and a zoo.
Isn’t it wonderful what we can do
With popsicle sticks and a new tube of glue?

Leslie D. Perkins

In this chapter you will:
Use models and formulas
Relate plane and solid figures
Investigate spatial relationships
Solve problems using a drawing or model

Critical Thinking/Finding Together
Use popsicle sticks to build a border around your desk. How many popsicle sticks did you use? Compare your border and the number of sticks used with classmates.
Perimeter is the distance around a figure.

You can use a formula to find the perimeter of a rectangle.

What is the perimeter of this rectangle?

\[
\text{perimeter} = \text{length} + \text{width} + \text{length} + \text{width}
\]

\[
P = \ell + w + \ell + w
\]

\[
P = 2\times\ell + 2\times w
\]

\[
P = (2\times 10) + (2\times 4)
\]

\[
P = 20 + 8
\]

\[
P = 28 \text{ m}
\]

The perimeter of the rectangle is 28 m.

You can also use formulas to find the perimeter of a square and of an equilateral triangle.

\[
P = \text{side} + \text{side} + \text{side} + \text{side}
\]

\[
P = s + s + s + s
\]

\[
P = 4 \times s
\]

\[
P = 4 \times 3
\]

\[
P = 12 \text{ ft}
\]

\[
P = \text{side} + \text{side} + \text{side}
\]

\[
P = s + s + s
\]

\[
P = 3 \times s
\]

\[
P = 3 \times 6
\]

\[
P = 18 \text{ cm}
\]
Find the perimeter of each. Use a formula.

1. 18 in.
2. 25 mm
3. 34 ft
4. 20 yd
5. 8 yd
6. 19 m
7. 53 mm
8. 37 m
9. 92 in.

Use grid paper to draw a square and a rectangle whose perimeters are:

10. 16 units
11. 24 units
12. 36 units
13. 44 units

Problem Solving Use a formula.

14. What is the perimeter of an equilateral triangle with a side that is 17 in. long?

15. What is the perimeter of a square with a side that is 49 m long?

16. What is the perimeter of a rectangle with a length of 72 cm and a width of 14 cm?

17. What is the perimeter of a rectangle with a width of 122 in. and a length of 15 in.?

Challenge

18. Write a formula to find the perimeter of a hexagon whose sides are all the same length.
Use Area Formulas

Area is the number of square units needed to cover a flat surface.

What is the area of the rectangle?

To find the area, use the area formula for a rectangle.

\[
A = \ell \times w
\]

\[
A = 7 \times 6
\]

\[
A = 42 \text{ square feet (sq ft) or } 42 \text{ ft}^2
\]

The area of the floor is 42 ft\(^2\).

You can also use a formula to find the area of a square.

\[
A = s \times s
\]

\[
A = 9 \times 9
\]

\[
A = 81 \text{ square centimeters (sq cm) or } 81 \text{ cm}^2
\]

The area of the floor is 81 cm\(^2\).

Other Square Units for Measuring Area

<table>
<thead>
<tr>
<th>Customary Units</th>
<th>Metric Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>square inch, sq in., in.(^2)</td>
<td>square millimeter, sq mm, mm(^2)</td>
</tr>
<tr>
<td>square yard, sq yd, yd(^2)</td>
<td>square decimeter, sq dm, dm(^2)</td>
</tr>
<tr>
<td>square mile, sq mi, mi(^2)</td>
<td>square meter, sq m, m(^2)</td>
</tr>
<tr>
<td></td>
<td>square kilometer, sq km, km(^2)</td>
</tr>
</tbody>
</table>
Find the area. Use the area formula.

1. \(9 \text{ m} \times 16 \text{ m}\)

2. \(10 \text{ in.} \times 15 \text{ in.}\)

3. \(7 \text{ ft} \times 15 \text{ ft}\)

4. \(25 \text{ cm} \times 23 \text{ cm}\)

5. \(18 \text{ m} \times 6 \text{ m}\)

6. \(23 \text{ yd} \times 6 \text{ yd}\)

7. \(12 \text{ in.} \times 14 \text{ in.}\)

8. \(15 \text{ m} \times 18 \text{ m}\)

9. \(55 \text{ cm} \times 40 \text{ cm}\)

Problem Solving

10. A football field is 120 yd long (including the end zones) and about 55 yd wide. About what is the area of a football field?

11. A baseball infield is a square that is 90 ft along each side, or baseline. What is its area?

12. A tennis court is a rectangle that is 78 ft long and 27 ft wide. What is the area of a tennis court?

Challenge

13. Use grid paper and the area formula to draw as many rectangles as you can that each have an area of 24 square units. Are the perimeters of the rectangles equal? Explain.
For each rectangle, find the area and perimeter. Then draw another rectangle with the same area but a different perimeter.

1. \[ A = 12 \text{ in.}^2 \quad P = 14 \text{ in.} \]
2. \[ A = 12 \text{ in.}^2 \quad P = 16 \text{ in.} \]
3. \[ A = 12 \text{ in.}^2 \quad P = 26 \text{ in.} \]

4. \[ A = 5 \text{ ft}^2 \quad P = 12 \text{ ft} \]
5. \[ A = 8 \text{ ft}^2 \quad P = 16 \text{ ft} \]
6. \[ A = 9 \text{ ft}^2 \quad P = 18 \text{ ft} \]

Figures that have the same area can have different perimeters.

Figures that have the same perimeter can have different areas.
Use grid paper to help to answer each question.

7. Draw two rectangles that have the same area, but different perimeters.

8. Draw two rectangles that have the same perimeter, but different areas.

Complex Figures

To find the area of a complex figure:
- Separate the figure into known figures.
- Find the area of each figure.
- Add the areas.

\[ A = 9 \text{ ft}^2 + 12 \text{ ft}^2 = 21 \text{ ft}^2 \]

To find the perimeter of a complex figure:
- Add the lengths of its sides.
  \[ 5 \text{ ft} + 6 \text{ ft} + 2 \text{ ft} + 3 \text{ ft} + 3 \text{ ft} + 3 \text{ ft} = 22 \text{ ft} \]
  \[ P = 22 \text{ ft} \]

Find the area and perimeter of each complex figure.

9. \[ \begin{align*} A &= 3 \times 3 \\ A &= 9 \text{ ft}^2 \end{align*} \]

10. \[ \begin{align*} A &= 2 \times 6 \\ A &= 12 \text{ ft}^2 \end{align*} \]

11. \[ \begin{align*} A &= 6 \times 3 \\ A &= 18 \text{ cm}^2 \end{align*} \]

12. \[ \begin{align*} A &= 12 \times 3 \\ A &= 36 \text{ ft}^2 \end{align*} \]
Solid Figures

Polygons, or plane figures are flat. They are two-dimensional. Solid figures are not flat. They are three-dimensional.

A cube is a solid figure with 6 faces, 12 edges, and 8 vertices.

A face is a flat surface surrounded by line segments. Two faces meet at a line segment called an edge. Three or more edges meet at a vertex.

These solid figures have faces, edges, and vertices.

- **rectangular prism**
  - 6 faces
  - 12 edges
  - 8 vertices

- **triangular prism**
  - 5 faces
  - 9 edges
  - 6 vertices

- **square pyramid**
  - 5 faces
  - 8 edges
  - 5 vertices

These solid figures have 0 edges and 0 faces. Each has a curved surface.

- **cylinder**
  - 2 flat surfaces

- **cone**
  - 1 flat surface

- **sphere**
  - 0 flat surfaces
Copy and complete. You need not draw the solid figures.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>name</strong></td>
<td>cube</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>2. <strong>faces</strong></td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>6</td>
<td>?</td>
</tr>
</tbody>
</table>

Problem Solving

5. I have 2 flat surfaces, 0 edges, and 0 vertices. Which solid figure am I?

6. I have 1 flat surface and a curved surface. Which solid figure am I?

7. I have 5 faces and 5 vertices. How many edges do I have? Which solid figure am I?

8. I am shaped like a ball. How many faces, edges, and vertices do I have? Which solid figure am I?

9. I have 6 faces and 12 edges. I am not a rectangular prism. Which solid figure am I?

10. I have 9 edges and 6 vertices. How many faces do I have? Which solid figure am I?

DO YOU REMEMBER?

Write the heading that matches the information in each column.

11. ?
- a line segment
- one endpoint on the circle
- one endpoint at the center

12. ?
- a line segment
- both endpoints on the circle
- passes through the center of the circle

13. ?
- a line segment
- both endpoints on the circle
- acute diameter
circle chord
point radius
Solid Figures and Polygons

Each flat surface of a solid figure is a plane figure.

A net is a flat pattern that folds into a solid figure.

The net shows that a triangular prism is made up of 5 polygons: 2 triangles and 3 rectangles. The dashed lines show where to fold the net.

If you could cut a solid figure, the new flat surfaces you create would be plane figures.

Name the shape of each shaded flat surface.

1. 2 circles
2. 2 rectangles
3. 
4. 

Practice
Copy each net on dot paper. Name each polygon. Then cut, fold, and tape each net to make a solid figure. Name the solid figure made.

5. 6.

Use dot paper.

7. Draw a net of a cube. Cut out and fold the net. Tape the edges together.

Name the shape of the new flat surfaces made by each cut.

8. 9. 10.


TEST PREPARATION

14. Which solid figure can be made from the net?

A sphere  B cylinder  C cone  D cube
**11-6**

**Spatial Relationships**

**Materials:** connecting cubes, paper, pencil

Work in small groups.

Use 36 connecting cubes to build each of these rectangular prisms. Each person in your group should build a different figure.

1. Compare the prisms you built. What do you notice?

Take turns. Use 36 cubes to build other rectangular prisms. Ask others in your group to build a prism just like yours. Record the length, width, and height of each prism.

2. How many different rectangular prisms did your group build?

3. How can you be sure that each prism is different from each of the other prisms?

Work together to guess how many connecting cubes you would need to build each of the solid figures in exercises 4, 5, 6, and 7. Record your group’s guesses. Then test the guesses by building each figure.
4. How close were your guesses to the actual number of cubes needed to build each figure?

5. Find the length, width, and height in cubes of each rectangular prism.

6. A rectangular prism has a length of 3 cubes, a width of 2 cubes, and a height of 5 cubes. Does it contain the same number of cubes as the prism in exercise 9? Explain.

7. Use connecting cubes to build a solid figure. Draw a picture of the figure on triangle dot paper. Put your drawing in your Math Journal.
The volume of a solid figure is the number of cubic units the figure can contain.

You can find the volume of a solid figure by counting the number of cubic units needed to fill it. Or you can build the figure with connecting cubes and then count the cubes.

The volume of the rectangular prism is 24 cubic inches.

You can also find the volume of a solid figure by multiplying.

\[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]

\[ \text{Volume} = 6 \times 2 \times 4 = 48 \]

Volume is always reported in cubic units.

Find the volume of each.

1. 24 cubic inches
2. 8 cubic meters
3. 12 cubic meters
Multiply to find the volume of each.

4. 5 cm
5. 6 yd
6. 8 mm

7. 10 ft
8. 9 in.
9. 16 m

Find the volume to complete the table.

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 cm</td>
<td>8 cm</td>
<td>6 cm</td>
<td>? cubic centimeters</td>
</tr>
<tr>
<td>9 m</td>
<td>10 m</td>
<td>9 m</td>
<td>? cubic meters</td>
</tr>
<tr>
<td>14 mm</td>
<td>4 mm</td>
<td>3 mm</td>
<td>? cubic millimeters</td>
</tr>
<tr>
<td>11 yd</td>
<td>5 yd</td>
<td>8 yd</td>
<td>? cubic yards</td>
</tr>
<tr>
<td>12 in.</td>
<td>12 in.</td>
<td>4 in.</td>
<td>? cubic inches</td>
</tr>
</tbody>
</table>

Problem Solving

15. Trey has 18 connecting cubes. How many different rectangular prisms can he build?

Write About It

16. Could you compute to find the volume of the figure in exercise 3? Explain how you would do it.
The Hobby Hut sign is a triangle. The owner wants a light at each vertex and every half foot along each side. Each side is 2 ft long. How many lights will the sign have?

**Read**

Visualize the facts of the problem as you reread it.

**Facts:**
- 1 light—at each vertex
- 1 light—every half foot along each 2-foot-long side

**Question:** How many lights will the sign have?

**Plan**

Since each side is 2 ft long, the sign is an equilateral triangle. Draw an equilateral triangle. Use marks for each light. Multiply to find the number of lights:

- at each vertex: $3 \times 1 = ?$
- along each side: $3 \times 3 = ?$

Then add to find the total.

**Solve**

1 light at each vertex: $3 \times 1 = 3$
3 lights along each side: $3 \times 3 = 9$
The total number of lights: $3 + 9 = 12$

The sign will have 12 lights.

**Check**

Add the number of lights around the figure.

$5 + 4 + 3 = 12$
Use a drawing or model to solve each problem.

1. A shape made up of tiles that are 1 cm square has an area of 9 sq cm and a perimeter of 12 cm. Describe the shape.

   **Read**
   Visualize the facts of the problem.

   **Facts:**
   Area = 9 sq cm
   Perimeter = 12 cm

   **Question:** What is the shape?

   **Plan**
   How should you arrange 1-sq-cm tiles to make a shape that has an area of 9 sq cm and a perimeter of 12 cm?

   **Solve**

2. How many different rectangles can you draw that have a perimeter of 20 units? What is the area of each rectangle?

3. The volume of a rectangular prism is 24 cubic centimeters. The flat surface at the bottom of the prism is 2 cm by 4 cm. How tall is the prism?

4. How many triangles can you find in the puzzle on the right?

5. What is the area of the figure at the right?
Solve each problem and explain the method you used.

1. Sara babysits for Ollie and shows him how to build a tower with 27 cubes. Each cube has a volume of 1 cubic inch. What is the volume of the tower?

2. Ollie builds a tower with his 1-inch cubes. What shape is the face of each 1-inch cube in Ollie's tower?

3. Trina brings crayons. Both ends of the blue crayon are rubbed flat. What solid figure does the crayon look like?

4. Benji’s crib mattress is 34 in. by 30 in. What is the perimeter of the mattress? (Hint: See page 20.)

5. Sara draws a hexagon. Each side is 9 cm. What is the perimeter of the hexagon?

6. Trina shows Benji a shape. It has 2 circular flat surfaces. What is the shape?

7. Three children work with blocks to build a rectangular prism. It has a width of 7 in., a length of 8 in., and a height of 10 in. What is the volume of this prism?

8. Trina has a sheet of paper that is $8 \frac{1}{4}$ in. by 11 in. What is the perimeter of the paper? (Hint: See page 20.)
Choose a strategy from the list or use another strategy you know to solve each problem.

9. Ralph has a photo in his wallet. The area of the photo is 6 square inches. How long might each side be?

10. Trina made this bead pattern: 1 sphere, 2 cylinders, 3 cones, 2 spheres, 3 cylinders, 4 cones, and so on. What is the shape of the 20th figure?

11. The shortest side of a quadrilateral is 5 cm. The next side is 10 cm. The length of each succeeding side increases by 5 cm. What is the perimeter of the quadrilateral? (Hint: See page 20.)

12. Ralph’s rectangular quilt has an area of 12 sq ft. One side is 3 feet long. What is the perimeter of the quilt?

13. Angie makes giant pillows. The table tells about each pillow. What solid figure does Benji’s pillow look like?

14. Which child’s pillow is shaped like a cylinder?

15. Draw five 1-centimeter squares to make a shape so that any 2 squares touch along at least one entire side. How many different arrangements are possible?

16. Write a problem that can be solved by using a drawing or model. Have a classmate solve it.
Check Your Progress
Lessons 1–9

Find the perimeter. Use a perimeter formula.

1. Find the perimeter of the rectangle.
   - Dimensions: 3 m x 8 m
   - Use the perimeter formula: P = 2l + 2w
   - Calculation: P = 2(3) + 2(8) = 10 m

2. Find the perimeter of the square.
   - Side length: 36 yd
   - Use the perimeter formula: P = 4s
   - Calculation: P = 4(36) = 144 yd

3. Find the perimeter of the triangle.
   - Side lengths: 27 cm
   - Use the perimeter formula: P = a + b + c
   - Calculation: P = 27 + 27 + 27 = 72 cm

Find the area.

4. Find the area of the rectangle.
   - Length: 9 yd
   - Width: 3 yd
   - Use the area formula: A = l x w
   - Calculation: A = 9 x 3 = 27 yd²

5. Find the area of the square.
   - Side length: 15 in.
   - Use the area formula: A = s²
   - Calculation: A = 15² = 225 in²

6. Find the area of the trapezoid.
   - Bases: 10 m and 24 m
   - Height: 4 m
   - Use the area formula: A = (b₁ + b₂) x h / 2
   - Calculation: A = (10 + 24) x 4 / 2 = 64 m²

Name each solid figure. Then name the shapes of all flat surfaces on each figure.

7. Name the solid figure: Triangular prism
   - Flat surfaces: 2 triangular bases and 3 rectangular faces

8. Name the solid figure: Rectangular prism
   - Flat surfaces: 6 rectangular faces

9. Name the solid figure: Cylinder
   - Flat surfaces: 2 circular bases

Find the area and perimeter of each figure.

10. Find the area and perimeter of the rectangle.
    - Dimensions: 7 yd x 5 yd
    - Area: 35 yd²
    - Perimeter: 2(7 + 5) = 24 yd

11. Find the area and perimeter of the rectangle.
    - Dimensions: 3 m x 1 m x 4 m
    - Area: 12 m²
    - Perimeter: 2(3 + 1) + 2(4) = 14 m

12. Find the area and perimeter of the rectangle.
    - Dimensions: 2 cm x 4 cm x 8 cm
    - Area: 32 cm²
    - Perimeter: 2(2 + 8) + 2(4) = 28 cm

Find the volume.

13. Find the volume of the cube.
    - Edge length: 3 in.
    - Volume: V = a³
    - Calculation: V = 3³ = 27 in³

14. Find the volume of the rectangular prism.
    - Dimensions: 9 in. x 3 in. x 3 in.
    - Volume: V = l x w x h
    - Calculation: V = 9 x 3 x 3 = 81 in³

15. Find the volume of the cube.
    - Edge length: 4 cm
    - Volume: V = a³
    - Calculation: V = 4³ = 64 cm³

(See pp. 358–359.)
(See pp. 360–363.)
(See pp. 364–367.)
(See pp. 362–363.)
(See pp. 370–371.)
(See Still More Practice, p. 470.)
Missing Cubic Units

Maya used cubes to build this figure. How many more cubes does she need to finish making a rectangular prism?

Draw the rectangular prism on triangle dot paper or use connecting cubes. Then count the cubes that are missing.

Maya needs 4 more cubes to finish making the rectangular prism.

Use triangle dot paper or connecting cubes.

1. How many more cubes are needed to finish building each cube?
   
a. 
   
b. 
   
c. 

2. How many more cubes are needed to finish building each rectangular prism?
   
a. 
   
b. 
   
c.
Chapter 11 Test

Find the perimeter and area of each figure. Use the formulas.

1. 30 m
   15 m

2. 18 ft
   4 cm

3. 8 cm
   4 cm
   6 cm

Name the shape of the new flat surfaces made by each cut.

4. 

5. 

6. 

Find the volume.

7. 8 in.
   3 in.
   5 in.

8. 6 ft
   4 ft
   10 ft

9. 12 yd
   20 yd
   1 yd

Problem Solving

Use a strategy you have learned.

10. Which solid figure has 5 faces, 9 edges, and 6 vertices? Which solid figure has 2 circular flat surfaces, 0 edges, and 0 vertices?

Tell About It

Explain how you found your answer.

11. The volume of a rectangular prism is 36 cubic cm. A flat surface at the bottom of the prism is 4 cm by 3 cm. How tall is it?

Performance Assessment

12. a. Jill Clark wrote her initials on a grid. Estimate the area of her initials.

   b. Write your initials on grid paper and then estimate the area they cover.
### Test Preparation

Choose the best answer.

1. Which is ordered greatest to least?
   - a. 4607; 46,070; 45,021; 46,088
   - b. 46,088; 46,070; 45,021; 4607
   - c. 46,070; 46,088; 45,021; 4607
   - d. 46,070; 46,088; 4607; 45,021

   **8.** $6907 + 386 + 2999$
   - a. 9192
   - b. 10,292
   - c. 13,766
   - d. not given

2. $65,600 - 1,592$
   - a. 64,008
   - b. 64,018
   - c. 64,192
   - d. not given

3. $8 + 6 ÷ 3 - 2$
   - a. 2 R2
   - b. 8
   - c. 14
   - d. not given

4. Alana pays $11.96 for 4 identical plants. How much does each plant cost?
   - a. $1.56
   - b. $1.99
   - c. $2.49
   - d. $2.99

5. Which is ordered least to greatest?
   - a. 4 cm; 300 mm; 40 m; 3 km
   - b. 300 mm; 4 cm; 40 m; 3 km
   - c. 4 cm; 300 mm; 3 km; 40 m
   - d. 3 km; 4 cm; 40 m; 300 mm

6. $\frac{5 \frac{2}{9}}{8 \frac{4}{9}}$
   - a. $13 \frac{1}{3}$
   - b. $13 \frac{2}{9}$
   - c. $13 \frac{2}{3}$
   - d. not given

7. Which is a quadrilateral?
   - a. M
   - b. N
   - c. P
   - d. all of these

8. Which graph is used to compare the parts of a whole?
   - a. circle graph
   - b. bar graph
   - c. line graph
   - d. pictograph

9. $76 \times 450$
   - a. 5850
   - b. 34,206
   - c. 34,206
   - d. not given

10. The dividend is 456. The quotient is 76. What is the divisor?
    - a. 4
    - b. 6
    - c. 8
    - d. 80

11. Which is normal room temperature?
    - a. $20^\circ C$
    - b. $37^\circ C$
    - c. $50^\circ C$
    - d. $68^\circ C$

12. Find the area.
    - a. $12 \text{ ft}^2$
    - b. $24 \text{ ft}^2$
    - c. $30 \text{ ft}^2$
    - d. $36 \text{ ft}^2$

   - a. $1 \frac{1}{5}$
   - b. $\frac{4}{5}$
   - c. 1
   - d. not given
### 15. Which fraction is closest to \( \frac{1}{2} \)?

- a. \( \frac{9}{11} \)
- b. \( \frac{4}{11} \)
- c. \( \frac{5}{11} \)
- d. \( \frac{8}{11} \)

### 16. Choose the GCF of 18 and 27.

- a. 18
- b. 9
- c. 6
- d. 3

### 17. What kind of triangle is shown?

- a. right
- b. isosceles
- c. equilateral
- d. scalene

### 18. Use front-end estimation.

\[ 7\frac{7}{9} + 6\frac{2}{6} \]

- a. about 14
- b. about 12
- c. about 15
- d. not given

### 19. \( \frac{6}{9} + \frac{1}{3} \)

- a. \( \frac{8}{9} \)
- b. \( \frac{2}{3} \)
- c. 2
- d. 1

### 20. How many angles does a pentagon have?

- a. 4
- b. 5
- c. 6
- d. 8

### 21. Choose the perimeter.

- a. 10 cm
- b. 16 cm
- c. 20 cm
- d. 16 cm

### 22. Tina draws an octagon. Each side is 11 mm. What is the perimeter?

- a. \( P = 66 \text{ mm} \)
- b. \( P = 19 \text{ mm} \)
- c. \( P = 88 \text{ mm} \)
- d. \( P = 55 \text{ mm} \)

### 23. Choose the area and perimeter of the figure.

- a. \( A = 30 \text{ m}^2; \ P = 26 \text{ m} \)
- b. \( A = 26 \text{ m}^2; \ P = 30 \text{ m} \)
- c. \( A = 21 \text{ m}^2; \ P = 20 \text{ m} \)
- d. \( A = 9 \text{ m}^2; \ P = 18 \text{ m} \)

### Tell About It

Explain how you solved the problem.
Show all your work.

23. How many ways can you separate the figure in exercise 23 in order to find its area? Describe all the possible ways.

24. A rectangle has an area of 36 ft\(^2\) and a perimeter of 26 ft. What are the length and width of the rectangle?
Divide by Two Digits

from
WHO HASN’T PLAYED GAZINTAS?

In your arithmetics
the problem is what sticks.
The language isn’t bound
by spelling, but by sound.
So 3 gazinta 81.
The answer? 27. Done!
In long division, I would hint, a
lot of work gazin gazinta.

Then Tums: the sign of which is X.
Do 8 tums 1-5-6? It checks
at just one thousand two four eight.
Repeat: 1,248.
Computers work at a faster rate.

David McCord

In this chapter you will:
Learn about patterns
Estimate in division
Investigate trial quotients
and zeros in division
Solve problems with more
than one step

Critical Thinking/
Finding Together
Explain how you can use
base ten blocks to check
that $81 \div 3 = 27$. 
Use division facts and patterns with zero to divide tens, hundreds, and thousands by multiples of 10.

Remember: Numbers that end in 0 are multiples of 10. They all have 10 as a factor.

Study these division patterns.

Fact: $8 \div 1 = 8$

\[
\begin{array}{c}
80 \div 10 = 8 \\
800 \div 10 = 80 \\
8000 \div 10 = 800
\end{array}
\]

Fact: $9 \div 3 = 3$

\[
\begin{array}{c}
90 \div 30 = 3 \\
900 \div 30 = 30 \\
9000 \div 30 = 300
\end{array}
\]

Fact: $28 \div 7 = 4$

\[
\begin{array}{c}
280 \div 70 = 4 \\
2800 \div 70 = 40 \\
28,000 \div 70 = 400
\end{array}
\]

Fact: $10 \div 2 = 5$

\[
\begin{array}{c}
100 \div 20 = 5 \\
1000 \div 20 = 50 \\
10,000 \div 20 = 500
\end{array}
\]

Look for a pattern to find each quotient.

1. $9 \div 1$
   
   \[
   \begin{array}{c}
   90 \div 10 = 9 \\
   900 \div 10 = 90 \\
   9000 \div 10 = 900
   \end{array}
   \]

2. $8 \div 4$
   
   \[
   \begin{array}{c}
   80 \div 40 = 2 \\
   800 \div 40 = 20 \\
   8000 \div 40 = 200
   \end{array}
   \]

3. $56 \div 7$
   
   \[
   \begin{array}{c}
   560 \div 70 = 8 \\
   5600 \div 70 = 80 \\
   56,000 \div 70 = 800
   \end{array}
   \]

4. $6 \div 3$
   
   \[
   \begin{array}{c}
   60 \div 30 = 2 \\
   600 \div 30 = 20 \\
   6000 \div 30 = 200
   \end{array}
   \]

5. $32 \div 8$
   
   \[
   \begin{array}{c}
   320 \div 80 = 4 \\
   3200 \div 80 = 40 \\
   32,000 \div 80 = 400
   \end{array}
   \]

6. $45 \div 9$
   
   \[
   \begin{array}{c}
   450 \div 90 = 5 \\
   4500 \div 90 = 50 \\
   45,000 \div 90 = 500
   \end{array}
   \]

7. $40 \div 5$
   
   \[
   \begin{array}{c}
   400 \div 50 = 8 \\
   4000 \div 50 = 80 \\
   40,000 \div 50 = 800
   \end{array}
   \]

8. $30 \div 6$
   
   \[
   \begin{array}{c}
   300 \div 60 = 5 \\
   3000 \div 60 = 50 \\
   30,000 \div 60 = 500
   \end{array}
   \]

9. $63 \div 7$
   
   \[
   \begin{array}{c}
   630 \div 70 = 9 \\
   6300 \div 70 = 90 \\
   63,000 \div 70 = 900
   \end{array}
   \]
### Divide mentally.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>10.</td>
<td>(40 \div 20)</td>
<td>11.</td>
<td>(20 \div 10)</td>
<td>12.</td>
<td>(60 \div 20)</td>
<td>13.</td>
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<td>14.</td>
<td>(360 \div 90)</td>
<td>15.</td>
<td>(420 \div 60)</td>
<td>16.</td>
<td>(560 \div 80)</td>
<td>17.</td>
</tr>
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<td>18.</td>
<td>(200 \div 40)</td>
<td>19.</td>
<td>(300 \div 50)</td>
<td>20.</td>
<td>(400 \div 80)</td>
<td>21.</td>
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<td>22.</td>
<td>(8000 \div 20)</td>
<td>23.</td>
<td>(4000 \div 80)</td>
<td>24.</td>
<td>(3000 \div 60)</td>
<td>25.</td>
</tr>
<tr>
<td>26.</td>
<td>(90\overline{4500})</td>
<td>27.</td>
<td>(80\overline{6400})</td>
<td>28.</td>
<td>(30\overline{1200})</td>
<td>29.</td>
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<tr>
<td>30.</td>
<td>(30\overline{21000})</td>
<td>31.</td>
<td>(40\overline{20000})</td>
<td>32.</td>
<td>(70\overline{35000})</td>
<td>33.</td>
</tr>
<tr>
<td>34.</td>
<td>(50\overline{40000})</td>
<td>35.</td>
<td>(60\overline{54000})</td>
<td>36.</td>
<td>(30\overline{24000})</td>
<td>37.</td>
</tr>
</tbody>
</table>

### Problem Solving

38. How many zeros are in the quotient when you divide 500 by 10?

39. How many zeros are in the quotient when you divide 4800 by 60?

40. How many zeros are in the quotient when you divide 540 by 90?

41. How many zeros are in the quotient when you divide 40,000 by 8?

### TEST PREPARATION

Choose the best answer.

42. The quotient is 400. The dividend is 20,000. What is the divisor?

   - A 5
   - B 50
   - C 500
   - D 5000

43. The divisor is 90. The quotient is 800. What is the dividend?

   - F 72
   - G 7200
   - H 720
   - J 72,000
12-2

Divisors: Multiples of Ten

Forty students share 137 marbles equally. How many marbles does each student get? How many marbles are left over?

To find how many each gets, divide: \( 137 \div 40 \).

Think

\[
\begin{align*}
40 & \mid 137 \\
40 & > 1 \quad \text{Not enough hundreds} \\
40 & > 13 \quad \text{Not enough tens} \\
40 & < 137 \quad \text{Enough ones}
\end{align*}
\]

Estimate to place the first digit in the quotient. \( 137 \div 40 \)
Think: \( 13 \div 4 = ? \) is close to \( 12 \div 4 = 3 \). Try 3.

\[
\begin{array}{c|c}
\text{Divide the ones.} & \text{Multiply.} & \text{Subtract and compare.} & \text{Check.} \\
\hline
3 & \times 3 & 3 & 40 \\
\hline
40 \overline{137} & 40 \overline{137} & 3 & \overline{17} \\
\hline
\end{array}
\]

\[
\begin{array}{c|c}
\times & \\
3 & \times 3 \\
\hline
\overline{120} & 120 \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\overline{17} \\
\hline
\end{array}
\]

Each student gets 3 marbles. There are 17 marbles left over.

Complete each division.

\[
\begin{align*}
\text{1. } & \quad 20 \overline{85} \\
\text{2. } & \quad 50 \overline{258} \\
\text{3. } & \quad 20 \overline{166} \\
\text{4. } & \quad 80 \overline{675}
\end{align*}
\]

384 Chapter 12
Divide and check.

5. $40 \div 66$
6. $80 \div 98$
7. $20 \div 78$
8. $50 \div 85$
9. $30 \div 77$

10. $70 \div 356$
11. $90 \div 548$
12. $80 \div 567$
13. $40 \div 283$
14. $50 \div 454$

15. $20 \div 175$
16. $50 \div 349$
17. $30 \div 199$
18. $70 \div 501$
19. $90 \div 317$

20. $430 \div 70$
21. $312 \div 50$
22. $250 \div 40$
23. $197 \div 60$

24. $599 \div 80$
25. $384 \div 60$
26. $672 \div 90$
27. $358 \div 40$

Problem Solving

28. Mariah will give an equal number of pencils to each of 60 students. She has 122 pencils. At most, how many pencils can she give to each student? How many pencils will she have left?

29. Brendan is sorting 150 pieces of chalk into boxes. Each box holds 20 pieces of chalk. How many boxes can he fill? How many pieces of chalk will be in the box that is not full?

30. The media center ordered 495 booklets on different health topics. Each of 80 fourth graders will read the same number of booklets. At most, how many booklets will each fourth grader read?

31. Dionne is helping Mr. Rau to stack 256 magazines. They put 30 magazines into each stack. How many stacks of 30 magazines are there? How many magazines are in the last stack?

Write About it

32. In your Math Journal, tell how knowing division patterns helps you to divide by multiples of 10.

Remember: Numbers that end in 0 are multiples of 10. They all have 10 as a factor.
12-3

Estimate Quotients

To estimate quotients with 2-digit divisors, think of nearby numbers that are compatible.

When one number divides another evenly, the two numbers are compatible.

Estimate using compatible numbers:
664 ÷ 24

\[
\begin{array}{c|c}
664 & \div 24 \\
600 & 20
\end{array}
\]

Compatible numbers

Think: 20 \( \frac{600}{20} \)

So 664 ÷ 24 is about 30.

Study these examples.

Estimate: 96 ÷ 31

Think: 3 \( \frac{30}{90} \)

So 96 ÷ 31 is about 3.

Estimate: $86.43 ÷ 38

Think: $2.00 \( \frac{40}{80.00} \)

So $86.43 ÷ 38 is about $2.00.

Write the compatible numbers you would use to estimate the quotient. Then estimate.

1. 63 ÷ 21
2. 89 ÷ 32
3. 78 ÷ 19
4. 47 ÷ 22
5. 58 ÷ 33
6. 67 ÷ 11
7. 81 ÷ 44
8. 92 ÷ 36
9. 594 ÷ 26
10. 905 ÷ 38
11. 825 ÷ 18
12. 652 ÷ 21
13. 452 ÷ 17
14. 395 ÷ 24
15. 6475 ÷ 36
16. 7959 ÷ 43
Estimate the quotient. Use compatible numbers.

17. \(95 \div 35\)  
18. \(87 \div 43\)  
19. \(62 \div 12\)  
20. \(59 \div 28\)  
21. \(49 \div 25\)  
22. \(81 \div 21\)  
23. \(91 \div 29\)  
24. \(67 \div 22\)  
25. \(644 \div 24\)  
26. \(841 \div 19\)  
27. \(919 \div 29\)  
28. \(592 \div 31\)  
29. \(799 \div 46\)  
30. \(652 \div 38\)  
31. \(401 \div 22\)  
32. \(423 \div 16\)  
33. \(8743 \div 36\)  
34. \(7921 \div 45\)  
35. \(5932 \div 24\)  
36. \(6417 \div 38\)  
37. \$59.75 \div 27\)  
38. \$4.21 \div 19\)  
39. \$91.39 \div 34\)  
40. \$5.56 \div 17\)  

Problem Solving

41. Last week 896 students came to the Folk Art Museum in buses. About the same number of students traveled on each of 28 buses. About how many students were there on each bus?

42. One class spent $75.05 for lunch in the museum cafeteria. There were 19 students in the class, and each student spent about the same amount. About how much money did each student spend for lunch at the museum?

DO YOU REMEMBER?

Divide.

43. \(7 \div 58\)  
44. \(5 \div 49\)  
45. \(3 \div 36\)  
46. \(6 \div 87\)  
47. \(3 \div 745\)  
48. \(4 \div 936\)  
49. \(8 \div 277\)  
50. \(9 \div 545\)  
51. \(2 \div 1.28\)  
52. \(7 \div 7.14\)  
53. \(9 \div 74.43\)  
54. \(6 \div 54.12\)
Terry had 92 flower seeds. He planted 22 seeds in each of his flower baskets. How many flower baskets did Terry have? How many extra seeds were there?

To find how many flower baskets, divide: 92 ÷ 22.

\[
\begin{array}{c|c|c}
\hline
22 & 92 & 22 > 9 \quad \text{Not enough tens} \\
22 & 92 & 22 < 92 \quad \text{Enough ones} \\
\hline
\end{array}
\]

Estimate to place the first digit in the quotient.

92 ÷ 22
Think: 9 ÷ 2 = ?
Try 4.

\[
\begin{array}{c|c|c|c}
\hline
\text{Divide the ones.} & \text{Multiply.} & \text{Subtract and compare.} & \text{Check.} \\
\hline
4 & \times 4 & 4 & 2 2 \\
22)9 2 & 2 2)9 2 & 2 2)9 2 & \times 4 \\
8 8 & 8 8 & 8 8 & + 4 \\
\hline
\end{array}
\]

Check: 2 2 × 4 = 8 8 + 4 = 9 2

Terry had 4 flower baskets. There were 4 extra seeds.

Study this example.

40 in. = ? yd 3 R4 40 in. = 3 ft 4 in. or 1 yd 4 in.

\[
\begin{array}{c|c|c}
\hline
1 \text{ yd} = 3 \text{ ft} & 12)40 & \text{Remember: Divide to rename smaller units as larger units.} \\
1 \text{ ft} = 12 \text{ in.} & - 36 & \text{12)40} \\
\hline
\end{array}
\]
Complete each division.

1. \(24 \div 48 = \frac{2}{?}
\)
2. \(25 \div 96 = \frac{3}{?}
\)
3. \(44 \div 88 = \frac{2}{?}
\)
4. \(21 \div 94 = \frac{2}{?}
\)

Divide and check.

5. \(31 \div 62 = \frac{3}{1}
\)
6. \(23 \div 46 = \frac{2}{1}
\)
7. \(42 \div 84 = \frac{2}{1}
\)
8. \(33 \div 99 = \frac{3}{1}
\)
9. \(22 \div 88 = \frac{2}{1}
\)
10. \(21 \div 98 = \frac{2}{1}
\)
11. \(41 \div 89 = \frac{2}{1}
\)
12. \(32 \div 99 = \frac{2}{1}
\)
13. \(21 \div 89 = \frac{2}{1}
\)
14. \(42 \div 70 = \frac{2}{1}
\)
15. \(22 \div .66 = \frac{2}{1}
\)
16. \(45 \div .90 = \frac{2}{1}
\)
17. \(31 \div .93 = \frac{2}{1}
\)
18. \(26 \div .78 = \frac{2}{1}
\)
19. \(33 \div .66 = \frac{2}{1}
\)

Divide to rename each measure.

20. \(32 \text{ fl oz} = \frac{3}{1} \text{ c}
\)
21. \(64 \text{ oz} = \frac{6}{1} \text{ lb}
\)
22. \(66 \text{ cm} = \frac{6}{1} \text{ dm}
\)
23. \(13 \text{ qt} = \frac{1}{1} \text{ gal}
\)
24. \(31 \text{ dm} = \frac{3}{1} \text{ m}
\)
25. \(49 \text{ pt} = \frac{4}{1} \text{ qt}
\)

**Problem Solving**

26. Chris set out 96 tomato plants in a vegetable garden. She placed 24 tomato plants in each row. Did she have more than 5 rows?

27. Mike was putting 95 seed packets in a display. He wanted to put the same number of packets into each of 22 sections. How many packets could he have put into each section? How many packets would he have had left over?

**Critical Thinking**

Compare. Write \(<, =, \text{ or } >\). Estimate or find exact answers.

28. \(64 \div 32 \frac{2}{72 \div 24}
\)
29. \(84 \div 21 \frac{2}{96 \div 32}
\)
30. \(72 \div 36 \frac{2}{96 \div 48}
\)
31. \(58 \div 29 \frac{2}{90 \div 45}
\)
There are 158 people who want to take a boat ride on the lake. How many trips with 45 passengers can the tour boat make? How many passengers will be on the last trip?

To find how many trips, divide: $158 \div 45$.

Think: $15 > 45 \quad$ Not enough hundreds

$158 \div 45 > 15 \quad$ Not enough tens

$158 \div 45 < 158 \quad$ Enough ones

Estimate. $158 \div 45$
Think: $15 \div 4 = \ ?$
Try 3.

Divide the ones. $\frac{3}{45} \overline{158}$

Multiply. $\frac{3}{158} \times 3$

Subtract and compare. $\frac{3}{135} \div 45$

Check. $\frac{3}{45} \times 3$

The tour boat can make 3 trips with 45 passengers. There will be 23 passengers on the last trip.

Study these examples.

\begin{align*}
6 & \overline{378} \\
3 & \overline{264} \\
\underline{0} & \underline{0}
\end{align*}

\begin{align*}
8 & \overline{264} \\
7 & \underline{360} \\
\underline{0} & \underline{0}
\end{align*}

\begin{align*}
\$0.5 & \overline{360} \\
\$4.06 & \underline{406} \\
\underline{0} & \underline{0}
\end{align*}
Complete each division.

1. $51 \div 306$  
2. $46 \div 419$  
3. $83 \div 392$  
4. $64 \div 533$  

Divide and check.

5. $22 \div 176$  
6. $32 \div 160$  
7. $43 \div 258$  
8. $57 \div 285$  
9. $74 \div 222$  
10. $61 \div 122$  
11. $95 \div 380$  
12. $34 \div 238$  
13. $62 \div 248$  
14. $81 \div 648$  
15. $42 \div 146$  
16. $72 \div 236$  
17. $51 \div 489$  
18. $21 \div 109$  
19. $91 \div 476$  
20. $63 \div 456$  
21. $54 \div 237$  
22. $83 \div 229$  
23. $75 \div 474$  
24. $32 \div 266$  
25. $67 \div 1.34$  
26. $92 \div 4.60$  
27. $71 \div 6.39$  
28. $83 \div 3.32$  
29. $44 \div 3.08$

30. Each ticket seller sold 82 tickets to a total of 574 passengers. How many ticket sellers were there?

31. The tickets came in rolls of 150. The ticket sellers sold 35 rolls of tickets. How many tickets did they sell?

32. Each tour bus can carry 64 passengers. What is the least number of buses needed for 595 passengers?

33. $164 \div 42$  
34. $218 \div 43$  
35. $119 \div 23$  
36. $213 \div 52$  
37. $358 \div 62$  
38. $326 \div 51$

MENTAL MATH

Estimate mentally.

Estimate: $168 \div 79$  
Think: $80 \div 160$  
So $168 \div 79$ is about 2.
12-6

**Trial Quotients**

Sometimes the quotient you try is too large. When this happens, you need to change the estimate.

Divide: $172 \div 27$.

**Think**

$27 \overline{)172}$

$27 > 1$; $27 > 17$

$27 \overline{)172}$

$27 < 172$ **Enough ones**

**Estimate.** $172 \div 27$

Think: $17 \div 2 = ?$ Try 8.

**Divide the ones. Multiply.**

$27 \overline{)172}$

$8$

$27 \overline{)172}$

$7$

$27 \overline{)172}$

$9$

$216$

$189$

$180$

$180$

$281$

$280$

$281$

$27$

$10 < 27$

**Subtract and compare.**

**Check.**

$10 < 27$

$172$

$27$

$6$

$10$

$35 \div 28$

**Think**

$35 \overline{)281}$

$35 > 2$; $35 > 28$

$35 \overline{)281}$

$35 < 281$ **Enough ones**

Estimate: $281 \div 35$.

Think: $28 \div 3 = ?$

Try 9.

Too large. Try 6.

Too large. Try 8.

Try 9.

Too large. Try 8.
Complete each division.

1. \( \frac{4}{27} \overline{82} \)
   \[
   \begin{array}{c|c|c}
   27 & 82 & 3 \text{ R } \_ \\
   \hline
   \_ & -81 & \_ \\
   \hline
   \_ & \_ & ? \\
   \end{array}
   \]
   Try 3.

2. \( \frac{48}{27} \overline{88} \)
   \[
   \begin{array}{c|c|c}
   48 & 88 & .07 \\
   \hline
   \_ & 33 & 6 \\
   \hline
   \_ & \_ & 0 \\
   \end{array}
   \]
   Try $.06.

3. \( \frac{64}{310} \)
   \[
   \begin{array}{c|c|c}
   64 & 310 & ? \text{ R } ? \\
   \hline
   \_ & -?? & \_ \\
   \hline
   \_ & \_ & 54 \\
   \end{array}
   \]
   Try 4.

4. \( \frac{86}{657} \overline{688} \)
   \[
   \begin{array}{c|c|c}
   86 & 657 & 8 \\
   \hline
   \_ & -?? & 688 \\
   \hline
   \_ & \_ & ?? \\
   \end{array}
   \]
   Try ?.

Divide.

5. \( \frac{27}{52} \)
6. \( \frac{36}{91} \)
7. \( \frac{45}{82} \)
8. \( \frac{18}{97} \)
9. \( \frac{35}{124} \)
10. \( \frac{48}{165} \)
11. \( \frac{54}{260} \)
12. \( \frac{79}{221} \)
13. \( \frac{66}{542} \)
14. \( \frac{94}{638} \)
15. \( \frac{87}{569} \)
16. \( \frac{49}{202} \)
17. \( \frac{27}{124} \)
18. \( \frac{39}{277} \)
19. \( \frac{76}{571} \)
20. \( \frac{99}{828} \)
21. \( \frac{28}{.84} \)
22. \( \frac{59}{3.54} \)
23. \( \frac{78}{6.24} \)
24. \( \frac{69}{5.52} \)

Problem Solving

25. Mr. Dean has signed up 180 students for a field trip to the zoo. Each bus can carry 36 students and 4 teachers. How many buses are needed for the field trip?

26. There are 115 chimpanzees at the zoo. No more than 25 chimpanzees can be in each environment. What is the least number of environments there could be at the zoo?

27. The chimpanzees eat 325 bananas each week. The bananas are shipped in crates of 48. How many crates of bananas are needed to feed the chimpanzees?
12-7  
**Greater Quotients**

Divide: $995 \div 22$.

\[
\begin{array}{c|c|c|c}
\text{Think} & 22 \div 95 & 22 > 9 & \text{Not enough hundreds} \\
22 & 22 \div 995 & 22 < 99 & \text{Enough tens} \\
\end{array}
\]

Estimate.  
$995 \div 22$

Think: $9 \div 2 = ?$

Try 4.

\begin{align*}
\text{Divide the tens.} & \quad \times \quad \text{Multiply.} \quad \text{Subtract and compare.} \\
\begin{array}{c|c|c|c|c}
4 & 22 & 995 & 4 \times 4 & 22 \div 995 \\
\hline
22 & 995 & 88 & \rightarrow 88 & 995 - 88 \\
\hline
\end{array}
\end{align*}

Bring down the ones.

\[
\begin{array}{c|c|c|c}
4 & 22 & 995 & 4 \times 4 \\
\hline
22 & 995 & 88 & \rightarrow 88 \\
\hline
11 & \rightarrow 11 & 11 & 115
\end{array}
\]

Repeat the steps.

Estimate.  
$115 \div 22$

Think: $11 \div 2 = ?$

Try 5.

\begin{align*}
\text{Divide the ones.} & \quad \times \quad \text{Multiply.} \quad \text{Subtract and compare.} \\
\begin{array}{c|c|c|c|c}
45 & 22 & 995 & 45 \times 22 & 22 \div 995 \\
\hline
22 & 995 & 88 & \rightarrow 88 & 995 - 88 \\
\hline
115 & \rightarrow 115 & 110 & 995 - 110 \\
\hline
\end{array}
\end{align*}

Check.

\[
\begin{array}{c|c|c}
45 & \times & 22 \\
\hline
90 & + & 900 \\
\hline
995 & + & 5 \\
\hline
995 & & \\
\end{array}
\]

5 < 22
Complete each division.

\[ \begin{array}{ccccccc}
1 & 2 & 3 & 4 \\
34 & 42 & 17 & 19 \\
884 & 890 & 357 & 536 \\
- & - & - & - \\
204 & 50 & ? & ? \\
- & - & - & - \\
\end{array} \]

Divide and check.

\[ \begin{array}{cccc}
5 & 6 & 7 & 8 \\
15 & 12 & 18 & 16 \\
95 & 92 & 79 & 68 \\
\end{array} \]

Problem Solving

35. Carey picked 865 pears. He put 42 pears into each box. How many boxes did Carey fill? How many pears were left over?

36. Wendell sold two peaches to each of 33 customers for a total of $16.50. What was the cost of each peach?

37. The divisor is 13. The quotient is 55. The remainder is 7. What is the dividend?

38. The quotient is 64. The divisor is 17. The remainder is 10. What is the dividend?
Divide: \(5481 \div 64\).

**Think**

\[
64)5481 \quad 64 > 5 \quad \text{Not enough thousands}
\]
\[
64)5481 \quad 64 > 54 \quad \text{Not enough hundreds}
\]
\[
64)5481 \quad 64 < 548 \quad \text{Enough tens}
\]

**Estimate.**

\[
5481 \div 64
\]

Think: \(54 \div 6 = \) ?

Try 9.

**Divide the tens. Multiply.**

\[
9
\]

\[
64)5481
\]

\[
576
\]

Too large. Try 8.

**Subtract and compare.**

\[
8
\]

\[
64)5481
\]

\[
512
\]

\[
36 \quad < \quad 64
\]

**Bring down the ones.**

**Repeat the steps.**

**Divide the ones. Multiply.**

\[
8
\]

\[
64)5481
\]

\[
85
\]

Too large. Try 5.

**Subtract and compare.**

\[
8
\]

\[
64)5481
\]

\[
512
\]

\[
361
\]

\[
320
\]

\[
41 \quad < \quad 64
\]

**Check.**

\[
85
\]

\[
\times \quad 64
\]

\[
340
\]

\[
+ \quad 5100
\]

\[
5480
\]

\[
+ \quad 41
\]

\[
5481
\]
Complete each division.

1. \( \frac{24}{51} \div 1273 \)
   \[-102 \]
   \[253 \]
   \[-??? \]

2. \( \frac{24}{24} \div 1107 \)
   \[-96 \]
   \[147 \]
   \[-??? \]

3. \( \frac{33}{33} \div 2179 \)
   \[-198 \]
   \[199 \]
   \[-??? \]

Divide and check.

4. \( \frac{40}{40} \div 2459 \)

5. \( \frac{80}{80} \div 5346 \)

6. \( \frac{80}{80} \div 6842 \)

7. \( \frac{70}{70} \div 4779 \)

8. \( \frac{34}{34} \div 1180 \)

9. \( \frac{52}{52} \div 3115 \)

10. \( \frac{44}{44} \div 2106 \)

11. \( \frac{63}{63} \div 4914 \)

12. \( \frac{72}{72} \div 4594 \)

13. \( \frac{96}{96} \div 7128 \)

14. \( \frac{22}{22} \div 1550 \)

15. \( \frac{84}{84} \div 5285 \)

16. \( \frac{64}{64} \div 5084 \)

17. \( \frac{48}{48} \div 4128 \)

18. \( \frac{38}{38} \div 2242 \)

19. \( \frac{55}{55} \div 3226 \)

20. \( \frac{22}{22} \div 1810 \)

21. \( \frac{73}{73} \div 5808 \)

22. \( \frac{14}{14} \div 1248 \)

23. \( \frac{18}{18} \div 1200 \)

24. \( \frac{92}{92} \div 21.16 \)

25. \( \frac{51}{51} \div 16.83 \)

26. \( \frac{88}{88} \div 22.00 \)

27. \( \frac{67}{67} \div 56.95 \)

Problem Solving

28. Each of 45 students bought a copy of *The Great Dinosaurs*. They paid a total of $42.75. How much did one copy of *The Great Dinosaurs* cost?

29. There are 1565 books at the Elmford book fair. If each table can hold 55 books, what is the least number of tables needed for the fair?

30. Each homeroom in Elmford School can seat 36 students. There are 1256 students in the school. What is the least number of homerooms needed for all the students?

31. Students bought 32 copies of *Amazing Science* for a total cost of $95.36 and 32 copies of *SciFi* for a total cost of $110.40. If each student bought 1 copy of each magazine, how much did each student spend?
Divide: 2865 ÷ 14.

**Think**

\[ \frac{14}{2865} \quad 14 > 2 \quad \text{Not enough thousands} \]

\[ \frac{14}{2865} \quad 14 < 28 \quad \text{Enough hundreds} \]

**Estimate.**

\[ 2865 ÷ 14 \]

Think: \( 2 ÷ 1 = \) ?

Try 2.

Divide the hundreds.

Divide the tens.

Divide the ones.

\[ \begin{array}{rcl}
2 & \downarrow & 14 \downarrow \downarrow 2865 \\
14 & \downarrow & 2865 \\
-28 & \downarrow & 06 \\
0 & & 6
\end{array} \]

\[ \begin{array}{rcl}
20 & \downarrow & 14 \downarrow \downarrow 2865 \\
14 & \downarrow & 2865 \\
-28 & \downarrow & 6 \\
-0 & \downarrow & 65 \\
0 & & 65
\end{array} \]

\[ \begin{array}{rcl}
204 & \downarrow & 14 \downarrow \downarrow 2865 \\
14 & \downarrow & 2865 \\
-28 & \downarrow & 6 \\
-0 & \downarrow & 65 \\
-56 & & 9
\end{array} \]

**Check.**

\[ 14 \times 204 = 2856 \rightarrow 2856 + 9 = 2865 \]

**Study these examples.**

\[ \begin{array}{l}
300 \quad \text{R 5} \\
21 \downarrow 6305 \\
-63 \downarrow 0 \\
0 \downarrow -0 \\
5 \downarrow -5 \\
5 & & 5
\end{array} \]

\[ \begin{array}{l}
300 \quad \text{R 5} \\
21 \downarrow 6305 \\
-63 \downarrow 0 \\
0 \downarrow -0 \\
5 \downarrow -5 \\
5 & & 5
\end{array} \]

\[ \begin{array}{l}
300 \quad \text{Check.} \\
21 \downarrow 21 \\
600 \downarrow 0 \\
6300 & & 0
\end{array} \]

\[ \begin{array}{l}
$3.06 \quad \text{Check.} \\
26 \downarrow $79.56 \\
-78 \downarrow 15 \\
156 \downarrow 156 \\
1836 & & 79.56
\end{array} \]

\[ \begin{array}{l}
$3.06 \quad \text{Check.} \\
26 \downarrow $79.56 \\
-78 \downarrow 15 \\
156 \downarrow 156 \\
1836 & & 79.56
\end{array} \]
Complete each division.

1. \[ 35 \div 210 = 60 \]
   \[ -210 \]
   \[ ? \]

2. \[ 57 \div 5814 = 102 \]
   \[ -57 \]
   \[ 11 \]
   \[ ? \]

3. \[ 18 \div 36.90 = 2 \]
   \[ -36 \]
   \[ 9 \]
   \[ ? \]

4. \[ 24 \div 7231 = 3 \]
   \[ -72 \]
   \[ 3 \]

Divide and check.

5. \[ 45 \div 3600 = 8 \]
6. \[ 32 \div 1600 = 7 \]
7. \[ 24 \div 2166 = 8 \]
8. \[ 56 \div 3930 = 3 \]
9. \[ 17 \div 6800 = 7 \]
10. \[ 25 \div 5000 = 10 \]
11. \[ 41 \div 8214 = 11 \]
12. \[ 33 \div 9927 = 12 \]
13. \[ 21 \div 2247 = 13 \]
14. \[ 19 \div 5852 = 14 \]
15. \[ 32 \div 9856 = 15 \]
16. \[ 46 \div 9246 = 16 \]
17. \[ 15 \div 9097 = 17 \]
18. \[ 51 \div 5576 = 18 \]
19. \[ 28 \div 8538 = 19 \]
20. \[ 34 \div 7068 = 20 \]
21. \[ 43 \div 8735 = 21 \]
22. \[ 13 \div 9175 = 22 \]
23. \[ 62 \div 6736 = 23 \]
24. \[ 74 \div 7904 = 24 \]
25. \[ 18 \div 37.44 = 25 \]
26. \[ 23 \div 70.61 = 26 \]
27. \[ 85 \div 92.65 = 27 \]
28. \[ 56 \div 60.48 = 28 \]

29. Damon bought a 12-yard length of cloth for $48.72. What was the cost per yard?

Find the quotient and any remainder.

30. \[ 22 \div 22,154 = 32 \]
31. \[ 32 \div 64,128 = 33 \]
32. \[ 17 \div 61,085 = 34 \]
33. \[ 42 \div 84,378 = 35 \]
34. \[ 51 \div 51,408 = 36 \]
35. \[ 24 \div 96,088 = 37 \]
Repeat the division steps as necessary when you divide greater dividends.

Divide: \(26,794 \div 52\).

**Think**

\[
\begin{array}{c}
52 \overline{)26,794} \\
\text{52 > 2; 52 > 26} \\
\text{52 < 267}
\end{array}
\]

**Enough hundreds.**

**Estimate.**
\[
26,794 \div 52
\]
Think: \(26 \div 5 = ?\)
Try: 5.

**Divide the hundreds.**
\[
\begin{array}{c}
52 \overline{)26,794} \\
5 \times 52 \\
\hline
260 \downarrow \\
\hline
79
\end{array}
\]

**Divide the tens.**
\[
\begin{array}{c}
26,794 \\
-260 \downarrow \\
\hline
79 \downarrow \\
-52 \downarrow \\
\hline
274
\end{array}
\]

**Divide the ones.**
\[
\begin{array}{c}
52 \overline{)26,794} \\
515 \times 52 \\
\hline
1030 \downarrow \\
+2575 \\
\hline
26780
\end{array}
\]

**Check.**
\[
\begin{array}{c}
515 \\
\times 52 \\
\hline
1030 \\
+2575 \\
\hline
26780
\end{array}
\]

**Division Steps**
- Estimate.
- Divide.
- Multiply.
- Subtract.
- Compare.
- Bring down.
- Repeat the steps as necessary.
- Check.
Complete each division.

1. \[43\overline{35,177}
\]
   \[
   -344
   
   \]
   \[
   \underline{\mathbf{77}}
   
   \]
   \[
   -43
   
   \]
   \[
   347
   \]
   \[
   -???
   
   \]
   \[
   \underline{3}
   \]

2. \[85\overline{42,949}
\]
   \[
   -425
   
   \]
   \[
   \underline{44}
   
   \]
   \[
   -\
   
   \]
   \[
   ???
   \]

3. \[66\overline{29,786}
\]
   \[
   -264
   
   \]
   \[
   337
   \]
   \[
   -? ?
   
   \]
   \[
   ??6
   \]

Find the quotient.

4. \[91\overline{56,708}
\]

5. \[48\overline{17,751}
\]

6. \[51\overline{35,138}
\]

7. \[75\overline{62,844}
\]

8. \[29\overline{13,479}
\]

9. \[37\overline{24,795}
\]

10. \[63\overline{42,726}
\]

11. \[86\overline{59,843}
\]

12. \[97\overline{72,471}
\]

13. \[43\overline{313.04}
\]

14. \[58\overline{349.74}
\]

15. \[72\overline{214.56}
\]

16. \[21\overline{137,662}
\]

17. \[32\overline{258,412}
\]

18. \[77\overline{445,083}
\]

Problem Solving

19. During Clean Up the River week, volunteers picked up 23,436 pounds of trash from the banks of the river. Each volunteer picked up an average of 28 pounds of trash. How many volunteers worked to pick up trash?

20. 28,694 pounds of canned goods were collected for the homeless. If each family receives 35 pounds of canned goods, what is the greatest number of families that can be helped?
Problem-Solving Strategy: Use More Than One Step

Andre needs 14 ft of rope to string between two trees to hang his art show. He buys a spool that has 175 in. of rope. Does Andre have enough rope?

Read

Visualize the facts of the problem as you reread it.

Facts: Andre needs 14 ft of rope.
The spool has 175 in.

Question: Does he have enough rope?

Plan

Interpret the hidden information.
Then find whether he has enough rope:
First divide. 175 in. ÷ 12 in. = ? ft
Then compare. 14 ft ? ? ft

Think

14 R 7 means
14 ft 7 in.

Solve

\[
\begin{array}{c}
14 \\
12 \\
-12 \\
55 \\
-48 \\
7 \\
\end{array}
\]

Compare. 14 ft < 14 ft 7 in.
Yes, Andre has enough rope.

Check

Multiply and add to check division.

\[
\begin{array}{c}
14 \\
\times 12 \\
28 \\
+ 14 \\
168 \\
\end{array}
\]

The answer checks.
Use more than one step to help you solve each problem.

1. Winnie must make 136 pint-sized yogurt sundaes. She has 66 quarts of yogurt. Does Winnie have enough yogurt?

Read
Visualize the facts of the problem as you reread it.

Facts: 136 pint-sized sundaes
       66 quarts of yogurt

Question: Does Winnie have enough yogurt?

Plan
Is there hidden information to interpret? Yes

Since there must be 136 sundaes, 136 pints of yogurt are needed.
To find out whether she has enough yogurt:
First divide: 136 ÷ 2. Then compare.

Solve

2. A nature DVD is 148 minutes long. Can Saundra watch the DVD in $2\frac{1}{2}$ hours?

3. Paulo earns $1196 a year for delivering newspapers. Mia earns $24 a week for mowing lawns. Who earns more money per year?

4. In one full day a satellite transmits 9600 messages. How many fewer messages does it transmit in 1 hour than a satellite that transmits 420 messages in 1 hour?

5. Arcade games cost 1 quarter to play. Byron has $15 in quarters. Explain if he has enough coins to play 50 arcade games.
Problem-Solving Applications: Mixed Review

Solve each problem and explain the method you used.

1. A store displays 252 different wrapping papers equally on 14 racks. How many papers are on each rack?

2. There are 180 toys to be wrapped for a toy drive. 20 people volunteer to wrap. How many toys will each person wrap?

3. A shop sells 10 ft of ribbon for $1.60. How much does 1 ft of ribbon cost?

4. Joe made 24 party invitations at a cost of $1.98. About how much did he spend on each invitation?

5. Joe cuts as many 18-in. strips as he can from a 100-in. roll of ribbon. How much ribbon is left on the roll?

6. Crepe paper streamers are sold in 28-ft rolls. To decorate a gym for a party, 150 ft of crepe paper is needed. How many rolls should be bought?


8. There were 2880 balloons delivered to 12 area stores. About how many balloons did each store order if each store received the same number of balloons?

9. A complete party package costs $75.90. If 22 friends share the cost, how much will each friend spend?
Choose a strategy from the list or use another strategy you know to solve each problem.

10. Birthday candles are sold in packs of 12. How many packs should you buy if you need to put 35 candles on a cake?

11. Jeff makes his own wrapping paper with cat and dog stickers in 8 rows, following this pattern: 2 cats, 4 dogs, 3 cats, 5 dogs, 4 cats. What is the pattern for the last 3 rows?

12. Joan needs 48 party favors. They come in packs of 12. How many packs will she need to buy?

13. A store’s display window is filled with 350 balloons. They came in packs of 24. How many packs were used?

14. Kim has $.95. Helium balloons are $11.28 a dozen. Does Kim have enough to buy one balloon?

15. On Mondays a shop gives a discount of 10¢ for every dollar spent. Ted spent $14 on Friday. How much would he have saved if he had shopped on Monday?


17. Of which patterns did the store sell more than 20 but fewer than 40 packs?

18. Of which pattern did the store sell about 15 fewer packs than it did for teddy bears?
Check Your Progress

Lessons 1–12

Divide and check.  
(See pp. 382–385.)

1. $20 \div 6$
2. $30 \div 7$
3. $70 \div 35$
4. $50 \div 29$
5. $90 \div 31$
6. $395 \div 70$
7. $312 \div 70$
8. $139 \div 20$
9. $256 \div 20$

Estimate the quotient.  
(See pp. 386–387.)

10. $48 \div 20$
11. $82 \div 39$
12. $99 \div 47$
13. $597 \div 19$
14. $4011 \div 38$
15. $69.03 \div 9$
16. $7482 \div 47$
17. $5.79 \div 19$

Divide and check.  
(See pp. 388–399.)

18. $22 \div 6$
19. $45 \div 9$
20. $31 \div .93$
21. $13 \div .65$
22. $17 \div 85$
23. $56 \div 28$
24. $37 \div 22$
25. $76 \div 34$
26. $42 \div 3.36$
27. $75 \div 97.5$
28. $17 \div 43$
29. $14 \div 45$
30. $13 \div 28$
31. $15 \div 1.80$
32. $12 \div 5.04$
33. $34 \div 118$
34. $96 \div 71$
35. $14 \div 124$
36. $67 \div 56$
37. $73 \div 58$
38. $17 \div 68$
39. $19 \div 58$
40. $13 \div 91$
41. $28 \div 85$
42. $74 \div 79$

Problem Solving

43. There are 257 sheets of lined paper for 24 students to share equally. How many sheets of paper does each student get? How many sheets are left over?

44. The rental of a school bus for a field trip is $56.00. Thirty-two students are going on the trip, and will split the cost equally. What is the cost for each student?

45. The dividend is 80. The quotient is 4. What is the divisor?

46. The quotient is 8. The divisor is 31. What is the dividend?

(See Still More Practice, p. 471.)
Logic

You have to read carefully to be sure you do not draw a false conclusion from true statements.

Read these statements and conclusions.
All the statements are true.

statements: All dogs have ears.
Sparky is a dog.

conclusion: Sparky has ears. TRUE

statements: All dogs have ears.
My cat has ears.

conclusion: My cat is a dog. FALSE

Read the true statements carefully. Then write true or false for each conclusion.

1. All ducks have feathers.
   A chicken has feathers.
   A chicken is a duck.

2. All fish can swim.
   A salmon is a fish.
   A salmon can swim.

3. Ralph is a 4th-grade boy.
   All the 4th-grade boys wore sneakers on Monday.
   Ralph wore sneakers on Monday.

4. All the 4th-grade boys wore sneakers on Monday.
   Maria wore sneakers on Monday.
   Maria is a 4th-grade boy.

5. All triangles are polygons.
   A pentagon is a polygon.
   A pentagon is a triangle.

6. All squares are parallelograms.
   All rectangles are parallelograms.
   All rectangles are squares.

7. Triangle $A$ has one right angle.
   All triangles with one right angle are right triangles.
   Triangle $A$ is a right triangle.
Chapter 12 Test

Estimate the quotient.
1. \(58 \div 33\)  
2. \(825 \div 18\)  
3. \(395 \div 24\)  
4. \(7959 \div 43\)  
5. \(29\)  
6. \(45\)  
7. \(27\)  
8. \(19\)  
9. \(38\)

Divide and check.
10. \(33\)  
11. \(31\)  
12. \(24\)  
13. \(41\)  
14. \(23\)
15. \(42\)  
16. \(34\)  
17. \(83\)  
18. \(24\)  
19. \(54\)
20. \(66\)  
21. \(76\)  
22. \(49\)  
23. \(31\)  
24. \(99\)
25. \(45\)  
26. \(35\)  
27. \(42\)  
28. \(25\)  
29. \(41\)
30. \(18\)  
31. \(15\)  
32. \(15\)  
33. \(88\)  
34. \(73\)

Problem Solving

Use a strategy you have learned.
35. A bus seats 52 passengers. How many buses are needed to carry 795 passengers from the hotel to the state fair?

Tell About It

Explain how to use compatible numbers to solve this problem.
36. In one week, a hospital’s cafeteria serves 5325 meals. About how many meals are served a day?

Performance Assessment

Use these dividends and divisors to make division exercises for the following:

<table>
<thead>
<tr>
<th>Dividends</th>
<th>Divisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1440</td>
<td>2820</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

37. A quotient between 60 and 100 with no remainder.
38. A quotient less than 100 with a remainder of 20.
39. A quotient greater than 100.
Test Preparation

Choose the best answer.

1. 8 yd 2 ft
   - 3 yd 1 ft
   a. 5 yd 1 ft  b. 12 yd  c. 12 yd 1 ft  d. 13 yd

2. Choose the standard form.
   800,000,000 + 400,000 + 50,000 + 1
   a. 84,501  b. 804,050,001  c. 804,501  d. 800,450,001

3. Use front-end estimation.
   4387
   × 9
   a. 36,000  b. 3600  c. 4000  d. 39,483

4. How many inches of rain are most likely to fall in August?
   a. 6 in.  b. 7 in.  c. 8 in.  d. 10 in.

5. Choose the equivalent fraction.
   \( \frac{4}{7} \)
   a. \( \frac{21}{12} \)  b. \( \frac{7}{10} \)  c. \( \frac{12}{21} \)  d. \( \frac{1}{4} \)

6. 3 yd = ? in.
   a. 9  b. 36  c. 108  d. not given

7. Choose the adjusted estimate.
   638 + 207 + 669
   a. about 1200  b. about 1300  c. about 1500  d. about 1600

8. Which expression matches the problem?
   Liv picks some berries. She eats 9 of them.
   a. 9 - b  b. b - 9  c. 9 + b  d. b + 9

9. How many students went on the roller coaster more than twice?
   a. b  b. 2  c. 9  d. 8

10. Choose the difference in simplest form.
    \( \frac{5}{6} - \frac{2}{6} \)
    a. \( \frac{1}{2} \)  b. \( \frac{3}{6} \)  c. \( \frac{7}{12} \)  d. \( \frac{1}{3} \)
Use the circle below for exercises 11 and 12.

11. Which names a chord?
   a. \( \overline{AB} \)  
   b. \( \overline{EG} \)  
   c. \( \overline{CH} \)  
   d. \( \overline{FC} \)

12. Which does not name a radius?
   a. \( \overline{AD} \)  
   b. \( \overline{CD} \)  
   c. \( \overline{CH} \)  
   d. \( \overline{FC} \)

13. Choose the angle defined.
    measures more than 90°, but less than 180°
   a. right  
   b. acute  
   c. obtuse  
   d. straight

14. \[ \frac{30}{349} \]
   a. 12  
   b. 110 R19  
   c. 11 R19  
   d. 11 R11

15. Choose the fraction in simplest form.
    \( \frac{9}{27} \)
   a. \( \frac{3}{9} \)  
   b. \( \frac{2}{4} \)  
   c. \( \frac{1}{2} \)  
   d. \( \frac{1}{3} \)

16. Choose the volume.
    Length: 8 cm  
    Width: 7 cm  
    Height: 9 cm  
   a. 504 cubic cm  
   b. 56 cubic cm  
   c. 63 cubic cm  
   d. 24 cubic cm

17. Find part of the number.
    \( \frac{3}{8} \) of 64 = \( n \)
   a. 8  
   b. 16  
   c. 24  
   d. 11

18. Choose the best compatible numbers to estimate.
    \( 88 \div 29 \)
   a. \( 90 \div 30 \)  
   b. \( 85 \div 30 \)  
   c. \( 90 \div 20 \)  
   d. \( 80 \div 30 \)

19. \[ \frac{17}{397} \]
   a. 22 R 23  
   b. 23  
   c. 23 R6  
   d. 24

20. \[ \frac{43}{6904} \]
   a. 16 R 24  
   b. 160 R 24  
   c. 161  
   d. 160 R 42

**Tell About It**

Explain each step you use to solve the problem.

21. Nick the Baker uses 96 fl oz of milk to bake a dozen cakes.  
    Rick the Baker uses 1 \( \frac{1}{2} \) cups of milk to bake 1 cake.  
    Who uses more milk in each cake?
Math Class

She talks about the decimal point,
The reasons why—
But on the window, buzzing free,
A fly

With two red eyes
Moves slowly up the pane.
She moves the decimal one place left
And then again

The fly moves up
And up, practiced and slow.
What I have learned of decimal points
Flies know.

Myra Cohn Livingston

In this chapter you will:
Learn about tenths and hundredths
Compare, order, and round decimals
Estimate, add, and subtract decimals
Divide money
Use more than one step to solve problems

Critical Thinking/Finding Together
Name the decimal written on the board. Then name and model the new decimal when the decimal point is moved one place to the left.
You can write tenths as a fraction or as a decimal.

Fraction: $\frac{3}{10}$

Decimal: 0.3

Read: three tenths

You can write hundredths as a fraction or as a decimal.

Fraction: $\frac{45}{100}$

Decimal: 0.45

Read: forty-five hundredths

You can write equivalent decimals to name the same part.

$\frac{5}{10}$ or 0.5 = $\frac{50}{100}$ or 0.50

0.5 and 0.50 name the same part. They are equivalent decimals.
Write as a fraction. Then write as a decimal.

1. 2. 3.

Rename as a fraction in simplest form.

4. 0.5 5. 0.25 6. 0.6 7. 0.4 8. 0.75 9. 0.8

Use grid paper to model each. Then write each as a decimal or a fraction.

10. 0.1 11. 12. 0.7 13. 14. 0.09

Are the decimals equivalent? Write yes or no.

15. 0.6; 0.60 16. 0.10; 0.1 17. 0.7; 0.07 18. 0.02; 0.2

Decimals and Fractions on a Number Line

You can model decimals and fractions on a number line.

To what decimal and fraction is each arrow pointing?

19. 20. 21. 22.
Decimals Greater Than One

You can write a mixed number or a whole number as a decimal.

Mixed Number: $3 \frac{25}{100}$

This 3 means 3 ones.

Decimal: 3.25

decimal point

Read: three and twenty-five hundredths

Study these examples.

$2 \frac{1}{10} = 2.1$  
$1 \frac{3}{100} = 1.03$  
$3 = 3.0$

two and one tenth  
one and three hundredths  
three

Write as a mixed number. Then write as a decimal.

1. 

2.
Write each as a decimal.
Then model exercises 3–10 using decimal squares.

3. \( \frac{53}{10} \)  
4. \( \frac{87}{10} \)  
5. \( \frac{42}{10} \)  
6. \( \frac{75}{10} \)

7. \( \frac{921}{100} \)  
8. 10  
9. \( \frac{36}{100} \)  
10. \( \frac{21}{100} \)

11. \( \frac{246}{10} \)  
12. \( \frac{9717}{100} \)  
13. 50  
14. \( \frac{1009}{100} \)

15. three and eight tenths  
16. nine and nineteen hundredths  
17. twelve and one hundredth  
18. one hundred fifty-seven

Write each as a mixed number.

19. 6.4  
20. 4.30  
21. 8.08  
22. 5.01  
23. 60.02

To what decimal is each arrow pointing?

24. \[ \begin{array}{c}
\text{2.0} \\
\text{2.5} \\
\text{3.0}
\end{array} \]

25. \[ \begin{array}{c}
\text{4.10} \\
\text{4.15} \\
\text{4.20}
\end{array} \]

26. \[ \begin{array}{c}
\text{9.60} \\
\text{9.65} \\
\text{9.70}
\end{array} \]

27. \[ \begin{array}{c}
\text{0} \\
\text{5.00} \\
\text{10.00}
\end{array} \]

Write a decimal or a mixed number for each situation.

28. Keisha hiked five and two tenths miles.  
29. Manny ran in a benefit race that was three and eighty hundredths miles.

30. Seo scored nine and nine hundredths on the horizontal bars competition.  
31. Ivan jogged twelve and three tenths miles in two days.

Problem Solving

32. Write a decimal that is:
   a. between 3 and 4.  
   b. less than 9 and greater than 8.  
   c. between 11 and 12.  
   d. greater than 1 and less than 2.
The value of a digit in a decimal depends on its place in the decimal.

Look at the decimals in the place-value chart.

The value of the digit 9 in each decimal is:

- 9 ones, or 9.
- 9 tenths, or 0.9
- 9 tenths, or 0.9
- 9 hundredths, or 0.09
- 9 hundredths, or 0.09

You can write decimals in standard form or in expanded form.

<table>
<thead>
<tr>
<th>Standard Form</th>
<th>Expanded Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.5</td>
<td>20 + 4 + 0.5</td>
</tr>
<tr>
<td>3.60</td>
<td>3 + 0.6</td>
</tr>
<tr>
<td>961.04</td>
<td>900 + 60 + 1 + 0.04</td>
</tr>
<tr>
<td>87.37</td>
<td>80 + 7 + 0.3 + 0.07</td>
</tr>
</tbody>
</table>

Write the place of the red digit. Then write its value.

1. 2.31
2. 0.49
3. 62.75
4. 11.38
5. 129.04
6. 21.59
7. 5.04
8. 30.03
9. 25.15
10. 53.96
11. 4.10
12. 8.56
13. 509.88
14. 9.14
15. 18.03
Write each decimal in expanded form.
16. 0.23  
17. 4.07  
18. 9.94  
19. 1.8  
20. 205.6
21. 91.05  
22. 30.8  
23. 84.73  
24. 670.01  
25. 700.60

Write each in standard form. Then write each word name.
26. \(40 + 2 + 0.9 + 0.07\)  
27. \(500 + 70 + 5 + 0.2 + 0.06\)
28. \(6 + 0.9 + 0.01\)  
29. \(8 + 0.2\)
30. \(0.4 + 0.06\)  
31. \(0.1 + 0.01\)
32. \(800 + 5 + 0.03\)  
33. \(300 + 20 + 0.8\)
34. \(100 + 0.5 + 0.07\)  
35. \(50 + 0.3 + 0.04\)

Write the word name for the number shown in expanded form.
36. \(200 + 30 + 0.6\)  
37. \(50 + 7 + 0.01\)
38. \(90 + 0.1 + 0.02\)  
39. \(400 + 9 + 0.09\)

**CHALLENGE**

Look at the decimal in the place-value chart.

The value of the digit 9 is:

9 thousandths, 0.009 or \(\frac{9}{1000}\)

Write each as a decimal.
40. \(\frac{657}{1000}\)  
41. \(\frac{171}{1000}\)  
42. \(\frac{6}{1000}\)  
43. \(\frac{83}{1000}\)

Write each as a fraction.
44. 0.107  
45. 0.001  
46. 0.034  
47. 0.004
Who rode the greater distance?

To find who rode the greater distance, compare: $2.5 \ ? \ 2.58$

To compare decimals:

- Align the digits by their place value.
- Start at the left. Compare the digits in the greatest place.
- Keep comparing digits until you find two digits that are not the same.

So $2.5 < 2.58$.

Naomi rode the greater distance, 2.58 km.

**Study these examples.**

$0.96 \ ? \ 0.92$

$42.7 \ ? \ 4.7$

$0.96 \ 9 = 9$

$42.7$

$0.92 \ 6 > 2$

$4.7$

So $0.96 > 0.92$.

There are no tens in 4.7.

$4 > 0$

So $42.7 > 4.7$. 

**Weekend Bike Rides**

<table>
<thead>
<tr>
<th>Name</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheena</td>
<td>2.5 km</td>
</tr>
<tr>
<td>Naomi</td>
<td>2.58 km</td>
</tr>
</tbody>
</table>
### Compare. Write $<$, $=$, or $>$.
Use grid paper to model exercises 1–8.

1. $0.4$ ? $0.9$
2. $0.22$ ? $0.18$
3. $0.35$ ? $0.38$
4. $0.65$ ? $0.6$
5. $0.7$ ? $0.70$
6. $0.84$ ? $0.8$
7. $2.7$ ? $1.8$
8. $3.5$ ? $3.9$
9. $5.6$ ? $5.9$
10. $5.47$ ? $5.77$
11. $8.03$ ? $8.30$
12. $2.35$ ? $1.99$
13. $23.05$ ? $8.79$
14. $2.17$ ? $62.1$
15. $14.9$ ? $1.49$
16. $100.1$ ? $100.10$
17. $235.0$ ? $23.5$
18. $604.04$ ? $604.40$
19. $839.00$ ? $839.10$
20. $147.5$ ? $145.7$
21. $252.01$ ? $225.1$
22. $\$5.65$ ? $\$3.65$
23. $\$0.76$ ? $\$0.76$
24. $\$20.19$ ? $\$2.09$
25. $\$1.04$ ? $\$1.40$
26. $\$10.00$ ? $\$10.25$
27. $\$3.09$ ? $\$3.90$

### Problem Solving

28. Ken’s top speed in the bike-a-thon was 32.6 kilometers per hour. Vince’s top speed was 32.65 kilometers per hour. Which boy had the greater top speed?

29. Each week before the bike-a-thon, Misha rode his bike 112.5 km and Luke rode his bike 121.5 km. Who rode his bike the lesser distance each week?

30. Elise had a total of $\$42.75$ in pledges for the bike-a-thon and Andres had a total of $\$42.05$. Who had the greater total pledges?

31. This year the bike-a-thon raised $\$726.50$ for charity. The bike-a-thon last year raised $\$725.75$. Was the greater amount raised this year or last year?
Chapter 13

Order Decimals

Order the finishing times from fastest to slowest.

You can use place value to order decimals from least to greatest.


| 40.1 | 38.03 | 36.33 | least | 36.33 |
| 40.3 | 36.33 | 38.03 | 40.1  | 40.3  |
| 38.03| 40.1  | 40.3  |       | 40.3  | greatest |
| 36.33|       |       | 0.1   | 0.3   |

30 < 40  6 < 8  0 = 0

The order from fastest to slowest: 36.33; 38.03; 40.1; 40.3

or

The order from slowest to fastest: 40.3; 40.1; 38.03; 36.33

You can use a number line to order decimals.

Order from least to greatest: 0.6; 0.4; 0.78; 0.65

The order from least to greatest: 0.4; 0.6; 0.65; 0.78

or

The order from greatest to least: 0.78; 0.65; 0.6; 0.4
Write in order from least to greatest. You may use a number line.

1. 0.2; 0.9; 0.5
2. 3.5; 3.3; 3.35
3. 1.12; 1.02; 1.2
4. 5; 0.5; 0.05
5. 6.7; 6.77; 6.07; 7.67
6. 2.4; 4.2; 2.44; 4.02
7. 10.03; 1.30; 10.3; 1.33
8. 52.6; 62.5; 6.52; 56.2
9. 83.7; 87.37; 87.3; 83.07
10. 13.3; 33.31; 13.33; 130

Write in order from greatest to least. You may use a number line.

11. 0.1; 0.01; 0.11
12. 2.6; 2.06; 6.26
13. 4.04; 4.40; 4.0
14. 9.99; 9.19; 9.9
15. 1.18; 1.8; 1.81; 1.08
16. 17.6; 16.7; 61.7; 17.76
17. 59.03; 59; 53.9; 53.09
18. 44; 4.04; 40.4; 44.04
19. 90.3; 30.93; 30.09; 39.3
20. 75.01; 75.1; 75.11; 7.51

Problem Solving

21. Erhard Keller won the 500-meter speed skating Olympic gold medal twice with times of 39.44 and 40.3 seconds. Uwe-Jens Mey also won the gold medal twice with times of 36.45 and 37.14 seconds. Order these winning times from slowest to fastest.
A number line can help you to round decimals.

Round to the nearest tenth: 0.42, 0.45, and 0.48.

- 0.42 is closer to 0.4. Round down to 0.4.
- 0.45 is halfway between 0.4 and 0.5. Round up to 0.5.
- 0.48 is closer to 0.5. Round up to 0.5.

You can round decimals the same way you round whole numbers:
- Find the place you are rounding to.
- Look at the digit to its right.

Round to the nearest tenth:
- 1.35, 5.62, and 2.48.
- 4.09, 6.7, and 8.54.

- 1.35
  - 5 = 5
  - Round up to 1.4.
- 5.62
  - 2 < 5
  - Round down to 5.6.
- 2.48
  - 8 > 5
  - Round up to 2.5.

- 4.09
  - 0 < 5
  - Round down to 4.
- 6.7
  - 7 > 5
  - Round up to 7.
- 8.54
  - 5 = 5
  - Round up to 9.

Do not write zeros to the right of the place you are rounding to.

Remember: If the digit is less than 5, round down. If the digit is 5 or more, round up.
### Round to the nearest one.

1. 7.3  
2. 9.2  
3. 3.9  
4. 1.5  
5. 12.8  
6. 16.2  
7. 28.5  
8. 62.4  
9. 30.8  
10. 19.7  
11. 4.64  
12. 15.35  
13. 25.78  
14. 41.23  
15. 20.91  
16. 17.52  
17. 71.18  
18. 49.62  
19. 24.03  
20. 3.95

### Round to the nearest tenth.

21. 6.27  
22. 4.64  
23. 9.75  
24. 2.20  
25. 1.11  
26. 31.37  
27. 25.65  
28. 85.06  
29. 24.75  
30. 38.33  
31. 9.47  
32. 13.53  
33. 27.13  
34. 82.75  
35. 63.08  
36. 52.71  
37. 30.59  
38. 81.11  
39. 55.05  
40. 44.89

### Problem Solving

41. What is ten and three tenths rounded to the nearest one?
42. What is six and five tenths rounded to the nearest one?
43. What is seventeen hundredths rounded to the nearest tenth?
44. What is nine and five hundredths rounded to the nearest tenth?
45. Is two and fifteen hundredths rounded to the nearest one 2, 2.2, or 3?
46. Is one and fifty hundredths rounded to the nearest tenth 20, 2.0, or 1.5?

### TEST PREPARATION

47. Choose the decimal that was rounded to get 6.7.
   - A 6.07  
   - B 6.59  
   - C 6.79  
   - D 6.68

48. Choose the decimal that was rounded to get 0.8.
   - F 0.09  
   - G 0.75  
   - H 0.74  
   - J 0.87
Estimate with Decimals

Rounding is one way to estimate decimal sums and differences.

To estimate sums or differences with decimals:
• Round the decimals to the greatest nonzero place of the lesser number.
• Then add or subtract.

Estimate: $123.6 + 8.43$  

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>123.6</td>
<td>124</td>
</tr>
<tr>
<td>+ 8.43</td>
<td>+ 8</td>
</tr>
<tr>
<td>about</td>
<td>132</td>
</tr>
</tbody>
</table>

Estimate: $78.61 - 0.45$

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>78.61</td>
<td>78.6</td>
</tr>
<tr>
<td>- 0.45</td>
<td>- 0.5</td>
</tr>
<tr>
<td>about</td>
<td>78.1</td>
</tr>
</tbody>
</table>

Study these examples.

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.92</td>
<td>0.9</td>
</tr>
<tr>
<td>+ 0.37</td>
<td>+ 0.4</td>
</tr>
<tr>
<td>about</td>
<td>1.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>- 0.18</td>
<td>- 0.2</td>
</tr>
<tr>
<td>about</td>
<td>4.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
<td>9</td>
</tr>
<tr>
<td>+ 5.1</td>
<td>+ 5</td>
</tr>
<tr>
<td>about</td>
<td>14</td>
</tr>
</tbody>
</table>

Round to estimate the sum or the difference. Watch the signs.

1. $5.9 + 3.2$  

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>+ 3.2</td>
<td></td>
</tr>
</tbody>
</table>

2. $9.7 - 4.6$  

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>- 4.6</td>
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</table>

3. $8.75 - 1.17$  

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<tbody>
<tr>
<td>8.75</td>
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<tr>
<td>- 1.17</td>
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</table>

4. $9.38 + 6.04$  

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<tbody>
<tr>
<td>9.38</td>
<td></td>
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<tr>
<td>+ 6.04</td>
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5. $4.91 + 6.73$  

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<tbody>
<tr>
<td>4.91</td>
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</tr>
<tr>
<td>+ 6.73</td>
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6. $42.3 - 6.7$  

<table>
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</thead>
<tbody>
<tr>
<td>42.3</td>
<td></td>
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<tr>
<td>- 6.7</td>
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7. $38.5 + 5.8$  

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<tbody>
<tr>
<td>38.5</td>
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</tr>
<tr>
<td>+ 5.8</td>
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</table>

8. $56.2 - 4.84$  

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<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>56.2</td>
<td></td>
</tr>
<tr>
<td>- 4.84</td>
<td></td>
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</table>

9. $27.8 + 6.65$  

<table>
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<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>+ 6.65</td>
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10. $85.43 - 1.7$  

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</tr>
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<tbody>
<tr>
<td>85.43</td>
<td></td>
</tr>
<tr>
<td>- 1.7</td>
<td></td>
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11. $0.85 + 0.63$  

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</thead>
<tbody>
<tr>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>+ 0.63</td>
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12. $10.3 - 0.81$  

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<tbody>
<tr>
<td>10.3</td>
<td></td>
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<tr>
<td>- 0.81</td>
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</table>

13. $62.77 + 9.84$  

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<tbody>
<tr>
<td>62.77</td>
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<tr>
<td>+ 9.84</td>
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14. $48.5 - 0.69$  

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<tr>
<td>48.5</td>
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<tr>
<td>- 0.69</td>
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15. $26.21 + 0.59$  

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<tbody>
<tr>
<td>26.21</td>
<td></td>
</tr>
<tr>
<td>+ 0.59</td>
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16. $74.36 + 18$  

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<td>74.36</td>
<td></td>
</tr>
<tr>
<td>+ 18</td>
<td></td>
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</table>

17. $62 - 7.8$  

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<tr>
<td>62</td>
<td></td>
</tr>
<tr>
<td>- 7.8</td>
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18. $49.95 - 5.2$  

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.95</td>
<td></td>
</tr>
<tr>
<td>- 5.2</td>
<td></td>
</tr>
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</table>

19. $405.5 - 5.76$  

<table>
<thead>
<tr>
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<th>Rounded</th>
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</thead>
<tbody>
<tr>
<td>405.5</td>
<td></td>
</tr>
<tr>
<td>- 5.76</td>
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</table>

20. $380.4 + 2.35$  

<table>
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</thead>
<tbody>
<tr>
<td>380.4</td>
<td></td>
</tr>
<tr>
<td>+ 2.35</td>
<td></td>
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</tbody>
</table>

21. $4.5 + 39.03$  

<table>
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<th>Rounded</th>
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</thead>
<tbody>
<tr>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>+ 39.03</td>
<td></td>
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</tbody>
</table>

22. $17.03 - 1.5$  

<table>
<thead>
<tr>
<th>Number</th>
<th>Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.03</td>
<td></td>
</tr>
<tr>
<td>- 1.5</td>
<td></td>
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</tbody>
</table>

23. $47 - 6.62$  

<table>
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</thead>
<tbody>
<tr>
<td>47</td>
<td></td>
</tr>
<tr>
<td>- 6.62</td>
<td></td>
</tr>
</tbody>
</table>
Use Front-End Estimation

Front-end estimation is another way to estimate decimal sums and differences.

To make a front-end estimate with decimals:
- Add or subtract the nonzero front digits.
- Write zeros for the other digits.

\[
\begin{array}{ccc}
83.41 & + & 9.3 \\
\downarrow & + & \downarrow \\
64.01 & \text{about} & 50.00
\end{array}
\]

Estimate the sum or the difference. Use front-end estimation.

24. \(30.98 + 56.44\)  
25. \(8.6 + 9.2\)  
26. \(43.21 - 12.04\)  
27. \(7.4 - 2.9\)  
28. \(58.4 - 21.62\)

29. \(0.94 - 0.55\)  
30. \(0.26 + 0.77\)  
31. \(23.2 + 96.09\)  
32. \(48.4 - 18.36\)  
33. \(74.6 - 21.09\)

34. \(8.09 + 8.9\)  
35. \(6.74 - 1.53\)  
36. \(81.2 - 27.35\)  
37. \(50.09 + 97.79\)  
38. \(59.5 - 24.07\)

Problem Solving  Use front-end estimation.

39. Maria jogged 97.5 miles. Audrey jogged 79.37 miles. About how many more miles did Maria jog than Audrey?

DO YOU REMEMBER?

Find the quotient.

40. \(2 \div 37.32\)  
41. \(4 \div 10.40\)  
42. \(9 \div 2.79\)  
43. \(8 \div 64.16\)

44. \(24 \div 87.60\)  
45. \(53 \div 57.24\)  
46. \(39 \div 82.29\)  
47. \(42 \div 41.16\)
Shawn walked 2.1 km in the morning and 1.95 km in the afternoon. How far did he walk altogether?

To find how far altogether, add:

\[ 2.1 + 1.95 \]

First, round to estimate the sum:

\[ 2.1 \quad 1.95 \rightarrow 2 + 2 = 4 \]

Then add.

```
Add the
tenths. Regroup.

Line up the decimal points. Add the hundredths. Add the ones.

2.1 0
+ 1.9 5
---
5

2.1 0
+ 1.9 5
---
4.0 5

Think...

4.05 is close to 4. The answer is reasonable.
```

Shawn walked 4.05 km altogether.

**Study these examples.**

```
1. 0.8
+ 0.6
---
1.4

11. 5.7 5
+ 0.9 0
---
6.6 5

1. 7 5.0 0
+ 6.4 2
---
8 1.4 2

Write the decimal point in the sum.
```

**Round to estimate the sum. Then add.**

1. 0.3
   + 0.6

2. 1.4
   + 6.2

3. 0.9
   + 0.7

4. 5.6
   + 9.8

5. 8.5
   + 10.5

6. 0.12
   + 0.43

7. 3.01
   + 0.57

8. 0.84
   + 0.77

9. $2.9
   + 7.83

10. 4.5
    + 2.86

426 Chapter 13
Find the sum.

11. \(5.03 + 8.9\)
12. \(83.8 + 47.65\)
13. \(90.41 + 62.7\)
14. \(17.54 + 5.9\)
15. \(45 + 9.24\)
16. \(16.75 + 4.32 + 10.08\)
17. \(0.7 + 1.2 + 8.9\)
18. \(92.3 + 48.05 + 18.39\)
19. \(74.32 + 10.1 + 0.8\)
20. \(59.11 + 10.08 + 8.9\)

Align and add.

21. \(0.3 + 8.44\)
22. \(12.87 + 34\)
23. \(0.95 + 22.6\)
24. \(62 + 0.8\)
25. \(32.5 + 575 + 0.49\)
26. \(367.92 + 0.09 + 5.1\)

Problem Solving

27. Val ran the first 100 meters of a 200-meter dash in 15.34 seconds. She ran the next 100 meters in 16.9 seconds. What was Val’s time in the 200-meter dash?

28. Xavier swam the 100-meter freestyle in 58.95 seconds. If he could keep up that pace for another 100 meters, what would be his time in the 200-meter freestyle?

29. The times for the 4 legs of a relay race were 10.9 seconds, 12.74 seconds, 11.08 seconds, and 10.06 seconds. How long did it take to run the race?

Write About It

Add. Use mental math or paper and pencil. Explain in your Math Journal why you chose your methods.

30. \(15 + 5.83\)
31. \(6.75 + 4.99\)
32. \(13.7 + 0.05\)
33. \(71.74 + 86.9\)
34. \(94.7 + 68.5\)
35. \(8.39 + 9.92\)
36. \(10.9 + 10\)
37. \(4.66 + 0.7\)
38. \(133.04 + 0.8 + 3.47\)
13-9 Subtract Decimals

How much farther is it from the Village to Black Rock than from Old Farm to Sam’s Beach?

To find how much farther, subtract:

\[ 26 \, - \, 18.46 \]

First, round to estimate the difference:

\[ 30 \, - \, 20 = 10 \]

Then subtract.

\[
\begin{align*}
9 & \quad 5 \quad 10 \quad 10 \\
2.6 & \quad 0 \quad 0 & \quad 5 \quad 10 \quad 10 \\
- \quad 1.8 & \quad 4 \quad 6 & \quad - \quad 1.8 \quad 4 \quad 6 \\
\quad 4 & \quad 5 \\
\end{align*}
\]

Remember: \( 26 = 26.00 \)

It is 7.54 km farther. 7.54 is close to 10. The answer is reasonable.

Study these examples.

\[
\begin{align*}
1.2 & = 12 \text{ tenths} \\
\end{align*}
\]

\[
\begin{align*}
9 & \quad 10 \quad 10 \\
2.6 & \quad 0 \quad 0 & \quad 5 \quad 10 \quad 10 \\
- \quad 8.2 & \quad 0 & \quad - \quad 3.4 \quad 2 \\
\quad 1.8 & \quad 5 & \quad 6.3 \quad 8 \\
\end{align*}
\]
Round to estimate the difference. Then subtract.

1. 18.7  
   − 13.9
2. 24.2  
   − 16.7
3. 3.43  
   − 2.84
4. 62.19  
   − 48.75
5. 75.11  
   − 27.25

6. 23.16  
   − 15.9
7. 82.6  
   − 56.75
8. 64.5  
   − 56.48
9. 10  
   − 9.07
10. 16  
    − 15.5

11. 17  
    − 7.4
12. 92.1  
    − 8.32
13. 76  
    − 9.09
14. 58  
    − 0.99
15. 31.2  
    − 0.99

Align and subtract.

16. 90.17 − 9.07
17. 40.6 − 2.04
18. 8.34 − 0.5

19. 100 − 55.5
20. 99 − 0.09
21. 76.1 − 75.06

Use the map on page 428.

22. How much closer to the Village is the Beacon than Black Rock?

23. How much farther from Old Farm is Black Rock than Sam’s Beach?

24. Is the route from Sam’s Beach to the Beacon longer or shorter than the distance from Black Rock to Old Farm? How much longer or shorter?

25. How many kilometers would you travel if you went from Old Farm to the Beacon by way of Sam’s Beach and the Village?

Subtract. Then check by adding.

26. 506.2
    − 175.35
27. 239.07
    − 86.6
28. 400.02
    − 0.8
29. 604
    − 64.91
Martin designs greeting cards. They cost $0.50 each if you buy them separately, or you can buy a box of 25 cards for $12. Which is the better buy?

To find which is the better buy, find the cost of one boxed card. Then compare the cost to $0.50.

To find the cost of one boxed card, divide: $12 ÷ 25

\[
\begin{array}{c}
25) \underline{12.00} \\
-100 \\
\hline
200 \\
-200 \\
\hline
0
\end{array}
\]

\[\frac{12.00}{25} = 0.48\]

$0.48 < $0.50

So the better buy is a box of 25 cards for $12.

Study this example.

\[
\begin{array}{c}
8) \underline{18.00} \\
-16 \\
\hline
20 \\
-16 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
\]

\[\frac{18.00}{8} = 2.25\]
Find the quotient.
1. $27 \div 6$  2. $41 \div 5$  3. $54 \div 8$  4. $38 \div 4$
5. $19 \div 2$  6. $90 \div 8$  7. $45 \div 6$  8. $78 \div 8$
9. $6 \div 24$  10. $48 \div 32$  11. $60 \div 16$
12. $8 \div 10$  13. $21 \div 14$  14. $32 \div 20$

Divide. Then check.
15. $4 \overline{)17}$  16. $5 \overline{)2}$
17. $8 \overline{)60}$
18. $2 \overline{)9}$  19. $8 \overline{)10}$
20. $4 \overline{)5}$
21. $52 \overline{)65}$  22. $25 \overline{)8}$
23. $48 \overline{)12}$
24. $66 \overline{)33}$  25. $72 \overline{)54}$
26. $84 \overline{)21}$

Tell which is the better buy.
27. 8 erasers for $2.80
or
10 erasers for $3

28. 5 notebooks for $10
or
9 notebooks for $18.45

29. 6 bottles of shampoo for $21
or
8 bottles of shampoo for $22

30. 12 pencils for $3
or
10 pencils for $2

31. 20 plums for $14
or
16 plums for $12

32. 10 melons for $12
or
4 melons for $6

33. 8 juice cartons for $18
or
12 juice cartons for $33

34. 6 boxes of detergent for $27
or
4 boxes of detergent for $17
Hector bought 3 jumbo magnets and 1 magnifying glass at the science sale. How much change did he get from $10?

**Visualize the facts of the problem.**

**Facts:**
- 3 jumbo magnets—$1.19 each
- 1 magnifying glass—2 for $5.78
- paid $10

**Question:** How much change did Hector get?

**Plan**

**Step 1:** Multiply to find the cost of 3 jumbo magnets. $3 \times 1.19$

**Step 2:** Divide to find the cost of 1 magnifying glass. $5.78 \div 2$

**Step 3:** Add to find the total cost.

**Step 4:** Subtract to find Hector’s change from $10.

**Solve**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2$</td>
<td>$1$ magnifying</td>
<td>$1$</td>
<td>$9$</td>
</tr>
<tr>
<td>$1.19$</td>
<td>$2$</td>
<td>$1$</td>
<td>$10$</td>
</tr>
<tr>
<td>$\times 3$</td>
<td>$5.78$</td>
<td>$2.89$</td>
<td>$10.00$</td>
</tr>
<tr>
<td>$3.57$</td>
<td>$-4$</td>
<td>$6.46$</td>
<td>$3.54$</td>
</tr>
</tbody>
</table>

3 magnets - 16 total cost

Estimate to check: cost of magnets $3 \times 1 = 3$

cost of magnifying glass $6 \div 2 = 3$

$10 - 6 = 4$ change

The answer $3.54$ is close to the estimate of $4$. 

**Check**
Use more than one step to solve each problem.

1. Mary wants 4 tubes of oil paint at $4.59 each and 3 brushes at $4.19 each. If she has saved $30.75, how much more money does she need?

   **Read**
   Create a mental picture of the problem.

   **Facts:**
   - 4 paint tubes at $4.59 a tube
   - 3 brushes at $4.19 a brush
   - Mary has saved $30.75.

   **Question:** How much more money does Mary need to buy the items?

   **Plan**
   Plan the steps to follow.

   - Step 1: Multiply to find the cost of 4 paint tubes.
   - Step 2: Multiply to find the cost of 3 brushes.
   - Step 3: Add to find the total cost.
   - Step 4: Subtract $30.75 from the total cost to find how much more money Mary needs.

   **Solve**

   **Check**

2. Mr. Ortiz collects 7.5 lb of honey in one bucket and 5.5 lb in another. He gives 1.2 lb of honey to a neighbor and 2.1 lb each to two workers. How much honey is left?

3. A shelf is 104.5 cm long. A set of encyclopedias uses 64.6 cm of space, and two books use 2.5 cm each. Is there more than 30 cm of space left? how much more or less?

4. It takes Lyn 58.34 s to swim a lap doing the backstroke and 42.15 s to swim a lap doing the crawl. She does 2 laps using the backstroke and 1 using the crawl. How much less than 3 minutes does she swim?
Solve each problem and explain the method you used.

1. On Monday, 2.4 cm of rain fell in the morning and another 1.8 cm fell in the afternoon. How much rain fell on Monday?

2. The time between a bolt of lightning and the sound of thunder was 4.72 s. What is this time rounded to the nearest second?

3. A rainstorm lasted 78.2 minutes. How much longer than an hour was the storm?

4. A meteorologist found that the diameter of a hail pellet measured 2.28 cm. What is this measurement to the nearest tenth?

5. The meteorologist found hail pellets with these diameters: 2.28 mm, 1.09 mm, 1.9 mm, 0.98 mm, and 1.42 mm. Order the pellets from smallest to largest.

6. The temperature during a hailstorm started at 11.4°C and then dropped by 0.5 degree. What was the temperature then?

7. Ms. Dell’s car received 5 dents during the storm. She paid $85.50 to repair the damage. Each dent cost the same amount to fix. How much did it cost to repair each dent?

8. During a snowstorm, 12.3 dm of snow fell. There were already 45.9 dm of snow on the ground. How much snow was on the ground after the storm?
Choose a strategy from the list or use another strategy you know to solve each problem.

9. At 6:00 A.M. the snow was 1.4 cm deep. It snowed 1.4 cm more every half hour. What time was it when the snow was 11.2 cm deep?

10. A gopher dug a tunnel in the snow. The tunnel began at ground level, rose 2.2 ft, fell 0.7 ft, and then rose another 2.8 ft. How high above ground level did the tunnel end?

11. A winter storm warning lasted 4.5 h. It began at 2:30 P.M. The storm brought 4.3 in. of snow. When did the warning end?

12. Lina broke off 1.2 dm from a long icicle. It melted and lost another 0.8 dm. It was 3.5 dm long at the end of the day. How long was the original icicle?

13. Hugh built a snow sculpture with three large snowballs. They weighed 45.2 lb, 32.7 lb, and 20.1 lb. Luke’s snow sculpture used three 28.5 lb snowballs. Whose snow sculpture was heavier? by how much?

Use the line graph for problems 14 and 15.

14. Between which two months did the amount of snowfall change the most on Mt. Sloper?

15. Joan did not ski in March. She did ski during a month that received less than 7 in. of snow. During which month did Joan ski?
Chapter 13

Check Your Progress

Lessons 1–12

Write the place of the underlined digit. Then write its value. (See pp. 416–417.)

1. 3.1 2. 2.42 3. 0.96 4. 1.92
5. 59.6 6. 8.5 7. 2.23 8. 15.49

Write as a decimal. (See pp. 412–415.)

9. five tenths 10. thirty-two hundredths
11. three and four tenths 12. eight hundredths

Compare. Write <, =, or >. (See pp. 418–419.)

13. 0.03 ? 0.7 14. 9.45 ? 12.8 15. 0.64 ? 0.05
16. 12.8 ? 12.80 17. 7.02 ? 7 18. 5.06 ? 5.6

Estimate the sum or difference. Then add or subtract. (See pp. 426–429.)

19. 0.6
20. 4.9
21. 23.5
22. 44

+ 0.2
− 2.73
+ 13.95
− 6.8

Round each to the nearest one. Then round each to the nearest tenth. (See pp. 422–423.)

23. 12.17 24. 32.74 25. 0.88

Compute. (See pp. 430–431.)

26. $36 ÷ 15
27. 8$2
28. $5 ÷ 25

Problem Solving

29. The weight of one bag of onions is 2.47 lb. The weight of another is 0.73 lb. Estimate the weight of the two bags of onions. (See Still More Practice, p. 472.)
## Magic Squares

In a **magic square** each row, column, and diagonal has the same sum, called the **magic sum**.

<table>
<thead>
<tr>
<th>Row Sums</th>
<th>Column Sums</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 + 12 + 5 = 24</td>
<td>7 + 6 + 11 = 24</td>
</tr>
<tr>
<td>6 + 8 + 10 = 24</td>
<td>12 + 8 + 4 = 24</td>
</tr>
<tr>
<td>11 + 4 + 9 = 24</td>
<td>5 + 10 + 9 = 24</td>
</tr>
</tbody>
</table>

Diagonal Sums

7 + 8 + 9 = 24 \quad 5 + 8 + 11 = 24

Copy and complete each magic square.

1. \[
\begin{array}{ccc}
6 & 7 & ? \\
? & 5 & 9 \\
? & 3 & ?
\end{array}
\]

2. \[
\begin{array}{ccc}
9 & ? & 7 \\
4 & 6 & ? \\
5 & ? & ?
\end{array}
\]

3. \[
\begin{array}{ccc}
? & 3 & ? \\
7 & 10 & ? \\
? & 17 & 5
\end{array}
\]

4. \[
\begin{array}{ccc}
2.7 & 3.8 & ? \\
5.2 & 3.6 & ? \\
? & 3.4 & 4.5
\end{array}
\]

5. \[
\begin{array}{ccc}
3.5 & 7.5 & 8.5 \\
11.5 & ? & ? \\
4.5 & 5.5 & ?
\end{array}
\]

6. \[
\begin{array}{ccc}
8.6 & 7 & 6.6 \\
5.4 & ? & ? \\
8.2 & 7.8 & ?
\end{array}
\]

7. \[
\begin{array}{ccc}
? & 63 & 68 \\
? & 67 & ? \\
? & 71 & 64
\end{array}
\]

8. \[
\begin{array}{ccc}
2.42 & 8 & 5.96 \\
9 & 5.46 & ? \\
4.96 & ? & ?
\end{array}
\]

9. \[
\begin{array}{ccc}
? & ? & 24 \\
? & 15 & ? \\
6 & ? & 12
\end{array}
\]

**Hint**

Use multiples of 3.
Chapter 13 Test

Write the place of the underlined digit. Then write its value.
1. 4.69  2. 47.33  3. 2.26  4. 0.13  5. 55.74

Write as a decimal.
6. $\frac{25}{100}$  7. $\frac{50}{100}$
8. four and six tenths  9. seven and seven hundredths

Compare. Write <, =, or >.
10. 0.8 ? 0.4  11. 0.7 ? 0.70  12. 2.43 ? 2.39

Write in order from least to greatest.
13. 13.4, 6.5, 13.3, 6.05  14. 2.15, 2.51, 2.05, 2.5

Round to the nearest tenth.
15. 3.94  16. 17.25  17. 12.53

Estimate the sum or difference. Then add or subtract.
18. 15  19. 0.46  20. 8.79  21. 2.6
   $-$ 3.21  $+$ 0.34  $+$ 9.7  $-$ 0.85

Problem Solving

Use a strategy you have learned.
22. Last year Kim measured 153.8 cm. Then she grew 6.8 cm. How tall is she now?
23. Which is the better buy: 25 stickers for $3 or 20 stickers for $2?

Tell About It

Are the decimals equivalent? Explain your answer.
24. 0.6; 0.60
25. 0.10; 0.1
26. 0.7; 0.07

Performance Assessment

27. Draw a number line to show the numbers in the box.
   9.08  9.6  9.6$\frac{6}{10}$  9.04  9.89
## Test Preparation

Choose the best answer.

1. Round 674,029 to the nearest ten thousand.
   - a. 700,000
   - b. 680,000
   - c. 674,000
   - d. 670,000

2. $8000 - 592$
   - a. 7408
   - b. 7518
   - c. 7592
   - d. not given

3. Estimate.
   - $42)7846$
   - a. 200
   - b. 300
   - c. 2000
   - d. 3000

4. Which type of graph would you use to show changes in data over time?
   - a. bar graph
   - b. pictograph
   - c. circle graph
   - d. line graph

5. Is the fraction three sevenths closer to 0, closer to $\frac{1}{2}$, or closer to 1?
   - a. 0
   - b. $\frac{1}{2}$
   - c. 1
   - d. cannot tell

6. Which figure has half-turn symmetry?
   - a. M
   - b. N
   - c. P
   - d. none of these

7. Round to estimate.
   - $3236 + 5873 + 1884$
   - a. 8000
   - b. 9000
   - c. 11,000
   - d. 15,000

8. $85 \times 409$
   - a. 5317
   - b. 34,725
   - c. 34,765
   - d. not given

9. $\frac{8 \text{ ft } 4 \text{ in.}}{} + \frac{7 \text{ ft } 10 \text{ in.}}{}$
   - a. 15 ft 4 in.
   - b. 15 ft 6 in.
   - c. 16 ft 2 in.
   - d. 16 ft 6 in.

10. What is the probability that the spinner will land on blue?
    - a. $\frac{2}{4}$
    - b. $\frac{2}{5}$
    - c. $\frac{1}{2}$
    - d. $\frac{1}{5}$

11. What is the least common multiple (LCM) of 4 and 6?
    - a. 2
    - b. 24
    - c. 36
    - d. none of these

12. What is the volume of a rectangular prism that is 12 m long, 9 m wide, and 7 m high?
    - a. 28 cubic meters
    - b. 126 cubic meters
    - c. 189 cubic meters
    - d. 756 cubic meters
13. Choose the equivalent mixed number in simplest form.

\[
\frac{34}{8} \quad a. \quad 3\frac{10}{8} \quad b. \quad 3\frac{5}{4} \quad c. \quad 4\frac{1}{4} \quad d. \quad 4\frac{2}{8}
\]

14. \(4 \times (5 + 7) = \) ?

a. \((4 \times 5) + 7\)  
b. \((4 \times 5) + (4 \times 7)\)  
c. \((4 + 5) \times (4 + 7)\)  
d. not given

15. Compare.

90 g \( \) 9 kg

a. <  
b. =  
c. >

16. Choose the value of the underlined digit.

692.71

a. 7  
b. 0.7  
c. 0.07  
d. 70

17. \(96\overline{7128}\)

a. 740 R24  
b. 7 R24  
c. 704 R24  
d. 74 R24

19. Choose the correct decimal.

\[17\frac{9}{100}\]

a. 17.90  
b. 17.09  
c. not given

20. \(45\overline{901}\)

a. 20 R1  
b. 2 R1  
c. 200 R1  
d. not given

21. Choose the rounded sum.

\[
\begin{array}{c}
63.6 \\
+ 9.27 \\
\hline
72.87 \\
\end{array}
\]

22. Divide.

\[
\begin{array}{c}
\$36 \div 40 \\
\hline
\end{array}
\]

a. $.09  
b. $.90  
c. $.99  
d. $9.00

23. Find the value of the expression.

\[34 - n, \quad \text{when} \ n = 9\]

a. 9  
b. 43  
c. 25  
d. 34 - 9

24. The times in seconds for the 4 legs of a relay race were 9.97, 10.15, 10.08, and 9.99. How long did it take to run the race?

a. 28.99 s  
b. 39.09 s  
c. 40.19 s  
d. 44.19 s

25. Round 49.92 to the nearest one.

26. Round 87.99 to the nearest tenth.
In this chapter you will:
Use variables in number sentences
Find missing numbers and symbols
Learn about function tables and parentheses
Graph equations on coordinate grids
Solve problems in more than one way

Critical Thinking/FindingTogether
Round and estimate to name the next three numbers in the doubling sequence above. Explain how you rounded and estimated each number.

Arithmetic
If you take a number and double it and double it again and then double it a few more times, the number gets bigger and bigger and goes higher and higher and only arithmetic can tell you what the number is when you decide to quit doubling.

From “Arithmetic” by Carl Sandburg.
A scout troop is planning a trip to a cave. They rent a minibus for $17 per hour. The trip will take 5 hours. How much will the bus cost?

Write an equation, or a number sentence, to help you solve the problem.

<table>
<thead>
<tr>
<th>What do you know?</th>
<th>What do you need to know?</th>
<th>Which operation will you use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>bus costs $17 per hour</td>
<td>how much the bus will cost for 5 hours</td>
<td>multiplication</td>
</tr>
</tbody>
</table>

Use a variable to stand for the unknown.

- Let \( n \) stand for how much the bus will cost.
- Write the equation. \( 5 \times 17 = n \)
- Solve for \( n \). \( 85 = n \)

The bus will cost $85.

Choose the correct equation for each problem. Then solve each problem.

1. The first cave chamber was 18 feet high. The second chamber was only 4 feet high. How much higher was the first chamber?
   - a. \( 4 + 18 = n \)
   - b. \( 4 \times 18 = n \)
   - c. \( 18 - 4 = n \)

2. The scouts discovered 225 bats in the first chamber and 172 in the second. How many bats did they discover in the two chambers?
   - a. \( 225 + 172 = n \)
   - b. \( 225 - 172 = n \)
   - c. \( 172 \times 225 = n \)
Write an equation to solve each problem.

3. One chamber was 195 ft below sea level. Another chamber was 119 ft deeper. How many feet below sea level was the second chamber?

4. Each of 24 scouts brought 15 ft of rope. If they laid their ropes end to end to form a long strand, how many feet long would it be?

5. Zack found an arrowhead that was about 1500 years old. Chang found one that was twice as old. About how old was Chang’s arrowhead?

6. Lucy’s Lunches prepared 24 box lunches for the scouts. The total cost of the lunches was $94.80. What was the cost of each box lunch?

7. Each guide was to lead a team of 5 scouts. There were 24 scouts in all. How many teams of 5 were there? How many guides were needed for all the scouts?

8. The lengths of five passages in a cave are 17.2 mi, 24.5 mi, 18.3 mi, 16.4 mi, and 23.6 mi. What is the total length of the five passages in the cave?


10. A cave has 144 miles of underground passages. Exploring 3 miles each day, how many days would it take to explore all the passages?

Do you remember?

Find the value of the variable.

11. $7 + n = 15$  
12. $n - 5 = 8$  
13. $6 \times n = 36$

14. $40 \div n = 8$  
15. $12 - n = 5$  
16. $n \div 7 = 9$

17. $n \times 4 = 28$  
18. $n \div 8 = 1$  
19. $n + 5 = 5$
Find Missing Numbers

What number does $a$ stand for?

$4a = 6 + 6$

To solve:

- Compute where possible.
  
  $4a = 6 + 6$
  
  $4a = 12$

- Solve for the missing factor.
  
  $a = 12 \div 4$
  
  $a = 3$

- Check.
  
  $4 \times 3 = 6 + 6$
  
  $12 = 12$

What number does $x$ stand for?

$3 \times 5 = x \div 2$

- Compute.
  
  $3 \times 5 = x \div 2$
  
  $15 = x \div 2$

- Solve.
  
  $15 \times 2 = x$
  
  $30 = x$

- Check.
  
  $3 \times 5 = 30 \div 2$
  
  $15 = 15$

Find the number that $n$ stands for in each equation.

1. $12 - 5 = n - 7$
2. $4 \times n = 8 \times 3$
3. $40 \div 8 = 30 \div n$
4. $n + 14 = 3 \times 6$
5. $n \div 8 = 22 - 17$
6. $2 \times 4 = 56 \div n$
Find the number that \( y \) stands for in each equation.

7. \( y \div 3 = 63 \div 7 \)  
8. \( 9 + 7 = y + 8 \)  
9. \( 2 \times 10 = 5y \)

10. \( 9 + y = 3 \times 6 \)  
11. \( 42 \div 7 = 16 - y \)  
12. \( 10 + 7 = y - 3 \)

13. \( 3y = 18 \div 3 \)  
14. \( y - 10 = 7 \times 2 \)  
15. \( 25 - 15 = y \div 4 \)

16. \( 8y = 26 - 26 \)  
17. \( 9 \times 8 = y \times 72 \)  
18. \( 100 + y = 9 \times 12 \)

19. \( 50 \times 3 = 200 - y \)  
20. \( y \div 2 = 10 \times 25 \)  
21. \( 12 \times 12 = 130 + y \)

22. \( y + 99 = 59 + 40 \)  
23. \( 43 \times y = 0 \div 34 \)  
24. \( 125 \times 2 = 400 - y \)

25. \( 64 + y + 22 = 100 + 20 + 8 \)  
26. \( 8 \times 8 \times y = 2 \times 250 + 12 \)

27. \( 500 \div 50 \times 95 = y + 2 \times 450 \)

Find the number that \( n \) stands for in each equation.

28. \( n + n = 6 \)  
29. \( 7 - n = 7 \)  
30. \( n \times n = 25 \)

Think: What number added to itself equals 6?

31. \( 4n = n \)  
32. \( n \div 5 = n \)  
33. \( n + n = 30 \)  
34. \( 64 \div n = n \)

**CHALLENGE**

Find the numbers that \( m \) and \( n \) stand for in each pair of equations.

35. \( m + n = 9 \)  
36. \( m \times n = 24 \)  
37. \( m \times n = 8 \)

\( m + m = 8 \)  
\( n \times n = 9 \)  
\( n - m = 7 \)
The table at the right is called a function table.

For each input number, or numbers that you put into the table, there is only one output. You can find the output number by following the rule.

The input is 12. What is the output?

\[
\text{Input} \quad \text{Rule} \quad \text{Output} \\
12 \quad \times \quad 3 \quad = \quad 36
\]

The output is 36.

What is the rule, or function, for this function table?

Think how each input is related to its output.

\[
\begin{align*}
40 \div 4 &= 10 \\
32 \div 4 &= 8 \\
28 \div 4 &= 7 \\
20 \div 4 &= 5
\end{align*}
\]

The rule is \( \div 4 \).

Complete each function table.

1. **Rule: + 7**

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>?</td>
</tr>
<tr>
<td>25</td>
<td>?</td>
</tr>
<tr>
<td>42</td>
<td>?</td>
</tr>
</tbody>
</table>

2. **Rule: − 11**

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>?</td>
</tr>
<tr>
<td>20</td>
<td>?</td>
</tr>
<tr>
<td>45</td>
<td>?</td>
</tr>
<tr>
<td>63</td>
<td>?</td>
</tr>
</tbody>
</table>

3. **Rule: ÷ 2**

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>?</td>
</tr>
<tr>
<td>210</td>
<td>?</td>
</tr>
<tr>
<td>180</td>
<td>?</td>
</tr>
<tr>
<td>100</td>
<td>?</td>
</tr>
</tbody>
</table>
Complete each function table.

<table>
<thead>
<tr>
<th>4. Rule: ( \times 9 )</th>
<th>5. Rule: ( \div 20 )</th>
<th>6. Rule: ( \times 43 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Output</td>
<td>Input</td>
</tr>
<tr>
<td>5</td>
<td>?</td>
<td>500</td>
</tr>
<tr>
<td>8</td>
<td>?</td>
<td>240</td>
</tr>
<tr>
<td>10</td>
<td>?</td>
<td>180</td>
</tr>
<tr>
<td>25</td>
<td>?</td>
<td>120</td>
</tr>
<tr>
<td>51</td>
<td>?</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Output</td>
<td>Input</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>12</td>
<td>96</td>
<td>58</td>
</tr>
<tr>
<td>20</td>
<td>160</td>
<td>42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. Rule: ( \times 7 )</th>
<th>11. Rule: ( \div 9 )</th>
<th>12. Rule: ( \times 15 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Output</td>
<td>Input</td>
</tr>
<tr>
<td>?</td>
<td>63</td>
<td>?</td>
</tr>
<tr>
<td>?</td>
<td>77</td>
<td>?</td>
</tr>
<tr>
<td>?</td>
<td>98</td>
<td>?</td>
</tr>
<tr>
<td>?</td>
<td>112</td>
<td>?</td>
</tr>
</tbody>
</table>

**CHALLENGE**

13. Which rule describes the pattern shown in the table?

<table>
<thead>
<tr>
<th>□</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>○</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>8</td>
<td>15</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

a. ○ + 5 = □
b. □ - 11 = ○
c. ○ × ○ + 1 = □
d. ○ × ○ - 1 = □
The function, or rule, of a function table can be an equation.

<table>
<thead>
<tr>
<th>Rule:  ( y = 2x )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input (x)</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

You can graph an equation on a coordinate grid.

To graph an equation:

- Write the values of \( x \) and \( y \) as ordered pairs \((x,y)\).
- Graph the ordered pairs on a coordinate grid.
- Connect the points with a line.

Use the equation \( y = x \div 3 \) for exercises 1–3.

1. Complete the function table.

<table>
<thead>
<tr>
<th>Input</th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Write the values of \( x \) and \( y \) as ordered pairs.

3. Graph the ordered pairs on a coordinate grid. Connect the points with a line.
Use the function table for exercises 4–6.

4. Complete the function table. Find the rule.

<table>
<thead>
<tr>
<th>Rule: ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
</tr>
<tr>
<td>Output</td>
</tr>
</tbody>
</table>

5. Write the values of x and y as ordered pairs.

6. Graph the ordered pairs on a coordinate grid. Connect the points with a line.

For each equation, complete a function table with 5 values for x and y. Then graph each set of ordered pairs on a coordinate grid.

7. \( y = x + 2 \)

8. \( y = x \div 2 \)

9. \( y = 2x + 2 \)

Problem Solving

Make a function table to solve each problem. Then graph the ordered pairs on a coordinate grid.

10. Maria needs 2 pizzas for every 6 people at her party. How many pizzas does she need for 24 people?

11. Tad needs 2 cups of punch for every guest at his party. How many cups of punch does he need for 9 guests?

Challenge

Use the coordinate grid you made for exercise 11.

12. Extend the line you drew on the coordinate grid for 10–14 guests.

13. How many cups of punch would Tad need for 13 guests?
The symbol = means “is equal to.”

\[ 8 = 8 \\
4 + 5 = 9 \\
15 = 3 \times 5 \\
6 + 1 = 5 + 2 \]

The symbol ≠ means “is not equal to.”

\[ 7 \neq 9 \\
13 - 4 \neq 12 \\
6 \neq 20 \div 5 \\
4 \times 3 \neq 3 \times 5 \]

Which symbol completes this number sentence?

\[ 8 \times 6 \, ? \, 25 + 25 \]

To find the correct symbol:

- Simplify the expression on each side of the missing symbol.

\[ 8 \times 6 \, ? \, 25 + 25 \\
48 \, ? \, 50 \]

- Compare. Write = or ≠.

\[ 48 \neq 50 \]

So \( 8 \times 6 \neq 25 + 25 \).

Study these examples.

\[ 3 \times 15 \, ? \, 39 + 6 \]

\[ 45 \, ? \, 45 \]

\[ 3 \times 15 = 45 \]

\[ 60 \times 9 \, ? \, 720 - 170 \]

\[ 540 \, ? \, 550 \]

\[ 540 < 550 \]

Write the letter of the correct answer.

1. \( 6 + 4 \neq ? \)
   - a. \( 13 - 3 \)
   - b. \( 20 \div 2 \)
   - c. \( 4 \times 2 \)

2. \( 7 \times 9 = ? \)
   - a. \( 87 - 15 \)
   - b. \( 39 + 24 \)
   - c. \( 40 + 16 \)

3. \( 100 \div 2 \neq ? \)
   - a. \( 2 \times 25 \)
   - b. \( 30 + 30 \)
   - c. \( 62 - 12 \)

4. \( 36 \div 6 = ? \)
   - a. \( 30 \div 5 \)
   - b. \( 36 - 6 \)
   - c. \( 6 \times 6 \)
Compare. Write = or ≠.

5. 10 + 8 ? 9 + 6
6. 13 − 5 ? 11 − 3
7. 5 × 8 ? 10 × 4
8. 54 ÷ 6 ? 56 ÷ 8
9. 4 + 5 ? 15 − 6
10. 2 × 3 ? 30 ÷ 6
11. 45 × 3 ? 125 + 10
12. 225 ÷ 25 ? 240 ÷ 30
13. 7250 + 100 ? 8450 − 200
14. 75 × 4 ? 900 ÷ 30
15. 586 − 139 ? 328 + 160
16. 396 ÷ 3 ? 12 × 11
17. 685 ÷ 5 ? 5 × 71
18. 8 × 525 ? 7 × 600
19. $4.50 + $1.15 ? 4 × $1.25
20. 6 × $5.95 ? 7 × $6.95

Compare. Write <, =, or >.

21. 500 ÷ 2 ? 200 ÷ 5
22. 50 × 600 ? 40 × 700
23. 2000 − 1500 ? 50 × 8
24. 850 − 125 ? 525 + 200
25. 2 × 550 ? 5 × 250
26. 400 ÷ 5 ? 500 ÷ 4

Problem Solving

27. Is the product of 8 and 45 equal to the difference of 500 and 140?
28. Is the sum of 534 and 166 equal to the product of 250 and 3?

TEST PREPARATION

29. Which numbers complete the equation?
   56 ÷ ? = 5 + ?
   A 2, 2      B 5, 1
   C 7, 3      D 9, 5
30. Which numbers complete the number sentence?
   8 × ? ≠ 6 × ?
   F 3, 4      G 3, 5
   H 6, 8      J 9, 12
Use Parentheses

How would you go about using the order of operations to simplify this problem?

\[ 40 - 3 \times 5 + (10 \div 2) = a \]

To simplify:

- Always do the operations in parentheses first.
- Next, multiply or divide. Work in order from left to right.
- Then, add or subtract. Work in order from left to right.

**Study these examples.**

\[
\begin{align*}
2 \times (4 + 3) - 10 &+ (4 \times 4) = b \\
2 \times 7 &- 10 + 16 = b \\
14 &- 10 + 16 = b \\
4 &+ 16 = 20
\end{align*}
\]

\[
\begin{align*}
(4 \times 2) + (9 \div 3) - 10 + 1 & = u \\
8 &+ 3 - 10 + 1 = u \\
11 &- 10 + 1 = u \\
1 &+ 1 = 2
\end{align*}
\]

**Simplify.**

1. \((6 - 2) + (6 \times 2)\)
2. \((8 \div 4) \times (9 - 5)\)
3. \((56 \div 8) \times (10 + 7)\)
4. \((4 \times 12) - (20 - 15)\)
5. \(9.7 + (6.1 - 5.1)\)
6. \(20 - (10 - 5.5)\)
7. \((8.1 - 8.1) \times (5 + 4)\)
8. \((3.2 + 4.6) - (2 \times 2)\)
Use the order of operations to simplify.

9. \((6 \times 2) + (9.3 - 7.5)\)

10. \((45 \div 5) + (10.75 - 2.25)\)

11. \(\frac{2}{5} + \left(\frac{4}{5} - \frac{2}{5}\right)\)

12. \(\left(\frac{7}{10} - \frac{4}{10}\right) + \frac{6}{10}\)

13. \(\frac{1}{2} + \left(\frac{1}{2} - \frac{1}{4}\right)\)

14. \(\frac{3}{4} + \left(\frac{1}{2} + \frac{1}{4}\right)\)

15. \(\left(\frac{1}{4} + \frac{1}{4}\right) + \left(\frac{1}{8} + \frac{1}{8}\right)\)

16. \(\left(\frac{2}{6} + \frac{3}{6}\right) - \left(\frac{1}{3} + \frac{1}{3}\right)\)

17. \(\left(\frac{7}{8} - \frac{1}{4}\right) - \left(\frac{2}{8} + \frac{1}{8}\right)\)

18. \(\left(\frac{5}{6} + \frac{1}{6}\right) \times \left(\frac{1}{2} + \frac{1}{2}\right)\)

Equalities

Equals added to or multiplied by equals are equal.

Addition:

\[ n + (5 + 4) = 2 + (3 \times 3) \]

\[ n + 9 = 2 + 9 \]

\[ n = 2 \]

Multiplication:

\[ 3 \times (1 + 7) = 3 \times (2 \times a) \]

\[ 3 \times 8 = 3 \times 2a \]

\[ 8 = 2a \]

\[ 8 \div 2 = a \rightarrow 4 = a \]

Find the value of each variable.

19. \(1 + (3 + 2) = 1 + (1 + a)\)

20. \(4 + (2 \times 3) = u + (1 \times 6)\)

21. \((b \times 7) + 8 = (9 + 5) + 8\)

22. \(5 \times (6 + n) = 5 \times (3 + 4)\)

23. \((4 + 8) \times 10 = (d \times 2) \times 10\)

24. \(7 \times (7 \times 7) = 7 \times (7 + f)\)
Kim is making a rectangular sign that is 3 ft wide. She uses 14 ft of edging to go around the sign. How long is the sign?

**Problem-Solving Strategy:**

**More Than One Way**

There is more than one way to find a solution. Here are 2 ways.

**Method 1**

Draw a picture.

Guess and test to find the length.

First Guess → 3 ft

3 ft + 3 ft + 3 ft + 3 ft = 12 ft

not large enough

Second Guess → 4 ft

3 ft + 3 ft + 4 ft + 4 ft = 14 ft

correct sum

The sign is 4 ft long.

**Method 2**

Use a formula.

\[ P = 2 \times \ell + 2 \times w \]

Guess and test to find the length.

Let \( \ell = \) length

\[ P = 2 \times \ell + 2 \times w \]

14 = 2 \times \ell + (2 \times 3 \text{ ft})

14 = 2 \times \ell + 6 \text{ ft}

14 = 2 \times \ell + 6 \text{ ft}

The sign is 4 ft long.
Solve each problem and explain the method you used.

1. The temperature at Beal Beach was 32.4°C at dawn. It rose 4.7°C by noon, and then fell 6.1°C by dusk. What was the temperature at dusk?

Visualize the facts.
Focus on the question.

Facts: dawn — 32.4°C
noon — 4.7°C higher
dusk — 6.1°C lower

Question: What was the temperature at dusk?

What method will you use?

Method 1
Draw and label a number line.

Method 2
Write an equation.

2. Karl has 25 wheels for wagons and scooters. How many of each toy can he make if the wagons have 4 wheels and scooters have 3 wheels?

3. The digits of a two-digit number have a sum of 7 and a difference of 5. The number is less than 70 and greater than 20. What is the number?

4. The Hoopsters scored 35 points in the first half of the game and 18 more than that in the second half. The other team scored 90 points in the game. Did the Hoopsters win?
Solve each problem and explain the method you used.

1. I am a whole number. If you add me to 28, the sum is 100. What am I?

2. I am a decimal. If I am added together 5 times, the answer equals 43. What decimal am I?

3. I am a decimal equal to the sum of 2.8, 3.2 and 7.4. What decimal am I?

4. What number should you add to complete this sentence? \( 8\frac{1}{4} + 2\frac{1}{4} + n = 11\frac{1}{2} \)

5. Use = or ≠ to complete this number sentence.
   \( 3 \times 4 - 2 \ ? \ 18 \div 2 + 4 \)

6. In which equation does \( n = 25 \)?
   a. \( 5 + 10 \times 4 \div 2 = n \)
   b. \( 35 - 10 \div 5 + 5 = n \)

7. What is the number halfway between 40 and 70?

8. What is the greatest number less than 65 that is divisible by 3?

9. In a contest, players scored 4 points for each correct answer. How many correct answers did the winner give? the player in 3rd place? (Use the bar graph to the right.)
Choose a strategy from the list or use another strategy you know to solve each problem.

10. The winner of a contest may choose from 2 prizes: a dime a day for a year or a dollar a day during March. Which amount is greater?

11. Mel, Rob, and Carmen were in a contest. Mel did not win, but he scored more points than Rob. Did Carmen win?

12. A program began at 6:30 P.M. and ended at 7:00 P.M. There were two 4.5-minute commercial breaks. How long was the program itself?

13. The winner of a competition received a T-shirt that said, “I’m Number 5 – 2 × 2.” What does this mean? Create a number sentence for a shirt for the second-place winner.

14. Arrange the numbers in the box so their sum, product, difference, and quotient are equal.


15. Math Facts auditioned students. In the first round, \( \frac{1}{2} \) were eliminated. In the second round, 30 more were eliminated. There were 10 students left for the third round. How many students came to the audition?

Check Your Progress
Lessons 1–8

Write the number that \( n \) stands for in each equation. (See pp. 444–445.)
1. \( 28 - n = 4 \times 6 \)
2. \( 11 \times 12 = 100 + n \)
3. \( n \div 4 = 12 \times 2 \)
4. \( 32 + 20 + n = 52 \times 4 \)

Complete each function table. (See pp. 446–447.)

<table>
<thead>
<tr>
<th>Rule: ( \times 3 )</th>
<th>Rule: ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>?</td>
</tr>
<tr>
<td>9</td>
<td>?</td>
</tr>
<tr>
<td>33</td>
<td>?</td>
</tr>
<tr>
<td>46</td>
<td>?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( n )</th>
<th>( n + 39 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>?</td>
</tr>
<tr>
<td>67</td>
<td>?</td>
</tr>
<tr>
<td>85</td>
<td>?</td>
</tr>
<tr>
<td>92</td>
<td>?</td>
</tr>
<tr>
<td>98</td>
<td>?</td>
</tr>
</tbody>
</table>

Use each equation to complete a function table for five values of \( x \) and \( y \). Then graph each equation on a coordinate grid. (See pp. 448–449.)
8. \( y = x + 4 \)
9. \( y = 2x + 3 \)
10. \( y = x \div 4 \)

Compare. Write \( = \) or \( \neq \). (See pp. 450–451.)
11. \( 36 \times 3 \ ? 24 + 24 \)
12. \( 25 - 5 \ ? 60 - 40 \)
13. \( 76 + 2 \ ? 92 - 31 \)

Use the order of operations to solve. (See pp. 452–453.)
14. \( 15 + 8 - 2 \times 9 \)
15. \( 9 \times 10 \div 5 + 6 \)
16. \( 30 + 4 \times 4 + 20 \)
17. \( 49 - 3 \times 7 \)
18. \( (54 \div 6) \times (2 + 10) \)
19. \( \frac{1}{5} + \frac{3}{5} - \frac{2}{5} \)

Problem Solving

Write an equation to solve each problem.
20. Mrs. Lam bought 720 yards of material to make curtains. If 8 yards of material are needed for each pair of curtains, how many windows can she decorate?
21. The school auditorium has 25 rows of seats. Each row has 15 seats. How many seats are in the auditorium?

(See Still More Practice, p. 472.)
Negative Numbers

Numbers that are written with a minus sign, such as \(-6\), \(-25\), and \(-247\), are called **negative numbers**. Negative numbers are less than zero.

You already know how to use negative numbers to write temperatures below zero.

\[-15^\circ F \quad -3^\circ C\]

You can also use negative numbers to show distances below sea level.

\(-5\text{ ft} \text{ means "5 feet below sea level."}"

The scale at the right shows the location of different sites in Crystal Caverns.

**Solve.** Use the scale of Crystal Caverns.

1. Which site is located at \(-90\text{ ft}\)?

2. About how many feet below sea level is Stalagmite Garden?

3. Which site is farthest below sea level? About how many feet below sea level is it?

4. How many feet difference is there between Bottomless Pool and Stalactite Chamber?

5. Which site is halfway between sea level and Pirate’s Rest? How many feet below sea level is it?

6. Suppose there was a site at \(-150\text{ ft}\). How much lower than sea level would it be than Bottomless Pool?
Find the value of $n$.

1. $6 + 8 = n - 5$
2. $27 \times n = 112 - 4$
3. $n \div 20 = 17 - 12$

Use each equation to complete a function table for five values of $x$ and $y$. Then graph each equation on a coordinate grid.

4. $y = x - 4$
5. $y = 3x - 5$
6. $y = x + 4$

Compare. Write $=$ or $\neq$.

7. $65 \div 5 \ ? 8 + 5$
8. $7 \times 8 \ ? 66 - 9$
9. $3 \times 36 \ ? 6 \times 18$

Use the order of operations to solve.

10. $16 \div 4 + 8$
11. $9 + 8 - 7 + 5$
12. $8 \times (25 + 6) - 7$

13. $12 + (2 \times 9) = \ ? + (3 + 15)$
14. $3 \times (3 \times 4) = 3 \times (3 + \ ?)$

**Problem Solving**

*Use a strategy you have learned.*

15. Brian has 87 stamps in his collection. Sue has 127 stamps, and Judy has 95 stamps. How many stamps do they have altogether?

16. Paul used 1 mile of fencing to fence in a square field. How many yards long is one side of the field?

**Performance Assessment**

19. What is the rule for the function table?

20. Make up a function table for each rule.
   a. Rule: $\div 3$
   b. Rule: $n - 8$
CHAPTER 1

Practice 1-1

Write the number in standard form.

1a. 8 thousands  
    b. twenty-two thousand

2a. four hundred    
    b. 700,000,000 + 
        seventy-three  
        400,000 + 10,000 + 
        million  
        7000 + 200 + 1

Write the word name for each number.

3a. 1,020,140  
    b. 80,000 + 4000 + 500

Write each number in expanded form.

4a. 668,850,201  
    b. 5,884,901

Write the place and value of the underlined digit.

5a. 2,300,400  
    b. 608,721  
    c. 2,300,400

Compare. Write <, =, or >.

6a. 3983 ? 3892  
    b. 2,120,121 ? 2,102,101

Practice 1-2

Write each amount.

1a. 2 dollars,  
    b. 5 quarters, 4 dimes,  
        2 quarters, 8 nickels, 3 pennies  
        1 dime, 3 nickels

Write the fewest coins and bills you would receive as change. Then write the value of the change.

2a. Cost: $4.20  
    b. Cost: $18.39  
        Amount given: $10.00  
        Amount given: $20.00

Round to the nearest hundred or dollar.

3a. 2390  
    b. 821  
    c. 56,472

4a. $3.29  
    b. $12.90  
    c. $35.85

Round to the nearest hundred thousand.

5a. 354,320  
    b. 819,925  
    c. 165,328

7. Write the amounts $45.15, $38.06, and $37.05 in order from greatest to least.

8. Write the numbers 15,403; 13,405; 14,340; 13,450; and 15,430 in order from least to greatest.

Problem Solving

9. What number is 100 more than 4,506,722?

10. What number is 1000 less than 439,800?

11. What number is 1000 more than 9,829,432?

12. What is the greatest even four-digit number?

13. The Beekman Library has 123,450 books. The Conrad Library has 124,355 books and the Doral Library has 125,320 books. Put the libraries in order from least books to most books.

About what number is each arrow pointing toward?

6.  

7.  

8. What is 4809 rounded to the nearest ten?

9. What is $328.59 rounded to the nearest ten dollars?

Problem Solving

10. Suzy has $32.28. Can she buy a fig tree that costs $23.82?

11. Yinka bought a book bag for $15.95. He gave the clerk a twenty-dollar bill. How much change did he receive?

12. What number is halfway between 1000 and 2000?
CHAPTER 2

Practice 2-1

1a. 1 + 0  b. 4 + 4  c. 0 + 7
2a. 3 + 5 + 4 + 7 + 1  b. 6 + 1 + 6 + 1
3a. 3 − 1  b. 8 − 0  c. 7 − 7
4a. 17¢ − 8¢  b. 11¢ − 6¢  c. 12¢ − 12¢

Find the value of the variable.

5a. 9 + e = 14  b. 9 = 7 + y
6a. 7 − b = 1  b. 5 = w − 8

Estimate the sum or difference.

7a. 28 + 22  b. 589 + 612  c. 825 − 592
8a. $1.28
     + 1.15
     + 194
     − 7.20

Practice 2-2

Add mentally. Use addition strategies.

1a. 5 + 0  b. 7 + 6  c. 6 + 7
2a. 6  b. 3  c. 1
     2
     5
     1
     +4
     +7
     +8
3a. 14 + 15  b. 9 + 9  c. 120 + 90
4a. 74  b. 8  c. 9
     30
     5
     3
     +44
     8
     +2

Find the sum or difference.

9a. 38 + 41  b. 211 + 544  c. $17 + $32
10a. 85 − 40  b. 54 − 43  c. $68 − $55

Problem Solving

11. A quilt has 12 blue squares and 24 green squares. How many squares does it have?

12. Max has 48 comic books. He sells 23 of them. How many does he have left?

13. Jan scored 8 points in a basketball game. Ina scored 19 points. How many more points did Ina score than Jan?

14. There are 18 turtles in a pond. There are 7 adult turtles. How many are not adults?

15. Alma needs $14 to buy a compact disc. She has $11. How much more money does she need?

Find the value of the variable.

5a. z + 3 = 11  b. 15 = 7 + c
6a. 13 − m = 7  b. 16 − f = 8

Estimate. Then find the sum or difference.

7a. 253,196 + 546,214  b. $82 − $47
8a. .47
     + .09
     − 2.93
     − 44.62

Problem Solving

9. Mark has 14 toy trucks in a carrying case. The case can hold 20 trucks. How many more trucks does Mark need to fill the case?
CHAPTER 3

Practice 3-1

1a. 323  b. 19  c. 695
+ 679  + 894  + 8126

2a.  94,320  b. 190,029  c. $18.26
  +  84,002  +  870,993  +  4.59

3a.  82,302  b. 79  c. $919
    97,586  500  610
    + 73,222  639  8120
    + 322  + 1293

4a.  25 + 75 + 50  b. $45.99 + $68.20

5a.  8550 + 10,203  b. 194,344 + 940,277

Make a rough estimate. Then adjust.

6a.  920  b. 2402  c. $79.45
    + 735  + 5111  +  60.99

7a.  382  b. 277  c. $18.95
    989  184  27.72
    + 105  + 457  + 11.08

Practice 3-2

1a.  894  b. 300  c. 738
  190  28  592

2a.  5493  b. 7000  c. 69,504
  2500  429  18,366

3a.  $9.29  b. $43.50  c. $50.22
  -  1.63  -  25.70  -  8.99

4a.  2280 - 2223  b. 29,302 - 10,233

5a.  $35.98 - $7.23  b. $600.75 - $240.80

Estimate the difference. Use front-end estimation.

6a.  849  b. 8394  c. 73,382
  - 290  - 2011  - 14,006

7a.  $51.20  b. $757  c. $98.35
  - 10.75  - 522  - 52.20

Problem Solving

8. A message board has 190 notes in English and 120 in Spanish. How many notes are on the board?

9. Find the total number of pencils in a box of 24 red, 12 blue, 30 green, and 23 yellow pencils.

10. Mr. Kanin has 1940 postcards from the United States and 2430 from other countries. How many postcards are in his collection?

11. Add 19,200 to the sum of 394 and 377.

12. Mitch uses tiles to cover a floor. He uses 287 black tiles, 78 white tiles, and 118 blue tiles. How many tiles does he use?

13. The sum is 54,000. One addend is 28,250. What is the other addend?

14. A necklace has 26 glass beads, 48 metal beads, and 82 tiny wooden beads. How many beads are in the necklace?

Problem Solving

8. How much greater than 427 is 549?

9. Ms. Brownell has 1327 marbles. There are 272 white marbles; the rest are multicolored. How many multicolored marbles does she have?

10. Ruth is reading a 178-page book. She is on page 67. How many pages does she still have to read?

11. Angie sells seed packs. She starts with a carton of 250 packs. She has 117 packs left. How many has she sold?

12. An adult's T-shirt costs $8.99 and a child's T-shirt costs $5.50. How much more expensive is the adult's T-shirt?

13. Subtract 3405 from the sum of 2847 and 5032.
CHAPTER 4

Practice 4-1

1a. 3 \times 0  
   b. 1 \times 5  
   c. 0 \times 8  

time 4-2

2a. 7 \times 6  
   b. 6 \times 7  
   c. 9 \times 1  

3a. 3 \times 21  
   b. 5 \times 18  
   c. 6 \times 94  

4a. 7 \times 100  
   b. 4 \times 805  
   c. 2 \times 4500  

5a. 8 \times \$1.05  
   b. 9 \times \$31.59  
   c. 3 \times \$82.80  

Use front-end digits to estimate the product.

6a. 2 \times 148  
   b. 5 \times 822  
   c. 9 \times 704  

Find the value of the variable.

7a. 2 \times s = 18  
   b. 21 = 7 \times x  

8a. 45 = 5 \times u  
   b. 27 \times y = 27  

9. What is the product of 78 and 7?

10. What is 459 multiplied by 5?

11. The product is 81. One factor is 9. What is the other factor?

12. Which is greater: 7 \times 1 or 0 \times 7?

Problem Solving

13. What is the product of 472 and zero?

14. Joel bought 3 boxes of peaches. There were 6 peaches in each box. How many peaches did he buy?

15. There are 8 shelves of books. Each shelf holds 45 books. How many books are there?

16. What is the product of \$19.95 and one?

17. Meg bought 6 CDs. Each CD cost \$9.98. How much did she spend?

Use front-end digits to estimate. Then multiply.

6a. 32 \times 41  
   b. 29 \times 491  
   c. 47 \times 307  

7a. 12 \times \$1.25  
   b. 22 \times \$4.59  
   c. 84 \times \$8.82  

Problem Solving

8. What is the product of 748 and 10?

9. A theater has 24 rows of seats. There are 18 seats in each row. How many seats are there?

10. A compact disc is on sale for \$7.99. How much would it cost to buy 11 of the discs?

11. Zenia earns \$10.05 an hour. She works 9 hours a week. How much does she earn in one week?

12. Each volume of an encyclopedia has 568 pages. There are 24 volumes. How many pages are in the entire encyclopedia?

13. What is the product of 409 and 89?

14. A pillowcase costs \$4.25. How much would cases for 15 pillows cost?

15. A toy store has 52 bags of marbles. There are 35 marbles in each bag. How many marbles does the store have?

16. There are 115 windows on each floor of an office building. The building has 48 floors. How many windows does the building have?
**CHAPTER 5**

**Practice 5-1**

1a. $9 \div 0$  
   b. $1 \div 8$  
   c. $7 \div 7$

2a. $5 \div 5$  
   b. $0 \div 4$  
   c. $2 \div 1$

Find the value of the variable.

3a. $42 \div g = 6$  
   b. $i \div 9 = 6$

Estimate the quotient.

4a. $8 \div 82$  
   b. $4 \div 51$  
   c. $3 \div 621$

5a. $2 \div 6905$  
   b. $5 \div 5.25$  
   c. $7 \div 34.89$

Divide.

6a. $7 \div 49$  
   b. $5 \div 48$  
   c. $3 \div 29$

7a. $4 \div 84$  
   b. $9 \div 90$  
   c. $6 \div 73$

8a. $2 \div 868$  
   b. $8 \div 969$  
   c. $7 \div 865$

9. Is 3892 divisible by 2?

**Practice 5-2**

1a. $9 \div 819$  
   b. $4 \div 110$  
   c. $8 \div 209$

2a. $3 \div 621$  
   b. $6 \div 650$  
   c. $2 \div 811$

3a. $5 \div 515$  
   b. $7 \div 745$  
   c. $4 \div 839$

4a. $8 \div 8968$  
   b. $5 \div 1005$  
   c. $7 \div 7325$

5a. $4 \div 31.20$  
   b. $9 \div 9.36$  
   c. $8 \div 7.52$

Write four related facts for each set of numbers.

6a. 6, 9, 54  
   b. 4, 8, 32  
   c. 3, 7, 21

Use the order of operations to solve.

7a. $9 - 2 \times 3$  
   b. $16 \div 2 + 3$

8a. $5 \times 10 \div 2$  
   b. $360 \div 4 \times 2$

9a. $15 - 5 \times 2 + 1$  
   b. $21 \div 7 + 9 \times 3$

10. Is 193 divisible by 5?

11. Is 711 divisible by 3?

12. Is 3,225,570 divisible by 10?

**Problem Solving**

13. Elena has 98 inches of ribbon. How many 6-inch pieces can she cut? Will there be any ribbon left over? How much?

14. If 3634 is divided by 7, what are the quotient and the remainder?

15. What is the next number in this pattern: 3645, 1215, 405, 135, . . . ?

16. An album has 164 photos. Each full page holds 8 pictures. At most, how many pages are full? How many pages are partly filled?

17. What numbers between 107 and 125 are divisible by 2?

**REINFORCEMENT**

10. There are 3727 flyers. What is the greatest number of flyers there could be in each of 8 equal stacks?

11. Michael bought 8 oak saplings for $48.40. How much did each sapling cost?

12. Leila makes 850 muffins for a bake sale. She places them in bags of 8. How many bags can she fill? How many muffins are left over?

13. Zack spent $200.35 during a 5-day vacation. How much did he spend each day if he spent an equal amount daily?

14. What is the mean of 104, 205, 47, and 36?

15. In their games this season, the Hoops scored 64, 68, 42, 70, 92, and 54 points. What is their mean score per game?

16. A train travels 600 miles in 9 hours. About how many miles per hour does the train travel?
CHAPTER 6

Practice 6-1

Write in., ft, mi, c, gal, or lb for the unit you would use to measure each.

1a. the length of a finger
   b. the weight of a bowling ball

2a. the capacity of a juice glass
   b. the distance from San Diego to Las Vegas

3a. the height of a door
   b. the capacity of an oil barrel

Add.

4a. 8 ft 5 in. + 4 ft 7 in.
   b. 6 ft 8 in. – 3 ft 5 in.

Rename each unit of measure.

5a. 36 in. = _?_ ft
    b. 4 gal = _?_ qt

6a. 3 lb = _?_ oz
    b. 32 c = _?_ pt

Practice 6-2

Write cm, m, km, mL, L, or g for the unit you would use to measure each.

1a. the mass of a goldfish
    b. the thickness of a book

2a. the distance from Rome to Madrid
    b. the capacity of a fish tank

3a. the capacity of a teaspoon
    b. the length of a large rug

Compare. Write <, =, or >.

4a. 200 cm _?_ 20 m
    b. 7 L _?_ 6000 mL

5a. 6000 g _?_ 5 kg
    b. 4 km _?_ 5000 m

Write how much time has passed.

6. from 12:30 A.M. to 4:00 A.M.
7. from 10:20 P.M. to 11:15 P.M.

8. Is a room comfortable when it is 68°F or 68°C?

7. Is a shoelace for a pair of sneakers about 3 in., 3 ft, 3 yd, or 3 mi long?
8. Would you need 2 fl oz, 2 c, 2 pt, or 2 gal of water to fill a large bucket?

Problem Solving

9. Does a wild rabbit probably weigh 3 oz, 3 lb, or 33 lb?
10. A recipe calls for 3 c of milk. Janet has 1 qt of milk. Does she have enough for the recipe?
11. There are 5 apples in a bag. Each apple weighs 5 oz. Does the bag weigh more than 2 lb?

Rename the units of time.

12a. 33 min = _?_ s    b. 2 y 65 d = _?_ d

13. How many inches are there in 12 ft?
14. Is a 5-lb box heavier than a 90-oz box?

9. Will ice melt at 2°F or 2°C?
10. What time is it when it is 12 minutes before noon?
11. Does a postcard have a mass of 1 g or 1 kg?
12. Is a pencil about 15 mm, 15 cm, or 15 m long?

Problem Solving

Use the map to solve.

13. How far is it from Alpha to Beta in kilometers?
14. Is Beta closer to Alpha or Delta?
CHAPTER 7

Practice 7-1

Problem Solving

Use the survey results to solve problems 1–3.

**Favorite Numbers of Mr. Porter’s Class**

7, 5, 7, 11, 2, 3, 13, 5, 7, 11, 2, 8, 8, 7, 7, 5

1. Make a tally chart and a line plot from the survey data.
2. Which was the most popular number?
3. Which numbers were equally popular?

Use the line graph to solve.

<table>
<thead>
<tr>
<th>Day</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees (°F)</td>
<td>74</td>
<td>72</td>
<td>70</td>
<td>68</td>
<td>66</td>
</tr>
</tbody>
</table>

4. Which day was the warmest?
5. On which day was the temperature 70°F?

Use the chart to solve.

<table>
<thead>
<tr>
<th>Type of Boat</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Boat</td>
<td>45</td>
</tr>
<tr>
<td>Sail Boat</td>
<td>80</td>
</tr>
<tr>
<td>Canoe</td>
<td>60</td>
</tr>
<tr>
<td>Row Boat</td>
<td>35</td>
</tr>
</tbody>
</table>

6. Make a pictograph from the data in the chart.
7. What type of boat was second most popular?

Use the bar graph to solve.

**Heights of Girls**

- Sally: 55
- Kyra: 53
- Gerta: 51

8. Which girl is 2 in. taller than Kyra?
9. How much taller is Sally than Gerta?

Practice 7-2

Problem Solving

Use the circle graph to solve.

**Cards at Holly’s Card Shop**

- Birthday: 125
- Get Well: 50
- Thank You: 75
- Other: 50

1. Does the shop have more thank you or get well cards?
2. How many cards in all does the shop have?

3. Molly must wear a blue, red, or white shirt with either black, brown, or blue pants to work. How many combinations of shirt and pants can she wear?

4. A computer picks a random number between 1 and 100. Is it more or less likely to pick a number above 20?

5. Is the computer more likely, less likely, or equally likely to pick an odd number?

6. On a 1–6 number cube, what is the probability of rolling an even number?

7. Irene tosses a nickel. It lands tails up. What is the probability that it will land tails up on her next toss?
CHAPTER 8

Practice 8-1

Write each as a fraction.
1a. two fifths  b. three sevenths

Write each fraction in words.
2a. \( \frac{3}{4} \)  b. \( \frac{5}{6} \)  c. \( \frac{1}{3} \)  d. \( \frac{2}{8} \)

About what fraction of the region is shaded?
3.

Write the equivalent fraction.
4a. \( \frac{1}{2} = \frac{d}{12} \)  b. \( \frac{3}{4} = \frac{t}{8} \)
5a. \( \frac{2}{3} = \frac{v}{9} \)  b. \( \frac{8}{10} = \frac{16}{7} \)

Practice 8-2

List all the common factors of each set of numbers. Then circle the GCF.
1a. 8 and 10  b. 20 and 30  c. 6, 12, and 42

Write each fraction in simplest form.
2a. \( \frac{5}{25} \)  b. \( \frac{3}{9} \)  c. \( \frac{6}{18} \)
3a. \( \frac{20}{100} \)  b. \( \frac{2}{14} \)  c. \( \frac{8}{12} \)

Compare. Write <, =, or >.
4a. \( \frac{1}{2} \) ? \( \frac{3}{4} \)  b. \( \frac{1}{10} \) ? \( \frac{2}{20} \)
5a. \( \frac{1}{6} \) ? \( \frac{1}{12} \)  b. \( \frac{5}{8} \) ? \( \frac{1}{8} \)
6a. \( \frac{4}{5} \) ? \( \frac{4}{6} \)  b. \( \frac{7}{8} \) ? \( \frac{6}{12} \)

Problem Solving

6. A carnival wheel is divided into 10 equal parts. Three of the parts are red. Write a fraction to show what part is red.

7. An orange has 9 equal sections. Rose ate 6 sections. Write a fraction to tell what part was eaten.

8. Eight out of 32 students are honor students. What fraction shows how many are honor students?

Tell whether the fraction is closer to 0, \( \frac{1}{2} \), or 1.
9. \( \frac{1}{5} \) 10. \( \frac{3}{4} \) 11. \( \frac{5}{8} \)

12. How many sixths are equal to one half?

Write in order from least to greatest.
7a. \( \frac{3}{8}, \frac{5}{8}, \frac{1}{8} \)  b. \( \frac{2}{3}, \frac{7}{12}, \frac{1}{12} \)
8. What is the greatest common factor of 8, 12, 20, and 40?

Name the fraction for letter A.

9.

10. Write nine and two ninths as a mixed number.

11. What whole number is equivalent to \( \frac{16}{1} \) ?

12. What whole number is equivalent to \( \frac{22}{22} \) ?

Problem Solving

13. A flag shows 15 equal sections, 5 of which are blue. What fraction tells the part of the flag that is blue? Write the fraction in simplest form.

14. EFEF is to GHGH as FEEF is to __
CHAPTER 9

Practice 9-1

Solve. Write the answer in lowest terms.

1a. \( \frac{6}{8} + \frac{1}{8} \)
1b. \( \frac{4}{10} - \frac{2}{10} \)

2a. \( \frac{3}{5} + \frac{2}{5} \)
2b. \( \frac{9}{8} - \frac{4}{8} \)

3a. \( \frac{2}{3} + \frac{4}{6} \)
3b. \( \frac{8}{10} + \frac{3}{5} \)

4a. \( \frac{1}{2} - \frac{1}{4} \)
4b. \( \frac{2}{5} + \frac{3}{10} \)

List the first six common multiples for each. Circle the least common multiple.

5a. 4, 10   b. 2, 6   c. 3, 6, and 9

Write as a whole number or mixed number in simplest form.

6a. \( \frac{12}{10} \)
6b. \( \frac{16}{4} \)
6c. \( \frac{22}{4} \)

CHAPTER 10

Practice 10-1

Name each figure.

1a. \( T \)   b. \( S \)   c. \( M \)

2a. \( C \)
2b. \( D \)
2c. \( M \)

3. Which lines are parallel?

4. Which lines are not perpendicular?

a. \( \)

b. \( \)

5. What shape is formed when two rays share a common endpoint?

6. How many sides does a triangle have? a pentagon? a hexagon?

Problem Solving

7. Len eats \( \frac{1}{3} \) of a pizza and Mia eats \( \frac{3}{8} \) of the pizza. What part of the pizza did they eat?

8. A recipe calls for \( \frac{3}{4} \) cup of milk. Rachel has \( \frac{1}{8} \) cup of milk. How much more does she need?

9. There are 6 red marbles and 3 blue marbles in a bag. Lou picks one without looking. What is the probability that Lou picks a red marble?

10. What is one fourth of 40?

11. What is \( \frac{2}{5} \) of 25?

12. Alan makes 20 brownies. He sells \( \frac{3}{4} \) of them at a bake sale. How many does he sell?

13. There are 35 horses. One fifth of them are brown. How many of the horses are brown?

7. How many vertices does a quadrilateral have? an octagon?

8. Name this figure.

9. Name the diameter and two radii.

10. Is this a simple closed curve?

Problem Solving

11. How is a square different from a rectangle?

12. A sign has 4 straight sides and 4 vertices. No 2 sides are the same length. What shape is the sign?

13. Is a circle a simple closed curve? Explain.
Practice 10-2

Write triangle, right triangle, or equilateral triangle to describe each figure.

1a.  

b.  

c.  

How is the pattern made? Write translation or reflection.

2a.  

2b.  

3. Are these figures congruent?

4. Are these figures similar?

CHAPTER II

Practice 11-1

Find the perimeter of each figure.

1a.  

b.  

Find the area of each figure.

2a.  

b.  

3. A tabletop is 4 feet long and 5 feet wide. What is the perimeter of the tabletop?

4. A solid figure has no faces and a curved surface. What is it?

5. How many faces, edges, and vertices does a cube have?

6. Name the shape of the new flat surface made by the cut.

Find the volume of each figure.

7a.  

b.  

4 cm  

2 cm  

2 cm  

24 cm
CHAPTER 12

Practice 12-1

1a. 8 ÷ 1  b. 80 ÷ 10  c. 800 ÷ 10
2a. 420 ÷ 70  b. 500 ÷ 50  c. 210 ÷ 30
3a. \( \frac{20}{4000} \)  b. \( \frac{80}{640} \)  c. \( \frac{90}{54000} \)

Estimate the quotient. Use compatible numbers.
4a. 56 ÷ 11  b. 249 ÷ 32  c. 109 ÷ 48
5a. \( \frac{62}{142} \)  b. \( \frac{74}{657} \)  c. \( \frac{52}{4.80} \)

Divide and check.
6a. 21 \( \sqrt{88} \)  b. 31 \( \sqrt{94} \)  c. 33 \( \sqrt{5.99} \)
7a. 35 \( \sqrt{73} \)  b. 72 \( \sqrt{360} \)  c. 91 \( \sqrt{5.46} \)

Problem Solving

8. How many dozens are there in 48?
9. A factory can make 21 toy trains in one hour. How long will it take to make 147 trains?

Practice 12-2

1a. 28 \( \sqrt{100} \)  b. 12 \( \sqrt{9000} \)  c. 14 \( \sqrt{234} \)
2a. 79 \( \sqrt{229} \)  b. 98 \( \sqrt{877} \)  c. 38 \( \sqrt{279} \)
3a. 65 \( \sqrt{541} \)  b. 72 \( \sqrt{630} \)  c. 63 \( \sqrt{371} \)
4a. 86 \( \sqrt{20.64} \)  b. 92 \( \sqrt{5060} \)  c. 54 \( \sqrt{2920} \)
5a. 62 \( \sqrt{3000} \)  b. 47 \( \sqrt{9.40} \)  c. 24 \( \sqrt{23600} \)
6a. 8 \( \sqrt{32} \)  b. 16 \( \sqrt{32.16} \)  c. 25 \( \sqrt{50.75} \)

Problem Solving

7. A carton can hold 24 cans of soup. A diner uses 627 cans in a month. How many full cartons does the diner use?
8. The diner has 576 drinking glasses stored on shelves. Each shelf holds 48 glasses. At most, how many shelves are there?
9. Rita buys 25 postcards for $8.75. How much does each postcard cost?
10. Roger worked 30 hours a week at summer camp. He worked a total of 240 hours. How many weeks did he work?
11. A box can hold 52 cans. How many boxes are needed to hold 260 cans?
12. There are 682 baseball cards and 31 children. If each child takes the same number of cards, what is the greatest number each child will get?
13. Avi buys 11 marbles for $.99. How much does each marble cost?
14. The dividend is 549. The divisor is 61. What is the quotient?
15. Amy earns $44 in 11 hours. How much does she earn in 1 hour?
16. A ship travels 29 miles an hour. How long will it take the ship to travel 87 miles?
17. A paper company donates 774 packs of paper to 18 schools. If the packs are shared equally, how many does each school receive? How many are left over?
18. The dividend is 46,460. The divisor is 23. What is the quotient?
19. A train travels 68 miles per hour. How long will it take the train to travel 748 miles?
20. Trudy buys a newspaper every day for 14 days. She spends $4.90. How much does each newspaper cost?
21. Glen’s dog eats 14 oz of dry food every day. Will a 400-oz bag of dog food last four weeks?
22. Ruth buys 18 yards of ribbon for $18.90. How much does one yard of ribbon cost?
23. What is the remainder when 824,402 is divided by 42?
CHAPTER 13

Practice 13-1
Write the value of the underlined digit.

1a. 5.2  b. 0.61  c. 25.83
Write as a decimal.
2a. eight hundredths  b. 30 + 6 + 0.4 + 0.02
3a. \( \frac{72}{100} \)  b. 3.5

Compare. Write <, =, or >.

4a. 5.54 ? 5.45  b. 7.12 ? 7.1
5a. 21.98 ? 22  b. 0.80 ? 0.8

Compute.

6a. 2.4 + 4.5  b. 3.6 + 5.89 + 4
7a. 7.2  b. 5  c. 0.57
   \(-2.7\)  4.2  0.75
   \(+6.81\)  \(+0.22\)

8. Write 25.89 in expanded form.
9. What is 3.28 rounded to the nearest tenth?
10. What is 45.92 rounded to the nearest one?
11. Write 0.1, 1.1, 1.11, and 1 in order from least to greatest.

Problem Solving

12. Joel swam 89.71 m. Kate swam 93.2 m. About how many more meters did Kate swim than Joel?
13. Ben’s cat is 28.8 cm tall. Gil’s cat is 32 cm tall. How much taller is Gil’s cat?
14. Which is a better buy: 18 crayons for $6.12 or 25 crayons for $8?
15. A bean plant is 46.3 cm tall at the end of May. It grows 10.45 cm in June. How tall is it at the end of June?
16. Write 6.5, 65.5, 65.6, and 60.5 in order from greatest to least.

CHAPTER 14

Practice 14-1
Find each value for \( n \).

1a. 32 + \( n \) = 50  b. 100 – \( n \) = 19
2a. 21 \( \times \) \( n \) = 105  b. 693 \( \div \) \( n \) = 63

Complete the function table.

3.

<table>
<thead>
<tr>
<th>( n )</th>
<th>10</th>
<th>8</th>
<th>17</th>
<th>25</th>
<th>64</th>
<th>3</th>
<th>92</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 60 )</td>
<td>( 48 )</td>
<td>( 102 )</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

Rule: Multiply by 6.

Compare. Write = or ≠.

4a. 140 \( \times \) \( 5 \) ? 600 + 20  
   b. 210 \( \div \) \( 15 \) ? 16 – 2
5a. 2.2 + 1.7 ? 39  
   b. 7 \( \times \) 7 ? 55 – 2 \( \times \) 3

6. There are 8 boxes of books. Each box holds 16 books. Which number sentence will help you find how many books in all: \( 8 \times 16 = n \) or \( 16 \div 8 = n \)?

7. Which is greater: 100 \( \div \) (2 + 3) or 100 \( \div \) 2 + 3?

8. Which is equal to zero: \( 10 - 2 \times 5 \) or \( (10 - 2) \times 5 \)?

For each equation, complete a function table with 5 values for \( x \) and \( y \). Then graph each set of ordered pairs on a coordinate grid.

9a. \( y = x + 4 \)  
   9b. \( y = x \div 3 \)
SET 1

Compare. Write <, =, or >.
1. \(8 + 4 \ ? \ 18 - 9\)  2. \(16 - 8 \ ? \ 7 + 6\)

Compute.
3. \((3 \times 7) + 1\)  4. \((5 \times 8) - 7\)
5a. \(63 \div 7\)  b. \(848\)

Give the place and the value of the underlined digits.
6. \(528,347,106\)

Give 4 related facts for:
7a. \(9, 8, 17\)  b. \(5, 7, 35\)

Write in standard form.
8. eighty thousand, forty-nine
9. Stickers cost \$0.06 each. How much will 9 stickers cost?

SET 2

Order from least to greatest.
1. \(304, 340, 356, 324\)

Round to the place of the underlined digit.
2a. \(92,315\)  b. \(387,082\)

Write in standard form.
3a. one hundred four thousand, three hundred seventy
   b. \(100,000 + 20,000 + 300 + 4\)

Compute.
4a. \(n - 8 = 5\)  b. \(15 = 6 + b\)
5. \(23 + 34\)  6. \(651 + 728\)  7. \(59 - 24\)  8. \(738 - 216\)
9. \$21.50 + \$7.25\) 10. \$33.95 - \$1.84

SET 3

Compute.
1. \(3 + 6 + 4 + 5\)
2. Double 8 and add 3.

Round to estimate.
3. \(46 + 22\)  4. \(371 + 119\)  5. \(68 - 37\)  6. \(482 - 245\)

Compute.
7. \(163 + 257\)  8. \(572 + 388\)  9. \(429 - 194\)  10. \(2610 - 1436\)
11. Add mentally.
   \(75 + 60 + 50 + 40 + 25\)

10. Joan has 356 stickers in her collection. Diane has 365. Which girl has more stickers?
11. Round the sum of 350 + 23 + 126 to the nearest hundred.
12. At \$0.96 a yard, what is the cost of 8 yards of material?
13. A bookcase has 8 shelves. There are 6 books on each shelf. How many books are in the bookcase?
14. Forty strawberries were divided equally among 5 children. How many did each child receive?
15. How much greater is the product of 6 and 7 than the product of 5 and 8?

11. Helen buys a toothbrush for \$0.96 and soap for \$0.45. How much change will she receive from \$2.00?
12. What four coins have the same value as one quarter?
13. How many odd numbers are there between 132 and 180? Name them.
14. Write 4,305,060 in expanded form.
15. Jack gave the clerk \$1.00 to pay for a \$0.32 item. The clerk then gave him 2 quarters, 1 dime, 1 nickel, and 2 pennies. Did he receive the correct change? Explain.

12. Jan, Sue-ling, and Tanya scored 86, 80, and 100 on the math test. Jan’s score was the lowest. Sue-ling had hoped to do better. Give each child’s score.
13. Julio bought a sweater for \$15.40 and shoes for \$22.90. How much change will he receive from \$40?
14. Find the total number of days in June, February, December, and July.
15. Mr. Doyle is traveling 682 km from Pensacola to St. Augustine. If he has already traveled 495 km, how much farther must he travel?
SET 4

Compute.
1. \[ \frac{3475}{63} + 8468 \]
2. \[ \frac{3475}{12001} \]
3. \[ \frac{40,000}{960} \]
4. \[ \frac{306,058}{98,738} \]
5. \[ \frac{4060 \times 8}{615.47} \]
6. \[ \frac{6,6960 + 10}{698,738} \]
7. \[ \frac{8468 \times 76}{306,058} \]
8. \[ \frac{6663 \times 10}{667} \]
9. \[ \frac{6,6960 \times 18}{698,738} \]
10. \[ \frac{6663 \times 10}{667} \]

Use front-end digits to estimate. Then multiply.
9. \[ 4 \times 18 \]
10. \[ 22 \times 631 \]

SET 5

Estimate each product by rounding.
1. \[ 403 \times 7 \]
2. \[ 3 \times 242 \]
3. \[ 6,8,10,7,9,11,8,10, ? \]

Discover the pattern and complete.
4. \[ 6 \times 7 = 42 \]
5. \[ 5 \div 38 \]
6. \[ 7 \times 48.75 \]

Complete.
7. \[ 6 \div 900 \]
8. \[ 4 \times 8608 \]

Divide.
9. \[ 75 \]
10. \[ 82 \]

Which are divisible by 3?
9. \[ 75 \]
10. \[ 82 \]

SET 6

Rename each unit.
1. \[ 30 \text{ in.} = \_ \text{ ft} \]
2. \[ 6 \text{ yd} = \_ \text{ ft} \]

Compute.
3. \[ \frac{2 \text{ ft} 8 \text{ in.} + 3 \text{ ft} 9 \text{ in.}}{4 \text{ yd} 2 \text{ ft} - 3 \text{ yd} 1 \text{ ft}} \]

Compare. Write \(<, =, \text{ or } >\).
5. \[ 6 \text{ qt} \_ \_ 2 \text{ gal} \]
6. \[ 3 \text{ pt} \_ \_ 6 \text{ c} \]

Rename each unit.
7. \[ 24 \text{ oz} = \_ \text{ lb} \_ \_ \text{ oz} \]
8. \[ 6500 \text{ lb} = \_ \_ \text{T} \_ \_ \text{ lb} \]

Choose the best estimate.
9. \[ \text{length of a paper clip: 30 cm or 30 mm?} \]
10. \[ \text{capacity of a swimming pool: 2000 L or 2000 mL?} \]

11. Patrick is 18 years old and is 6 ft tall. Bud is 23 years old. How much older is Bud?
12. How long will it take Traci to read a book of 168 pages if she reads 8 pages each day?
13. If a jet travels 300 miles an hour, how far will it go in 13 hours?
14. Each of the 136 students in the graduating class will be inviting 4 guests to the ceremonies. How many guests will be invited in all?
15. If Phillipe earns $4.50 an hour, how much will he earn if he works 20 hours?
SET 7

Rename the unit of time.
1. $3\,\text{h} = \,?\,\text{min}$
2. $96\,\text{h} = \,?\,\text{days}$

Compute.
3. $3658 + 2793 = \,?$
4. $9657 - 2985 = \,?$
5. $53841 \times 52 = \,?$

Use the graph to answer questions 7 and 8.

<table>
<thead>
<tr>
<th>Number of Tickets Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
</tr>
</tbody>
</table>

SET 8

Closer to 0, $\frac{1}{2}$, or 1?
1. $\frac{3}{6}$
2. $\frac{7}{8}$
3. $\frac{1}{9}$

Give the equivalent fraction.
4. $\frac{2}{3} = \frac{\,\,?\,}{12}$
5. $\frac{4}{5} = \frac{\,\,?\,}{15}$
6. $\frac{2}{9} = \frac{\,\,?\,}{27}$

Find the GCF.
7. 12 and 36
8. 28 and 42

Write each fraction in simplest form.
9. $\frac{15}{40}$
10. $\frac{20}{38}$

11. Latisha has 4 apples. She wants to share them equally with a friend. How many apples does each child get?

SET 9

Find the pattern and complete.
1. $\frac{1}{12}, \frac{2}{12}, \frac{3}{12}, \frac{\,\,?\,}{12}, \frac{\,\,?\,}{12}, \frac{\,\,?\,}{12}$

Compute. Write the answer in simplest form.
2. $\frac{1}{8} + \frac{1}{8} = \frac{\,\,?\,}{8}$
3. $\frac{12}{5} + \frac{3}{5} = \frac{\,\,?\,}{5}$
4. $\frac{1}{8} + \frac{3}{4} = \frac{\,\,?\,}{8}$
5. $\frac{5}{6} - \frac{1}{2} = \frac{\,\,?\,}{6}$

Find the LCM.
6. 8 and 10
7. 4 and 7
8. To $\frac{1}{3}$ of 36 add 4.
9. Subtract 5 from $\frac{2}{5}$ of 40.
10. A piece of wood measures 4 $\frac{3}{8}$ ft in length. Another piece is 6 $\frac{1}{8}$ ft. What is the combined length?
11. On a fair spinner with the numbers 1, 2, and 3, what is the probability of spinning either a 1, a 2, or a 3?
12. Bill had 63 marbles. He gave $\frac{1}{9}$ of them to Chung. How many did Bill have left?
13. At $309 each, what will a store pay for 85 television sets?
14. Julie has 3 quarters, 4 dimes, 3 nickels, and 7 pennies in her pocket. Does she have enough to buy a toy that costs $1.29?
15. Darryl did $\frac{3}{8}$ of a project, and Dana did $\frac{1}{4}$ of it. How much of the project is completed? How much still needs to be completed?
SET 10

Identify each.
1. \[ \begin{array}{c}
A \rightarrow B \\
\end{array} \]  2. C  3. \[ \begin{array}{c}
D \rightarrow E \\
\end{array} \]

Draw 3 angles:
4a. a right   b. acute   c. obtuse angle
5. The rungs of a ladder form \( ? \) lines.
6. Trace a penny. Then draw a diameter and a radius. Label these line segments.
7. Draw a hexagon. How many angles are there?
8. Is the figure a reflection or a translation?
9. Write congruent or similar figures.
10. \[ \begin{array}{c}
\quad a. \\
\quad b. \\
\end{array} \]  \[ \begin{array}{c}
\quad a. \\
\quad b. \\
\end{array} \]

SET II

1a. \( 83 + 74 + 36 \)  b. \( 80 + 24 + 65 \)
2a. \( 651 - 289 \)  b. \( 708 - 498 \)
3a. 7\text{,}749  b. 20\text{,}180
4a. 30\text{,}241  b. 23\text{,}7432
5a. 52\text{,}67\text{,}652  b. 13\text{,}117,726
6. How many 8s are in: 26; 37; 43; 57?
7a. 36\text{,}820  b. 41\text{,}211
8. \( 7 + 0.2 + 0.09 \)
9. \( \$2.59 + 0.09 \)  10. \( \$23.50 - 7.65 \)

SET 12

Round to the nearest one; then to the nearest tenth.
1a. 36.18  b. 12.96  c. 44.50
2a. \( 48 ? 3 = 9 ? 7 \)  b. \( 6 ? 8 = 59 ? 11 \)

Solve.
3. \( 0.7 + 0.6 - (2 \times 0.3) \div (1.9 - 0.9) \)

Order from least to greatest.
4. 1.3, 1.36, 0.3, 1.63  5. 2.4, 2.43, 2.423

Estimate.
6. 8.6 + 2.9  7. 15.3 - 10.4

Find the value of the variable.
8. \( t \times 15 = 25 \times 3 \)  9. \( w \div 4 = 120 \div 6 \)

Compute.
10. \( 1 + 7 - 2 + 3 + 4 - n = 5 \)
11. Mrs. Riso bought 1 dozen donuts at \( \$0.30 \) each and \( \frac{1}{2} \) dozen muffins at \( \$0.65 \) each. How much change will she receive from \( \$10 \)?
12. Complete the pattern.
   \( 0.1, 0.5, 0.7, 0.2, 0.6, 0.8, \ ? , \ ? \)

13. If a ship travels 409 miles in one day, how far will it travel in six days?
14. After Greg paid \( \$40.00 \) for shoes and \( \$3.50 \) for socks, he had \( \$20.50 \) left. How much money did Greg have at first?
15. Maggie had 2 dozen eggs. She used \( \frac{2}{3} \) of them for baking. How many eggs were left?
SET 1

1. 3  2  5  3  4  7
   +7 +9 +2 +6 +8 +7
2. 7  10  9  16  14  8
   −3 −2 −4 −8 −9 −3
3. Give related facts. $8 + 2, 6 + 5,$
   $7 + 4, 5 + 3, 6 + 7, 9 + 7, 1 + 9$
4. $2 \times 3$  $2 \times 5$  $3 \times 6$  $3 \times 8$
   $2 \times 9$  $3 \times 9$  $2 \times 7$  $3 \times 4$
5. $4 \times 2$  $4 \times 6$  $5 \times 9$  $5 \times 6$
   $4 \times 8$  $5 \times 2$  $4 \times 7$  $5 \times 7$

6. Don is 9 years old. How old will
   he be 6 years from now?
7. A farmer had 11 cows. He sold 8
   of them. How many cows did he
   have left?
8. Crackers are 9¢ each. How much
   will Joey pay for 3 crackers?
9. How many nickels are worth
   50 cents?
10. Anna picked 9 flowers. Laura
    picked 3. How many flowers did
    they pick in all?

SET 2

1. 9  8  7  5  6  7
   +9 +6 +9 +8 +9 +8
2. 16  17  15  18  14  13
   −7 −9 −6 −9 −7 −7
3. $7 \times 3$  $6 \times 4$  $7 \times 7$  $6 \times 9$
   $7 \times 5$  $7 \times 6$  $6 \times 8$  $6 \times 6$
4. $8 \times 4$  $8 \times 8$  $9 \times 4$  $9 \times 7$
   $8 \times 6$  $9 \times 8$  $8 \times 5$  $9 \times 3$
5. $8 \div 2$  $10 \div 2$  $12 \div 3$  $18 \div 3$
   $15 \div 3$  $4 \div 2$  $21 \div 3$  $14 \div 2$

6. Josh has 8¢. Therese has twice
   as much. How much money does
   she have?
7. At 9¢ each, what will 7 pencils
   cost?
8. Thirty-five cents is divided equally
   among 5 students. How much will
   each student receive?
9. Tom paid 24¢ for 3 balloons. How
   much did each balloon cost?
10. The dividend is 42. The divisor is
    7. What is the quotient?

SET 3

1. Give related facts. $6 \div 2, 9 \div 3,$
   $10 \div 2, 3 \div 3, 8 \div 4, 6 \div 3$
2. Subtract 3 from: 21, 18, 15, 12, 9,
   6, 3, 24, 27, 30
3. $28 \div 7$  $24 \div 4$  $30 \div 5$  $48 \div 6$
   $49 \div 7$  $32 \div 4$  $40 \div 5$  $36 \div 6$
4. 10 more than: 58, 14, 82, 95, 103,
   191
5. Give the value of the underlined
digit: 563; 721; 345; 2,976,588;
   3,126,908

6. When 67 is divided by 9, what is
   the quotient? the remainder?
7. What is 78 in words?
8. What is $5000 + 100 + 60$ in stan-
   dard form?
9. What number is ten thousand less
   than 56,201?
10. There are 3189 adults and 3819
    children at the fair. Are there
    more adults or children?
SET 4

1. Order from least to greatest:
   3,601,432; 3,562,620; 3,563,634; 3,610,981
2. Round to the nearest ten: 57, 111, 363, 288, 435, 519, 604, 792
3. Divide by 4: 24, 16, 36, 28, 32, 8, 12
4. Multiply by 7, by 8, by 9: 3, 5, 6, 4, 8, 2, 9, 0, 1, 7
5. Round to the nearest hundred thousand: 659,752; 348,796; 789,214; 204,046
6. What is one hundred and twelve in standard form?
7. What is 4,000,000 + 500,000 + 30,000 + 2000 + 10 + 8?
8. There are 18 caps. Six are red. How many caps are not red?
9. What number comes between 613,725 and 613,727?
10. A DVD costs $17.99. How much change will you receive from a twenty-dollar bill?

SET 5

1. Round to the nearest hundred dollars: $275.10; $316.05; $760.13; $440.44; $859.77
2. Name the period of the underlined digits: 74,118; 25,308,433; 8,065,243; 117,589; 608,145; 3,698,572
3. Add 7 to: 8, 18, 28, 38, 58, 78, 48, 68
4. Subtract 8 from: 15, 25, 45, 65, 85, 35
6. How much money: 1 ten-dollar bill, 2 quarters, 3 dimes, 1 nickel?
7. Which is less? by how much?
   183,575 or 183,775
8. Tony scored 5 points in the 1st quarter, 6 in the 2nd, and 4 each in the 3rd and 4th quarters. How many points did he score?
9. What must be added to 9 to make a sum of 17?

SET 6

1. \[ 8 + 0 + 4 \quad 7 + 2 + 3 \quad 6 + 4 + 1 \]
2. \[ 5 + 6 + 0 \quad 8 + 9 + 2 \quad 1 + 9 + 5 \]
3. \[ u + 8 = 11 \quad 4 + p = 13 \]
4. \[ 12 - a = 7 \quad 9 = 16 - t \]
5. \[ z - 3 = 9 \quad 12 = 6 + r \]
6. \[ u + 8 = 11 \quad 4 + p = 13 \]
7. \[ 12 - a = 7 \quad 9 = 16 - t \]
8. \[ z - 3 = 9 \quad 12 = 6 + r \]
9. \[ u + 8 = 11 \quad 4 + p = 13 \]
10. \[ 12 - a = 7 \quad 9 = 16 - t \]
   \[ z - 3 = 9 \quad 12 = 6 + r \]

6. Is the sum reasonable? Check by estimation. 524 + 46 = 984
7. Complete the pattern.
   9, 18, 27, \ldots, \ldots, 54, \ldots, 72
8. Nora had $10.68 and spent $10.35. How much money did she have left?
9. Grace is 23 years old. Mary is 11 years older than Grace. How old is Mary?
10. Ned needs $17. He has $8. How much more money does he need?
SET 7

1. Add 110 to: 34, 134, 244, 354, 424, 564, 634, 714, 844
2. Add 8 to: 7, 17, 57, 37, 47, 27, 67, 77
3. Subtract 9 from: 13, 43, 73, 85, 14, 74, 34, 12, 92, 62, 82, 52
4. Estimate. 123 / 216 / 351 / 435 / 694 / 216
5. 4000 / 6100 / 3400 / 5300 / 2400 / 7500
6. Bob’s coat cost $67. Ted’s coat cost $8 more than Bob’s. How much did Ted’s coat cost?
7. Gina is 47 in. tall. Don is 5 in. shorter. How tall is Don?
8. Add. 138 / 22 / 19
9. Ramon has $17.30 and Joe has $8.70. How much do the boys have altogether?
10. Rosa had 24 cookies. She gave 7 to Jane. How many cookies did Rosa have left?

SET 8

1. Subtract 5 from: 13, 43, 73, 33, 53
2. $10.00 – $4.00 $12.00 – $6.00 $25.00 – $20.00 $36.00 – $24.00
3. Multiply by 3, then add 4: 4, 8, 0, 9, 1, 5, 3, 6, 2, 7
5. Multiply by 7: 2, 4, 5, 7, 9, 1, 0, 3, 6, 8
6. How much greater than 150 is 220?
7. Frank is 7 years old. His sister is 5 years older than Frank. How old is Frank’s sister?
8. What is 4 more than the product of 9 times 7?
10. Pedro is 42 in. tall. Dave is 9 in. taller. How tall is Dave?

SET 9

1. $1 \times 6 \ 4 \times 6 \ 7 \times 6 \ 9 \times 6$
   $6 \times 1 \ 6 \times 4 \ 6 \times 7 \ 6 \times 9$
2. $3 \times 0 \ 5 \times 1 \ 4 \times 0 \ 6 \times 0$
   $1 \times 7 \ 8 \times 0 \ 9 \times 1 \ 2 \times 0$
3. $8 \times b = 24 \ 5 \times w = 45$
   $n \times 2 = 12 \ d \times 6 = 48$
   $7 \times m = 35 \ p \times 4 = 36$
4. Multiply by 2: 10, 20, 30, 40, 50, 70, 90, 60, 80
5. $3 \times (2 + 5) \ (1 + 4) \times 4$
   $2 \times (1 + 3) \ 6 \times (2 + 2)$
   $(3 + 2) \times 5 \ (3 + 3) \times 1$
6. Myra pulled out fourteen white socks from the laundry basket. How many pairs of socks can she make?
7. Which is the greater product? 3 times 40 or 4 times 20
8. Paul is 20 years old. Jack is 3 times as old as Paul. How old is Jack?
9. About how much will 5 toys cost if each toy costs $1.98?
10. There are 24 stickers on a sheet. How many stickers are on 2 sheets?
SET 10

1. Multiply by 6, then add 2: 0, 8, 6, 2, 4, 10, 1, 3, 5, 9, 7
2. Multiply by 8, then add 5: 2, 4, 0, 3, 7, 1, 9, 10, 5, 8, 6
3. Estimate. \(3 \times \$0.48\) \(2 \times \$0.12\)
   \(4 \times \$0.23\) \(5 \times \$0.36\) \(6 \times \$0.38\)
4. Estimate. \(28 \times 21\) \(39 \times 12\)
   \(13 \times 17\) \(43 \times 36\) \(51 \times 22\)
   \(14 \times 67\)
5. \(20 \times 100\) \(30 \times 100\) \(20 \times 300\)
   \(40 \times 200\) \(30 \times 300\) \(20 \times 200\)

6. Mr. Lass sold 52 tickets on each of the 4 days before the dance. How many tickets did he sell?
7. Tanya bought 2 kites that cost $18 each. How much did she pay for the kites?
8. Velvet costs $8 a yard. How much do 4 yards cost?
9. Complete the pattern.
   \(0, 4, 3, 7, 6, \ ?\, , \ ?\)
10. How much greater is the product of 7 and 6 than the product of 0 and 6?

SET 11

1. \(30 \times 60\) \(90 \times 20\) \(30 \times 31\)
   \(10 \times 210\) \(10 \times 880\) \(40 \times 31\)
2. \(8)\overline{8}\ 1)\overline{7}\ 6)\overline{0}\ 5)\overline{5}\)
   \(1)\overline{4}\ 3)\overline{0}\ 9)\overline{0}\ 4)\overline{4}\)
3. \(2)\overline{14}\ 5)\overline{30}\ 7)\overline{28}\ 6)\overline{36}\)
   \(8)\overline{64}\ 9)\overline{72}\ 4)\overline{36}\ 8)\overline{40}\)
4. Divide by 4: 25, 17, 37, 29, 33, 9, 13, 21, 26, 18, 38, 30, 34, 10, 22
5. \(g \times 4 = 32\) \(6 \times c = 24\)
   \(h \times 2 = 18\) \(e \times 7 = 21\)
   \(8 \times i = 56\) \(f \times 8 = 72\)

6. The factors are 23 and 68. Estimate the product.
7. The product is 42. One factor is 6. What is the other factor?
8. What is the remainder when 20 is divided by 9?
9. It took Sam 6 hours to pack 325 cartons. About how many cartons did he pack each hour?
10. Five ties cost $60. Each tie costs the same. How much does 1 tie cost?

SET 12

1. Divide by 9: 29, 11, 46, 20, 38, 40, 31, 15, 48, 33, 14, 49, 19, 42, 44
2. Which are divisible by 2? by 7? by 10?
   \(12, 25, 42, 90, 63, 75, 110, 68, 130\)
3. \(2)\overline{222}\ 5)\overline{555}\ 3)\overline{363}\ 4)\overline{484}\)
   \(4)\overline{888}\ 2)\overline{462}\ 3)\overline{393}\ 2)\overline{846}\)
4. Divide by 8: 73, 74, 78, 79, 69, 71, 65, 12, 19, 21, 30, 31, 35, 38, 37, 59, 61, 57, 63, 49, 52, 55, 53
5. \(12 + 4 = 3\) \(16 - 9 + 5\)
   \(8 + 7 - 4\) \(12 \div 4 \times 5\)
   \(5 \times 6 \div 2\) \(40 \div 5 \div 2\)

6. Sue has $12.72 to share equally with Meg. How much money will each girl receive?
7. Jim spent $1.40 for 2 feet of wire. How much did each foot cost?
8. A farmer plants 800 corn plants in 4 equal rows. About how many plants are in each row?
9. Which is greater? by how much?
   \(12,626\) or \(12,662\)
10. What number comes next after \(124,169\)?
SET 13
1. Rename as feet: 12 in. 36 in. 24 in. 48 in. 72 in. 60 in. 84 in.
2. Name the time a half hour later.
   8:15, 10:30, 12:00, 3:45, 5:20, 6:10, 4:05, 7:15, 9:25
3. Compare. Use <, =, >. 3 c ? 2 pt
   8 pt ? 4 qt
4. Name the date 1 week later.
   Jan. 8, Mar. 12, Aug. 23, Oct. 2, Nov. 18, Dec. 20
5. Divide by 9: 27, 29, 81, 84, 72, 75, 9, 13, 45, 49, 53, 63, 64, 69
6. Mr. Jones spends $25 every work week on tolls. He works 5 days a week. How much does he spend each workday on tolls?
7. Which is longer, 1 meter or 98 centimeters?
8. Pete’s pet weighs 30 oz. How many more ounces does it need to gain to weigh 2 lb?
9. How much longer is 5 feet than 1 yard?
10. Which distance is longer, 10 kilometers or 1000 meters?

SET 14
1. Multiply by 4: 6, 7, 8, 0, 1, 2, 5, 4, 3
2. Count by 1000: 1400–6400; 2300–7300; 5900–10,900; 9700–18,700
3. Divide by 7: 61, 62, 58, 57, 60, 59, 31, 36, 38, 37, 40, 41, 29, 34
5. Give the fraction for the shaded part of each region.

SET 15
1. What part of a dollar is: 10¢, 50¢, 25¢, 5¢, 1¢, 75¢, 30¢, 70¢, 20¢
2. \( \frac{1}{3} = \frac{k}{6} \), \( \frac{1}{4} = \frac{y}{16} \), \( \frac{1}{2} = \frac{x}{10} \)
   \( \frac{2}{5} = \frac{q}{15} \), \( \frac{2}{3} = \frac{i}{12} \), \( \frac{3}{4} = \frac{x}{20} \)
3. \( 1 \times 2 = \frac{3 \times 3}{8 \times 2} \), \( 7 \times 3 \)
   \( 1 \times 4 = \frac{4 \times 3}{3 \times 4} \), \( 5 \times 3 \)
4. Closer to 0, \( \frac{1}{2} \), or 1? \( \frac{1}{4}, \frac{2}{2}, \frac{11}{2} \)
   \( \frac{8}{5}, \frac{3}{4}, \frac{12}{4} \)
5. Name the GCF of: 6 and 12; 3 and 15; 8 and 24; 10 and 12; 9 and 12
6. Would you use centimeters or meters to measure the length of a pencil?
7. One paper clip weighs 1 g. How many paper clips do you need to equal 1 kg?
8. Key: Each \( \vartriangle = 10 \) cones. How many cones does \( \vartriangle \vartriangle \vartriangle \vartriangle \) equal?
9. A graph is used to show change over a period of time.
10. If 1 mi equals 5280 ft, how many feet are there in 2 mi?
SET 16

1. Express in lowest terms: \( \frac{3}{6}, \frac{6}{9}, \frac{5}{10}, \frac{2}{7}, \frac{4}{8}, \frac{3}{12}, \frac{18}{20}, 18' 10' \)

2. Fraction or mixed number? \( \frac{5}{6}, \frac{1}{3}, 2\frac{4}{5}, 3\frac{1}{6}, 4\frac{7}{8}, \frac{9}{10} \)

3. Order from least to greatest:
   \( \frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10} \)

4. Multiply by 6, then add 7: 10, 8, 6, 4, 2, 0, 1, 3, 5, 7, 9

5. Subtract a nickel from: 25¢, 18¢, 50¢, $1.35, $2.05, $1.16, $6.96

6. A jar has 10 red beans, 5 green beans, 5 blue beans, and 1 yellow bean. What is the probability of choosing red? yellow? blue? green?

7. In a survey of 100 people, 30 people chose hot dogs. What part of the people chose hot dogs?

8. At 0°C, water _?_.

9. Roy rolled a ball 6 yards. Was that more or less than 20 feet?

10. What is 3 more than the product of 9 times 5?

SET 17

1. \( \frac{3}{5} + \frac{1}{5} \)
   \( \frac{7}{15}, \frac{2}{3}, \frac{1}{2} + \frac{3}{7} + \frac{1}{6} + \frac{4}{6} \)

2. \( \frac{3}{5} - \frac{2}{8} \)
   \( \frac{1}{8}, \frac{1}{3} + \frac{5}{9} + \frac{4}{9} + \frac{10}{10} \)

3. Express as a mixed number.
   \( \frac{15}{2}, \frac{7}{4}, \frac{11}{3}, \frac{17}{5}, \frac{9}{2}, \frac{13}{6}, \frac{15}{4} \)

4. \( \frac{3}{2} + \frac{1}{4} \)
   \( \frac{2}{2} + \frac{4}{2} + \frac{3}{4} + \frac{5}{3} \)

5. Multiply by 3, then add 4: 4, 8, 0, 9, 5, 6, 7, 10, 2, 3, 1

6. Tom ate \( \frac{1}{3} \) of the pizza. Sal ate \( \frac{2}{3} \). Who ate more?

7. Six ninths minus four ninths is _?_.

8. In a pet store \( \frac{1}{5} \) of the pets are cats and \( \frac{2}{5} \) are dogs. What part of the pets are cats and dogs?

9. Sasha bought \( \frac{5}{4} \) lb of chicken. She cooked \( \frac{3}{4} \) lb. How much is left?

10. Estimate the sum of
    \( \frac{2}{3} + \frac{3}{4} + \frac{4}{2} \).

SET 18

1. Subtract 2 from: \( 3\frac{1}{2}, 4\frac{1}{5}, 7\frac{1}{8}, 8\frac{2}{3}, 5\frac{2}{5}, 2\frac{7}{8}, 2\frac{1}{3} \)

2. How many nickels are there in:
   25¢, $.20, $.35, $.50, 45¢, 60¢, $.30, $.55, $.40

3. Find \( \frac{1}{6} \) of: 6, 18, 42, 54, 24, 36, 12

4. Find half of: 14, 10, 8, 18, 20, 6, 4

5. Add 5 to: 9, 19, 59, 29, 38, 68, 28

6. If 47 is divided by 8, what is the quotient? the remainder?

7. Al did \( \frac{1}{6} \) of his homework in school and \( \frac{1}{2} \) before dinner. How much of his homework did he do?

8. In a set of 10 pens, 3 are black. What fractional part of the set is black?

9. Of 20 fish, \( \frac{3}{4} \) are striped. How many fish are striped?

10. Estimate. \( \frac{6\frac{1}{10}}{} - \frac{3\frac{1}{3}}{} \)
SET 19

1. Double each, then add 3: 10, 20, 30, 40, 50, 60, 70, 80, 90
2. Name the line segments.
3. Compare to a right angle. <, =, >.
4. Intersecting or parallel?
5. Closed or open?

SET 20

1. Congruent or similar? □□
2. Reflection or translation? → ← → →
3. Divide by 9, then add 2: 18, 9, 36, 81, 27, 54, 72, 63, 36, 45
4. 20 × 200 60 × 20 4 × 800
   40 × 600 50 × 300 30 × 700
5. Multiply by 8: 4, 6, 3, 9, 5, 7
6. Which letter has no line of symmetry, G or M?
7. What number comes next after 9999?
8. Ben’s calculator costs $25. Ann’s costs $19. What is the difference in cost?
9. Find \( \frac{1}{3} \) of 27¢, then add 4¢.
10. What is the value of zero in 4,036,645?

SET 21

1. Name the solid figure.
2. Multiply by 9, then add 3: 2, 3, 7, 5, 0, 1, 10, 6, 4, 9, 8
3. \( \frac{3}{6} \frac{6}{6} \frac{6}{6} \) \( \frac{4}{4} \frac{4}{4} \frac{4}{4} \) \( \frac{2}{2} \frac{2}{2} \frac{2}{2} \)
4. \( 3 \times 5 \times 2 \) \( 4 \times 2 \times 6 \) \( 3 \times 3 \times 5 \)
   \( 7 \times 3 \times 2 \) \( 2 \times 6 \times 5 \) \( 8 \times 5 \times 2 \)
5. Find \( \frac{1}{5} \) of: 10, 30, 40, 25, 5, 35, 20, 15, 45, 50
6. What is 100,000 + 5000 + 9 in standard form?
7. Find the perimeter of a fenced lot whose sides measure 7 m, 8 m, 5 m, 9 m, and 6 m.
8. What is the perimeter of a square playpen 2\( \frac{1}{2} \) yd on each side?
9. The bedroom rug measures 10 m by 4 m. What is its area?
10. What solid figure has 2 flat surfaces and 1 curved surface?
SET 22

1. How many tens are in: 370, 420, 550, 600, 780, 190, 830, 240, 960
2. $\frac{2}{8} \times 140 \quad \frac{3}{10} \times 210 \quad \frac{4}{7} \times 160 \quad \frac{7}{5} \times 350$
   \[20 \times 180 \quad 30 \times 150 \quad 40 \times 200 \quad 50 \times 450\]
3. How many 20s are in: 49, 67, 84, 182, 121, 165, 108, 114, 143
4. How many 7s are in: 45, 66
5. Estimate the quotient. $24 \div 42$, $31 \div 89$, $47 \div 99$, $43 \div 82$, $20 \div 85$, $34 \div 69$, $27 \div 88$
6. Find the volume of a dollhouse that is 3 ft long, 2 ft wide, and 2 ft high.
7. Dan put 480 soccer cards on the floor. He put them into 20 equal rows. How many cards were in each row?
8. Bus fare to the zoo was $18. About how much did the driver collect from 19 children?
9. Express 6 feet as yards.
10. Each box holds 28 crayons. How many crayons are in 4 boxes?

SET 23

1. How many 9s are in: 56, 19, 12, 39, 46, 68, 76, 29, 84, 65
2. How many 30s are in: 95, 62, 159, 277, 156, 243, 126, 214, 181
3. $16 = q \times 8 \quad 56 = b \times 8$
   $40 = h \times 8 \quad 24 = d \times 8$
   $64 = c \times 8 \quad 48 = v \times 8$
   $32 = a \times 8 \quad 72 = m \times 8$
   $80 = z \times 8$
4. Estimate the quotient.
   $32 \div 124$, $51 \div 98$, $16 \div 135$, $23 \div 144$, $49 \div 152$, $62 \div 188$
5. Multiply by 6: 1, 2, 5, 8, 9, 6, 0, 7, 4, 3, 10
6. A box of cupcakes costs $2.40. If there are 24 cupcakes in a box, how much does each cupcake cost?
7. How many dimes are in $4.00?
8. What is the difference in cents between 1 quarter and 3 nickels?
9. Ramon earns $63 a week. He saves $\frac{1}{7}$ of this amount. How much does he save weekly?
10. What is the sum of 19, 17, and 110?

SET 24

1. $4 \div 200 \quad 5 \div 300 \quad 6 \div 300 \quad 7 \div 700$
   $8 \div 400 \quad 2 \div 100 \quad 3 \div 900 \quad 9 \div 900$
2. Multiply by 7, then add 4: 6, 3, 4, 1, 9, 2, 0, 5, 7, 8
3. How many tens are in: 85, 62, 77, 43, 38, 22, 15, 94, 51
4. Read. 0.4, 0.9, 0.07, 0.5, 0.03, 0.46, 0.72, 0.01, 0.35, 0.11
5. Read. 1.6, 3.7, 8.6, 4.9, 12.5, 5.03, 8.07, 26.3, 6.18, 35.01
6. A parking garage holds a total of 480 cars with an equal number of cars on 4 levels. How many cars does each level hold?
7. What is one fifth of 20 cents?
8. Dan is 36 years old. David is 9 years old. How much older is Dan than David?
9. Name a decimal between 0.1 and 0.3.
10. What is 0.2 more than 1?
SET 25

1. Give the value. 0.42, 6.23, 14.3, 0.05, 36.1, 8.07, 1.48
2. Compare. $<$, $=$, $>$. 0.7 ? 0.3
   0.16 ? 0.19  2.36 ? 2.63
   6.35 ? 6.3  1.7 ? 1.72
3. Order least to greatest: 0.3, 0.1, 0.6; 0.13, 0.25, 0.20; 3, 0.3, 0.03
4. Complete the pattern. 0.1, 0.4, 0.7, __; 0.05, 0.15, 0.25, __; 1.1, 2.1, 3.1, __; 3.4, 3.6, 3.8 __; 5.9, 5.6, 5.3, __
5. $0.5 + 0.2 = 0.6 + 0.2 = 1.3 + 1.4$
   $2.1 + 1.6 = 0.8 + 0.1 = 1.7 + 1.2$
6. Name two decimals between 3 and 4.
7. Jesse ran 3.25 m and Tim ran 3.55 m. Who ran farther? by how many meters?
8. Round $382.87$ to the nearest dollar.
9. Missy spent 2.3 min on the first problem and 3.5 min on the next. How long did she spend on both problems?
10. What is the rule for this pattern? $0.3, 0.1, 0.5, 0.3, 0.7, 0.5, 0.9$

SET 26

1. Add 0.2 to: 1.2, 0.3, 2.7, 1.4, 3.9, 2.1, 0.6, 1.5
2. Add 5 cents to the sum of:
   $.04 + $.06  $.25 + $.50
   $.02 + $.03  $.18 + $.02
3. Round to the nearest one: 8.6, 4.9, 6.2, 7.8, 2.3, 3.4, 5.5, 0.7
4. Round to the nearest tenth: 4.18, 5.61, 3.22, 2.73, 7.45, 1.55
5. $w + 2 = 7 - 1$
   $g ÷ 4 = 3 × 3$
   $6 × r = 9 + 9$
   $24 ÷ y = 10 - 2$
6. The finishing times for the race were 59.1 s for 1st place and 59.6 s for 2nd place. What is the difference in the times?
7. Milk costs $2.89 and bread costs $1.64. About how much money do both items cost in all?
8. Pam bought 2 six-packs of soda. She spent $6.00. What did each can cost?
9. What is $4 + 0.5$ in standard form?
10. How much greater than 0.2 is 0.48?

SET 27

1. Subtract 0.1 from: 9.6, 0.4, 6.3, 1.8, 0.6, 5.4, 3.3, 2.7
2. $3 + 4 - 2$
   $10 - 7 + 2$
   $7 + 8 - 9$
   $9 + 9 - 10$
3. Divide by 5, then subtract 2: 35, 20, 45, 15, 25, 40, 30, 10, 50
4. $(3 × 3) ÷ 9$
   $10 × (4 - 4)$
   $(6 - 2) ÷ 1$
   $(4 + 4) × 2$
5. $2)\$1.80$
   $3)\$2.70$
   $4)\$4.00$
   $5)\$4.50$
   $6)\$4.80$
   $7)\$4.20$
6. Tom had $21.40. He spent $12.50. Then he found $5.00. How much money does he have now?
7. Multiply 6 and 4, add 2, subtract 5.
8. 1 quarter, 2 dimes, 3 pennies = _____¢
9. Three friends share $1.86 equally. How much does each friend receive?
10. There are 25 cookies in each of 3 bags. Tony eats 2 from each bag. How many cookies are left?
acute angle  An angle that measures less than 90°.
addend  A number that is added to another number or numbers.
angle  The figure formed by two rays that meet at a common endpoint.
area  The number of square units needed to cover a flat surface.
associative (grouping) property  Changing the grouping of the addends (or factors) does not change the sum (or product).
axis  The horizontal or the vertical number line of a graph.

capacity  The amount, usually of liquid, that a container can hold.
center  A point from which every point on a circle is the same distance.
centimeter (cm)  A metric unit of length; 10 cm = 1 dm; 100 cm = 1 m.
certain  An event that cannot fail to occur, or has a probability of 1.
circle  A simple closed curve; all the points on the circle are the same distance from the center point.
circle graph  A graph that uses sections of a circle to represent data.
clustering  To find addends that are nearly alike in order to estimate their sum.
common factor  A number that is a factor of two or more products.
common multiple  A number that is a multiple of two or more numbers.
commutative (order) property  Changing the order of the addends (or factors) does not change the sum (or product).
compatible numbers  Two numbers, one of which divides the other evenly.

composite number  A whole number greater than 1 that has more than two factors.
cone  A solid figure that has one circular base.
congruent figures  Figures that have the same size and shape.
cube  A solid figure with six congruent square faces.
customary system  The measurement system that uses inch, foot, yard, and mile; cup, pint, quart, and gallon; and ounce and pound.
cylinder  A solid figure that has two congruent circular bases.
data  Facts or information.
decimal  A number in base ten that is written with a decimal point.
2.04  decimal
 __________  decimal point
decimeter (dm)  A metric unit of length; 1 dm = 10 cm; 10 dm = 1 m.
degree (°)  A unit used to measure angles.
degree Celsius (°C)  A unit for measuring temperature. The freezing point of water is 0°C.
degree Fahrenheit (°F)  A unit for measuring temperature. The freezing point of water is 32°F.
denominator  The numeral below the bar in a fraction; it names the total number of equal parts.
diameter  A line segment that passes through the center of a circle and has both endpoints on the circle.
difference  The answer in subtraction.
digit  Any one of the numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.
**distributive property**  
Multiplying a number by a sum is the same as multiplying the number by each addend of the sum and then adding the products.

**dividend**  
The number to be divided.

\[
24 \div 4 \quad 4)24
\]

**divisibility rules**  
A rule that tells whether one number is divisible by another.

**divisible**  
One number is divisible by another if it can be divided by that number and yield no remainder.

**divisor**  
The number by which the dividend is divided.

\[
36 \div 9 \quad 9)36
\]

**flip (reflection)**  
The movement of a figure over a line so that the figure faces in the opposite direction.

**fluid ounce (fl oz)**  
A customary unit of capacity; 8 fluid ounces = 1 cup.

**formula**  
A rule that is expressed by using symbols.

**fraction**  
A number that names part of a whole or part of a set.

**front-end estimation**  
A way of estimating by using the front, or greatest, digits to find an approximate answer.

**function**  
A quantity whose value depends on another quantity.

**gram (g)**  
A metric unit of mass; 1000 g = 1 kg.

**greatest common factor (GCF)**  
The greatest number that is a factor of two or more products.

**half-turn symmetry**  
A figure that matches its image when it is turned halfway around has half-turn symmetry.

**hexagon**  
A polygon with six sides.

**identity property (property of one)**  
The product of one and a number is that number.

**impossible**  
An event that cannot occur, or has a probability of 0.

**improper fraction**  
A fraction whose numerator is greater than or equal to its denominator.

**inch (in.)**  
A customary unit of length; 12 in. = 1 ft.

**intersecting lines**  
Lines that meet or cross at a common point.

**inverse operations**  
Mathematical operations that undo each other, such as addition and subtraction or multiplication and division.
isosceles triangle  A triangle with at least two sides that are equal in length.

K
kilogram (kg)  A metric unit of mass;  
$1\text{ kg} = 1000\text{ g}$.
kilometer (km)  A metric unit of distance;  
$1\text{ km} = 1000\text{ m}$.

L
least common denominator (LCD)  The least common multiple of two or more denominators.
least common multiple (LCM)  The least number that is a multiple of two or more numbers.
like denominators  Denominators that are the same in one or more fractions; the fractions $\frac{3}{7}$ and $\frac{5}{7}$ have like denominators.
line  A straight set of points that goes on forever in opposite directions.
line graph  A graph that uses points on a grid connected by line segments to represent data.
line plot  A graph of data on a number line.
line segment  The part of a line between two endpoints.
liter (L)  A metric unit of capacity;  
$1\text{ L} = 1000\text{ mL}$.
lowest terms (simplest form)  A fraction is in lowest terms when its numerator and denominator have no common factor other than 1.

M
mass  The measure of the amount of matter an object contains.
mean (average)  A number derived by dividing a sum by the number of its addends.
median  The middle number of a set of numbers arranged in order.
meter (m)  A metric unit of length;  
$1\text{ m} = 10\text{ dm}$;  
$1\text{ m} = 100\text{ cm}$;  
$1000\text{ m} = 1\text{ km}$.
metric system  The measurement system that uses centimeter, decimeter, meter, and kilometer; milliliter and liter; and gram and kilogram.
mile (mi)  A customary unit of distance;  
$5280\text{ ft} = 1\text{ mi}$;  
$1760\text{ yd} = 1\text{ mi}$.
milliliter (mL)  A metric unit of capacity;  
$1000\text{ mL} = 1\text{ L}$.
millimeter (mm)  A metric unit of length.  
$10\text{ millimeters} = 1\text{ centimeter}$.
minuend  A number from which another number is subtracted.
mixed number  A number that is made up of a whole number and a fraction.  
$1\frac{1}{2}$  $\longrightarrow$  mixed number
mode  The number that appears most frequently in a set of numbers.
multiple  The product of a given number and any whole number.

N
negative numbers  Numbers that are less than zero; $-4$ is a negative number.
net  A flat pattern that folds into a solid figure.
number line  A line that is used to show the order of numbers.
number sentence  An equation or inequality.  
$16 = 9 + 7$  \hspace{1cm}  $28 < 52$
numerator  The numeral above the bar in a fraction; it names the number of parts being considered.

O
obtuse angle  An angle that measures more than $90^\circ$, but less than $180^\circ$.
Octagon  A polygon with eight sides.
one million  The next counting number after 999,999, or 1,000,000.
order of operations  The order in which operations must be computed when more than one operation is involved.

ordered pair  A pair of numbers that is used to locate a point on a grid or coordinate graph.

origin  The point (0, 0) on a coordinate grid where the x-axis and y-axis intersect.

ounce (oz)  A customary unit of weight; 16 oz = 1 lb.

outcome  The result of a probability experiment.

parallel lines  Lines in the same plane that never intersect.

parallelogram  A quadrilateral whose opposite sides are parallel and congruent.

partial product  When multiplying numbers with two or more digits, the product of a single digit in one factor and the other factor.

pentagon  A polygon with five sides.

percent (%)  The ratio or comparison of a number to 100.

perimeter  The distance around a figure.

period  A group of three digits set off by commas in a whole number.

perpendicular lines  Intersecting lines in the same plane that form four right angles.

plane  A flat surface that extends indefinitely in all directions.

point  An exact location in space.

polygon  A simple closed flat figure made up of three or more line segments.

prime factorization  The expression of a composite number as the product of prime numbers.

prime number  A whole number other than 0 or 1 that has exactly two factors, itself and 1.

probability  The chance or likelihood of an event occurring.

protractor  The tool used to measure angles.

pyramid  A solid figure that has a polygon for a base and has triangular faces that meet at a point. A square pyramid has a square base.

quadrilateral  Any four-sided polygon.

radius  A line segment with endpoints at the center of a circle and on the circle.

range  The difference between the greatest and least numbers in a set of data.

ratio  The comparison of two numbers, often expressed as a fraction.

ray  The part of a line that starts at an endpoint and goes on forever in one direction.

rectangle  A parallelogram with four right angles.

rectangular prism  A solid figure with six rectangular faces.

regrouping  Trading one from a place for ten from the next lower place, or ten from a place for one from the next higher place.

remainder  The number left over after dividing.

rhombus  A parallelogram with all sides the same length.

right angle  An angle that measures 90°. It forms a square corner.

right triangle  A triangle that has one right angle.

rounding  Writing a number to the nearest ten or ten cents, hundred or dollar, and so on.
S
scale  The numbers along an axis of a graph; the ratio of a pictured measure to the actual measure; the tool used to measure weight.
scale

scalene triangle  A triangle with no sides that are equal in length.

side  A line segment that forms part of a polygon.
side

similar figures  Figures that have the same shape. They may or may not be the same size.
similar figures

simple closed curve  A path that begins and ends at the same point and does not cross itself.
simple closed curve

slide (translation)  The movement of a figure along a line without changing direction.
slide (translation)

solid figure  A figure that is not flat, but that has volume; a solid figure is three-dimensional.
solid figure

sphere  A solid figure shaped like a ball.
sphere

square  A parallelogram that has four right angles and four congruent sides.
square

square pyramid  A pyramid with a square base.
square pyramid

straight angle  An angle that measures 180°.

straight angle

subtrahend  A number that is subtracted from another number.

subtrahend

survey  A way to collect data to answer a question.
survey

T
temperature  The measure of how cool or warm something is.
temperature

thermometer  An instrument used to measure temperature.
thermometer

ton (T)  A customary unit of weight; 2000 pounds = 1 ton.
ton

trapezoid  A quadrilateral with exactly one pair of parallel sides.
trapezoid

triangle  A polygon with three sides.

triangle

triangular prism  A solid figure with two parallel triangular faces.

triangular prism

turn (rotation)  The movement of a figure around a point.
turn (rotation)

turn image  The result of a turn (or rotation) of a figure.
turn image

U
unlike denominators  Denominators that are not the same in one or more fractions; the fractions $\frac{1}{8}$ and $\frac{1}{7}$ have unlike denominators.

unlike denominators

V
variable  A letter or other symbol that replaces a number in an expression, equation, or inequality.

variable

vertex  A common endpoint of two rays or line segments. In a solid figure, the point at which three or more edges meet.

vertex

volume  The number of cubic units needed to fill a solid figure.

volume

W
whole number  Any of the numbers 0, 1, 2, 3, 4, . . .
whole number

X
x-axis (horizontal axis)  The horizontal number line on a coordinate grid.
x-axis (horizontal axis)

x-coordinate  The number that tells how many spaces to move horizontally along the x-axis; in the ordered pair (1, 2), 1 is the x-coordinate.
x-coordinate

y-axis (vertical axis)  The vertical number line on a coordinate grid.
y-axis (vertical axis)

y-coordinate  The number that tells how many spaces to move vertically along the y-axis; in the ordered pair (1, 2), 2 is the y-coordinate.
y-coordinate

Z
zero (identity) property of addition  The sum of zero and a number is that number.
zero (identity) property of addition

zero property of multiplication  The product of zero and a number is zero.
zero property of multiplication
Abacus, 91

Addition of decimals
computation
tenths/hundredths, 426–7, 452–3
column, 426–7
estimate (see Estimation strategies)
missing addends, 437
representations, 426

Addition of fractions and mixed numbers
computation
column, 303
fractions with like denominators, 296–7, 301, 304–5, 312–3, 452–3
fractions with unlike denominators, 308–9, 321
mixed numbers, 301, 304–5, 316–7, 318
estimate (see Estimation strategies)
mental math, 305
on a number line, 296, 300
related to probability, 312–3
renaming sums, 308, 321
representations, 296, 300

Addition of whole numbers and money
addend/sum, 4(SU), 68, 84, 215
basic facts, 4(SU), 5(SU), 68–9, 70–1, 74–5, 443, 444–5, 449, 452–3
check, 83–4, 116
computation
no regrouping, 6(SU), 82–3
regroup
through ten thousands, 98–9, 100–1, 102–3, 104–5, 114–5, 116–7, 118–9, 147, 450–1
through millions, 103
column, 20(SU), 68–9, 70–1, 79, 80–1, 84–5, 103, 104–5, 114–5, 117, 119, 155, 437
money, 4 (SU) 82–3, 98–9, 100–1, 103, 104–5

Addition with measurement, 210–1, 215, 217, 225, 230, 316–7
estimate (see Estimation strategies)
fact families, 5(SU)
mental math, 71, 78–9
missing addends, 5(SU), 74–5, 76–7, 437, 443, 444–5, 447, 449, 451
number sentences (see Algebra)
perimeter, 20(SU), 358–9, 454
properties (see Algebra, properties)
related to multiplication, 8–9(SU), 128, 132
related to subtraction, 5(SU), 76–7, 84–5
representations, 4(SU), 98
strategies
add ten, 70–1
break apart ten, 70–1
doubles plus/minus one, 70–1
make hundred, 78–9
make ten, 70–1, 78–9
using properties, 68–9

Algebra
coordinate graphs, 23(SU), 346–7, 448–9
ordered pairs, 346–7, 353
x- and y-coordinates 347, 353
equations
missing addends, 5(SU), 74–5, 76, 437, 443, 444–5, 447, 449, 451, 453
missing cubic units, 377
missing digits, 115
missing dividend/divisor, 165, 168–9, 185, 383, 395, 443, 444–5, 451
missing factors, 8(SU), 12(SU), 127, 168–9, 275, 315, 443, 444–5, 447, 451, 453
missing minuends/subtrahends, 5(SU), 76–7, 443, 444–5, 447
missing numerator/denominator, 273, 274–5, 278, 283
missing symbols, 2(SU), 53, 208–9, 213, 215, 218–9, 221, 223, 225, 283, 389, 419, 450–1
number sentences
translating, 76, 127, 131, 156–7, 165, 168, 185, 442–3, 451, 453
for two variables, 445, 449
expressions
- compare, 143, 223, 389, 450, 451
- evaluate, 74, 143, 192–3, 389, 448, 450–1
- numerical, 74, 192–3, 389, 444–5, 450–1, 452–3
- factorization, 201, 276–7

formulas
- area, 360–1, 362–3, 373
- perimeter, 358–9, 362–3, 374–5, 454
- volume, 370–1, 374
- function tables, 170–1, 208, 213, 218, 220, 222, 227, 446–7, 448–9
- functions: writing the rule, 170–1, 446–7
- order of operations, 192–3, 445, 452–3
- problems with more than one solution, 51, 59, 60, 61, 99, 273, 283, 289, 327, 339, 415
- properties
  - addition of equality, 453
  - associative (grouping)
    - addition, 68–9, 78
    - multiplication, 126–7
  - commutative (order)
    - addition, 68–9
    - multiplication, 126–7
  - distributive, 127, 132, 139
  - identity of addition, 68–9
  - identity of multiplication, 126–7
  - multiplication of equality, 453
  - zero in multiplication, 126–7

Area
- 24(SU), 360–1, 362–3, 373, 375

**Assessment**
- Chapter Test, 64, 92, 122, 160, 202, 236, 262, 292, 322, 354, 378, 408, 438, 460
- Check Your Progress (two per chapter available online), 62, 90, 120, 158, 200, 234, 260, 290, 320, 352, 376, 406, 436, 458
- Performance Assessment, 64, 92, 122, 160, 202, 236, 262, 292, 322, 354, 378, 408, 438, 460
- Tell About It, 64, 92, 122, 160, 202, 236, 262, 292, 294, 322, 324, 354, 356, 378, 380, 408, 410, 438, 440, 460
- Test Preparation, 43, 49, 77, 111, 135, 193, 195, 221, 251, 271, 297, 345, 367, 383, 423, 451

**Average / mean**, 194–5

**Brain Builders**, 473–6

**Challenge** (see also Brain Builders, Critical Thinking, and Enrichment), 39, 47, 51, 55, 71, 99, 115, 135, 137, 171, 177, 207, 211, 247, 253, 269, 283, 311, 327, 341, 359, 361, 399, 417, 429, 445, 447, 449, 451

**Chapter Openers**, 35, 67, 95, 125, 163, 205, 239, 265, 295, 325, 357, 381, 411, 441

**Choose a Computation Method**, 179, 209

**Communicate** (see also Math Journal, Tell About It, Write About It) 39, 45, 369, 187, 207, 277, 343, 368

**Compare**
- angles, 329
- decimals, 418–9
- degrees Fahrenheit/Celsius, 225
- expressions, 223, 389, 450–1
- fractions, 268, 282–3, 286, 288–9
- measures
  - capacity, 15(SU), 18(SU), 213, 221
  - length, 14(SU), 17(SU), 208–9, 218–9, 404
  - temperature, 225
  - weight/mass, 16(SU), 19(SU), 215, 223
  - mixed numbers, 282–3
  - money, 52–3, 419
  - whole numbers, 2(SU), 46–7, 450

**Composite number**, 201, 277

**Connections**, 35, 67, 95, 125, 163, 205, 239, 265, 295, 325, 357, 381, 411, 441

**Consumer** (see also Money)
- better buy, 430–1
- order form, 191

**Coordinate grid**
- draw polygons, 347
- locating points, 347, 353, 448
- to find distance between x-, y-coordinates, 353 x- and y-coordinates 346–7


**Customary system** (see Measurement)

**Data** (see Statistics)

**Decimals**
- compare, 418–9
- concepts, 412–3, 414–5, 416–7
- decimal point 412, 414
- divide money, 430–1, equivalent decimals, 412–3, 414–5, 416–7 related to fractions, 412–3, 417
- estimate (see Estimation strategies) greater than one, 414–5 related to mixed numbers, 414–5
- on a number line, 413, 415, 420–1
- operations (see Addition and Subtraction of Decimals)
place value topics (see Place value, decimals)
related to fractions 412–3, 414–5, 417
representations, 412–3, 414–5, 418, 422, 426, 428
round: rules for, 422–3
word names, 412–3, 414–5, 416–7, 423
write and read, 412, 414–5, 416–7, 423
write zeros, 412, 414, 418, 422
Divisibility, 176–7
Division of whole numbers and money
average/mean, 194–5
basic facts, 10(SU), 11(SU), 12(SU), 164–5, 166–7,
check, 167, 174, 178, 180–2, 184, 187, 188,
190, 196, 197, 384–5, 388–9, 390–1, 392,
394–5, 398–9, 400, 430–1
computation
1-digit quotients, 174–5, 299, 384–5, 387,
388–9, 390–1, 392–3, 394–5
2-digit quotients, 178–9, 180–1, 184–5, 190–1,
194–5, 387, 394–5, 398–9
3-digit quotients, 182–3, 186–7, 188–9, 190–1,
387, 398–9, 400–1
divisors of 10 and multiples of 10, 382–3, 384–5,
386–7
money, 11(SU), 190–1, 387, 391, 393, 395, 397,
399, 401, 425, 430–1
trial quotients, 392–3
zero in the quotient, 186–7, 398–9
concepts, 10(SU), 11(SU), 12(SU), 166–7
divisibility, 176–7
divisor/dividend/quotient, 11(SU), 164–5, 383
estimating (see Estimation strategies)
fact families, 12(SU), 167
interpreting the remainder, 174, 175, 179, 180–1,
183, 185, 196–7, 199, 233, 385, 388–9, 390–1,
393, 395, 397
mental math, 167
missing dividend/divisor, 168–9, 179, 189, 191,
383, 443, 444–5, 451
number sentences (see Algebra)
patterns, 170–1, 382–3
related to multiplication, 11(SU), 12(SU), 166–7
related to subtraction, 10(SU)
remainder, 174–5, 180–1, 182–3, 184–5, 186–7,
188–9, 299, 384–5, 387, 388–9, 390–1, 392–3,
394–5, 396–7, 398–9, 400–1
representations, 10(SU), 11(SU), 12(SU), 166, 174,
186
rules for (zero and 1), 11(SU), 164–5, 398–9
Do You Remember?, 79, 103, 141, 147, 169, 215,
241, 249, 275, 285, 299, 309, 335, 387, 425, 442–3
Elapsed time (see Measurement)
Enrichment (see Measurement)
Expressions (see Algebra)
Factor trees, 201
Finding Together, 35, 67, 95, 125, 163, 205, 239, 265, 295, 325, 357, 381, 411, 441
Fractions (see also Number theory)
add (see Addition of fractions)
compare fractions and mixed numbers, 268, 282–3, 286, 288–9
concepts, 13(SU), 266–7
equivalent fractions
computing, 274–5, 278–9, 282–3, 284–5, 288–9, 308–9, 310–1, 321
patterns, 272–3, 275
using a table to find, 272–3
find part of a number, 314–5
fraction sense, 266–7, 270–1
improper fractions, 300–1, 321
least common denominator (LCD), 321
lowest terms, 278–9, 295, 296–7, 300–1, 304–5, 308–9, 310–1, 317, 318–9, 321
missing numerator/denominator, 273, 274–5, 278, 283
mixed numbers, 280–1, 282–3, 300–1, 302–3, 309
mixed numbers related to decimals, 414–5
numerator/denominator, 266–7, 309
on a number line, 268–9, 270–1, 280–1, 282, 296, 298, 300
one as a fraction, 272–3, 281, 296–7, 300–1, 308–9, 313
operations (see Addition, and Subtraction of fractions and mixed numbers)
order, 284–5
parts of a whole/set, 13(SU), 266–7
patterns, 272–3, 275
percent and ratio, 284–5
related to decimals, 412–3, 417
related to probability notation, 252–3, 254–5, 312–3
related to turn symmetry, 344–5
rename, 274–5, 278–9, 281, 282–3, 284–5, 300–1, 304–5, 308–9, 310–1, 321
representations, 13(SU), 266–7, 268–9, 272–3, 274–5, 278–9, 280, 296, 300, 304, 311
simplest form (see lowest terms)
subtracting (see Subtraction of fractions)
as whole numbers, 281, 297, 301, 305, 308–9
word names, 266–7, 280
write and read, 13(SU), 266–7, 268–9, 272–3, 280
zero as numerator, 268–9, 270–1, 280, 296–8, 310, 313
Functions (see Algebra)
Geometry
concepts, 326–7
congruence, 21(SU), 340
coordinate grid, 346–7, 353
linear relationships, 346–7, 353
draw, 21(SU), 327, 328, 331, 335, 337, 341, 342–3, 345, 347, 348, 350, 359, 361, 362–3, 367
lines
concepts, 326–7
curved/straight, 326–7, 332–3, 334–5
intersecting, 330–1
parallel, 330–1, 336–7
perpendicular, 330–1
ray, 328–9
line segments, 326–7, 334, 347, 348, 353
patterns,
geometric, 21(SU), 340, 342–3, 349
slide/ flips, 342–3
plane, 326–7
plane figures
angles
acute/obtuse, 329, 331, 339, 365
compare, 329
count, 328–9
measuring, 329
right angle, 328–9, 330–1, 336–7, 338
attributes
open/closed figures, 333, 344–5
simple/closed curve, 333, 350
vertex/sides, 334–5
circle
diameter/radius/center/chord, 332–3, 350, 365
polygons
classify, 334–5, 336–7, 338–9
polygon as a face, 366–7
quadrilateral, 276, 334–5, 336–7, 358–63
regular polygons, 334–5, 349, 350
triangle, 338–9, 358–9
point, 326–7, 332
endpoint, 326–7, 328–9, 334
separating plane figures, 363
similarity, 340–1, 353
solid figures
attributes
vertex/edge/face, 364–5
figures
cone/cylinder/sphere, 364–5
cube/ rectangular prism, 364–5, 370–1
square pyramid/triangular prism, 364–5
classification, 364–5, 366–7
related to plane figures, 366–7
separating solid figures, 366–7
nets, 366–7
symbols (geometric)
angle, 328–9
line, 326–7, 330–1
line segments, 326–7, 332–3, 350
parallel lines, 330–1
perpendicular lines, 330–1
point, 326–7
dot, 334–5
ray, 328–9
symmetry, 22(SU), 344–5, 349
transformations
slides/ flips, 342–3, 347
turns, 344–5, 347
Glossary, 486–91
Graphs (see Statistics and Coordinate graphs)
Hand-On Lessons, 38–9, 44–5, 136–7, 186–7, 342–3, 368–9
Identity properties (see Algebra properties)
Inequalities (see Algebra)
Interpret the remainder, (see Problem Solving Strategies)
Journal (see Math Journal)
Least common denominator (LCD), 321
Logic (see also Problem-solving strategies and Reasoning)
all/some/none, 307, 333, 337, 407
always/sometimes/never, 337
analogies, 287, 350
syllogisms, 407
true/false statements, 307, 333, 337, 345, 407
Magic squares, 437
Maintenance (see Do You Remember?, Still More Practice, Assessment, Cumulative Review)
Map, 41, 104, 136, 219, 233, 308, 428
paths, 219, 233, 308, 428
Materials (see Representations)
Math Journal, 171
Measurement (see also Estimation)
area
by formula, 360–1, 362–3
count square/half units, 24(SU)
of complex figures, 363, 373
of irregular figures, 24(SU), 373
relationship to perimeter, 362–3, 373
square units, 24(SU), 360–1, 362–3
benchmark, 14(SU), 17(SU), 18(SU), 19(SU), 214, 218, 220, 222
best estimate, 14(SU), 16(SU), 17(SU), 18(SU), 214, 220, 222
chop the appropriate tool, 215
chop the appropriate unit, 14(SU), 15(SU), 16(SU), 17(SU), 209, 213, 214–5, 220–1, 222, 225
compare units
capacity, 15(SU), 18(SU), 213, 221
length, 14(SU), 17(SU), 207, 208–9, 218–9, 404
temperature, 225
weight/mass, 16(SU), 19(SU), 215, 223
customary system
capacity, 15(SU), 212–3
length, 14(SU), 95, 206–7, 208–9, 233, 308, 357–8, 360–1, 371, 454
weight, 16(SU), 214–5, 230–1
denominate numbers, 210–1, 316–7
distance, 209, 219
draw, 207, 217
equivalent units, 14(SU), 15(SU)
measure
between points, 207, 216
objects to nearest cm/dm, 216–7
objects to nearest 1/4 in., 1/2 in., in., 206–7
metric system
capacity, 18(SU), 220–1, 249
length, 17(SU), 216–7, 218–9, 249, 357–8, 360–1, 362–3, 371
mass, 19(SU), 222–3, 249
prefixes, 217, 249
perimeter,
by adding, 20(SU)
by formulas, 358–9, 362–3, 374–5, 454
rename units
by computing, 95, 208–9, 210–1, 212–3, 215, 218–9, 223, 227, 229, 234, 259, 388–9
make a table, 208–9, 212–3, 214, 218–9, 220–1, 222, 223, 227
temperature
Celsius, 224–5, 455
compare Fahrenheit and Celsius, 225
degree, 224–5
Fahrenheit, 224–5
temperatures below zero, 224–5
use a table, 32
write and read, 224–5
time
A.M./P.M., 226–7
calendar, 229
clocks, 226–7, 228–9, 235
elapsed time, 228–9, 232–3, 235
minutes before/after the hour, 226–7
standard notation, 226–7, 228–9
telling, 226–7, 228–9
time zones, 235
volume, 368–9, 370–1, 374, 377
cubic units, 370–1, 373, 374, 377
by formula, 370–1, 374
Mental Math (maintenance), 477–85
Mental Math (end-of-lesson feature), 78–9, 85, 145, 165, 213, 305, 391
Money (see also Addition of whole numbers and money, Division of whole numbers and money, Multiplication of whole numbers and money, Subtraction of whole numbers and money, and Consumer)
compare/order amounts, 52–3, 56–7, 60
decimal point/dollar sign, 3(SU)
makes change, 50–1, 56–7, 60
recognize and count coin/bill combinations, 3(SU), 50–1, 56–7, 60–1
round, 54–5, 56
write and read, 3(SU), 50–1
Multiples
common multiple, 306–7, 321, 335
least common multiple (LCM), 306–7, 321, 335
**Multiplication of whole numbers and money**
- area, 24(SU), 360–1, 362–3, 373
- array, 128, 129
- basic facts, 7(SU), 8(SU), 9(SU), 11(SU), 12(SU), 126–7, 274–5, 277, 306, 444–5, 449, 452–3
- computation
  - 1-digit multipliers
    - 2-digit multiplicands, 128–9, 132–3, 359, 361
    - 2-digit multiplicands with regrouping, 136–7
  - 3-digit multiplicands with regrouping, 138–9
  - 4-digit multiplicands with regrouping, 142–3
  - greater multiplicands, 144–5
- multiplicands: multiples of 10, 100, 1000, 130–1, 156
- 2-digit numbers
  - 2-digit multiplicands, 148–9, 150–1, 156
  - 3-digit multiplicands, 152–3
  - multipliers of 10 and multiples of 10, 144–5
- three factors, 126–7, 370–1
- money, 7(SU), 8(SU), 9(SU), 140–1, 142–3, 149, 150–1, 152–3, 156, 233
- with measurement, 232
- concept, 7(SU), 8(SU), 9(SU)
- estimate (see Estimation strategies)
- fact families, 12(SU), 167
- factor/product, 7(SU), 126, 127, 143, 275
- mental math, 144–5
- missing factors, 12(SU), 127, 131, 275, 443, 444–5, 449
- patterns, 130, 137, 144–5
- properties (see Algebra)
  - related to addition, 7(SU), 8(SU), 128, 132
  - related to division, 11(SU), 12(SU), 168
- representations, 7(SU), 8(SU), 9(SU), 127, 128, 129, 130
- volume, 370–1, 374

**Negative numbers**, 224–5, 459

**Number line**
- compare, 268, 282
- decimals, 413, 415, 420–1, 422
- estimate, 49, 271
- fractions/mixed numbers, 268–9, 270–1, 280–1, 282, 296, 298, 300
- halfway point, 48–9, 270–1
- identify a point, 49, 268–9, 270–1, 281, 413, 415
- negative numbers, 459
- order, 420
- round, 422
- whole numbers, 10(SU), 48–9

**Number theory**
- divisibility, 176–7
- factors (common), 276–8
- greatest common factor (GCF), 277, 278
- least common denominator, 321
- prime/composite numbers, 201
- prime factorization (factor tree), 201

**Order of operations**, 192–3, 445, 452–3

**Ordered pairs**, 23(SU), 346–7, 448–9

**Ordering**
- decimals, 420–1
- fractions, 284–5
- measures, 207, 221
- money, 52–3
- on a number line, 420
- whole numbers, 46–7

**Patterns**, 21(SU), 38, 39, 42–3, 78–9, 130, 137, 144–5, 151, 170–1, 177, 272, 306–7, 340, 342, 348–9, 353, 375, 382

**Percent**, 291

**Perimeter** (see Measurement), 20(SU), 358–9, 362–3, 374–5, 454

**Place value**
- decimals
  - tenths/hundredths, 412–3, 414–5
  - thousandths, 417
  - expanded form, 416–7
  - representations, 412–3, 414–5, 418, 422, 426, 428
  - standard form, 416–7
  - word names, 412, 414–5, 416–7
- whole numbers
  - abacus, 93
  - chart, 36, 40, 42, 63
  - concepts, 1(SU), 36–43, 63
    - through thousands period, 1(SU), 36–7
    - through millions period, 38–43
    - through billions period, 63
  - expanded form, 42–3, 63, 416–7
  - representations, 1(SU), 37, 48, 49
  - standard form, 1(SU), 36–7, 40–1, 42–3, 63
  - word names, 1(SU), 36–7, 38–9, 40–1, 42–3, 63
- write and read, 1(SU), 36–7, 38–9, 40–1, 42–3, 63

**Practice** (see Practice in each lesson and Still More Practice)

**Predict**, 71, 143, 187, 244–5, 253, 255, 368

**Prime factorization**, 201

**Prime number**, 201, 277

**Probability**
- certainty/impossibility, 313
- combinations, 51, 59, 61, 250–1
- computing, 252–3, 312–3
- dependent/independent events, 253, 255
- equally/more/less likely, 253, 255
- events, 252–3, 254–5, 312–3
- experiments, 27(SU), 255, 312–3
- fair/unfair games, 255
- notation, 312–3
- outcomes, 252–3, 254–5
8204-6_491-499

4/16/07

9:29 PM

Page 497

predict and record, 71, 143, 253, 255
randomness, 252–3, 254
tree diagrams, 250–1
Problem Solving
Applications (Mixed strategies) in lessons, 34,
60–1, 88–9, 90–1, 118–9, 156–7, 198–9, 232–3,
258–9, 288–9, 318–9, 350–1, 374–5, 404–5,
434–5, 456–7
Formulation (Write Your Own), 59, 73, 87, 119,
197, 199, 259, 317, 351, 457
Introduction to Problem Solving (Heuristic model)
28–34, 154–5, 156–7, 196–7, 198–9, 230–1,
232–3, 256–7, 258–9, 285, 286, 288–9, 316–7,
318–9, 348–9, 350–1, 402, 404–5, 432–3,
434–5, 454–5, 456–7
Strategies
Choose the Operation, 30, 34, 60, 61, 82–3,
88–9, 115, 116–7, 118, 119, 156, 157, 198,
199, 211, 221, 223, 225, 232–3, 258–9,
302–3, 304–5, 310–1, 318–9, 350–1, 391,
404–5, 429, 434, 442–3
Draw a Picture, 314–5, 325, 335, 337, 339, 341,
351
Find a Pattern, 58–9, 61, 171, 348–9, 350–1,
375, 405, 435
Guess and Test, 31, 34, 57, 61, 105, 118, 119,
157, 233, 259, 289, 319, 375, 445, 454–5,
456–7
Interpret the Remainder, 174–5, 179, 180–1,
183, 184–5, 196–7, 199, 233, 385, 388–9,
390–1, 393, 395, 397, 401, 404, 405
Logical Reasoning, 86–7, 88, 89, 118, 119, 156,
157, 198, 199, 209, 233, 259, 286–7, 288–9,
319, 350–1, 352–3, 375, 435, 457
Make an Organized List, 51, 57, 59, 61, 118–9,
250–1, 255, 257, 327
Make a Table, 25(SU), 31, 58–9, 60, 61, 68–9,
89, 118, 119, 171, 209, 289, 404–5, 449
More Than One Way, 454–5
Use a Drawing/Model, 49, 53, 56–7, 60, 125,
128–9, 219, 228–9, 283, 285, 288, 314–5,
348–9, 350–1, 359, 360, 362–3, 371, 372–3,
374–5, 407, 434–5
Use a Diagram/Graph, 25(SU), 26(SU), 118,
157, 198, 229, 235, 240–1, 242–3, 244–5,
246–7, 248–9, 253, 254–5, 256–7, 258–9,
261, 288–9, 296, 298–9, 319, 350–1, 405,
435, 456, 459
Use More Than One Step, 32, 34, 60, 71, 85, 89,
95, 99, 101, 109, 111, 113, 117, 118–9, 131,
135, 139, 141, 153, 154, 156–7, 165, 189,
195, 198, 209, 213, 215, 217, 219, 221, 223,
225, 230–1, 232–3, 241, 249, 259, 261, 289,
315, 316–7, 318–9, 350, 374–5, 397, 402–3,
404–5, 429, 432–3, 434–5, 454, 455, 456–7
Use Simpler Numbers, 316–7, 318–9
Work Backward, 154–5, 156, 157, 229, 319,
434–5, 457

Write a Number Sentence, 8–9(SU), 33, 34, 60,
61, 67, 72–3, 76–7, 82–3, 85, 88–9, 97, 99,
101, 102–3, 104–5, 106–7, 108–9, 110–1,
112–3, 115, 116–7, 118–9, 129, 131, 132–3,
134–5, 136–7, 138–9, 140–1, 142–3, 146–7,
148–9, 150–1, 152–3, 156–7, 159, 164–5,
167, 168–9, 174–5, 178–9, 180–1, 183,
184–5, 186, 189, 190, 198–9, 209, 210–1,
213, 221, 223, 225, 232, 241, 247, 249,
258–9, 261, 296–7, 298–9, 301, 302–3,
304–5, 308, 310–1, 318, 339, 374–5, 383,
387, 388–9, 390–1, 393, 395, 397, 399, 401,
404, 425, 426–7, 428–9, 430, 434, 442–3,
454–5, 456–7
Topics
Extra Information, 116–7, 119, 198, 199, 233,
319, 351, 435
Hidden Information, 101, 119, 131, 148, 199,
233, 259, 402–3, 405, 457
Properties (see Algebra, properties)
Ratio, 291
Reasoning
algebraic thinking, (see Algebra)
analyze
information, (relevant/irrelevant), (see
Problem Solving Topics: Hidden
Information, Extra Information, Missing
Information (see Problem-solving Topics)
7(SU), 10(SU), 13(SU), 14–5(SU),
16–7(SU), 18–9(SU), 21(SU), 22(SU),
24–5(SU), 26–7(SU), 30–1, 32–3, 34, 37,
44, 48–9, 51, 53, 55, 56–7, 58–9, 60–1,
68–9, 70–1, 74–5, 76–7, 78–9, 85, 86–7,
88–9, 91, 99, 101, 103, 105, 106–7, 108–9,
110–1, 117, 118–9, 127, 128–9, 130–1, 135,
137, 138–9, 141, 143, 144–5, 147, 148–9,
151, 152–3, 154–5, 156–7, 159, 164–5,
166–7, 168–9, 170–1, 172–3, 175, 176–7,
180–1, 183, 184–5, 186, 189, 191, 195,
196–7, 198–9, 205, 207, 208–9, 210–1, 213,
214–5, 217, 218–9, 220–1, 222–3, 225, 227,
228–9, 230–1, 232–3, 235, 240–1, 242–3,
244–5, 246–7, 248–9, 250–1, 252–3, 254–5,
256–7, 258–9, 261, 268–9, 270–1, 272,
274–5, 276–7, 280, 283, 284–5, 286–7, 288,
291, 295, 296–7, 298–9, 301, 302–3, 304–5,
307, 308, 310–1, 313, 314–5, 316–7, 318–9,
321, 328–9, 330–1, 332–3, 334–5, 336–7,
338–9, 340–1, 342, 344–5, 347, 348–9,
350–1, 353, 382–3, 384–5, 387, 388–9,
390–1, 395, 397, 399, 401, 402–3, 404–5,
407, 413, 414–5, 418–9, 421, 423, 425,
426–7, 428–9, 430–1, 432–3, 434–5, 437,
441, 442–3, 446, 449, 454–5, 456–7, 459
apply strategies/rules/conceptual understanding,
20(SU), 34, 38–9, 41, 43, 51, 54–5, 56–7,
58–9, 60–1, 70–1, 72–3, 75, 78–9, 82, 88–9,
91, 97, 109, 117, 118–9, 125, 127, 131, 139,

497


141, 145, 149, 151, 155, 156–7, 165, 168–9, 171, 175, 192, 194–5, 196–7, 198–9, 201, 278, 297, 299, 300, 305, 309, 310, 312, 318, 351, 383, 385, 405


communicate, (see Communicate, Math Journal, Tell About It and Write About It) 143, 151, 167, 187, 255, 267, 337, 343, 347


classifications/deductive reasoning, 86–7, 137, 143, 144–5, 247, 254, 407

estimate/distinguish exact from estimate, (see Estimation) 14(SU), 17(SU), 48, 113, 159, 205, 206–7, 216–7, 220, 222, 227, 302–3, 384, 386–7


generalize/inductive reasoning, 38, 170 justify/verify


logic/logical reasoning all, some, none, 307, 333, 337, 407 always, sometimes, never, 337 predictions, (making), 27(SU), 71, 143, 170, 187, 244–5, 252–3, 382, 449

problem-solving apply strategies to other situations (see Problem Solving Strategies and Problem-Solving Applications) break apart to simpler, (see Problem-Solving Strategies: Use Simpler Numbers, More Than One Step, and Combine Strategies)


rules (identify/write), 11(SU), 54–5, 73, 79, 80–1, 82, 164–5, 170–1, 192–3, 398–9, 422–3, 446–7

spatial reasoning, 45


Reinforcement (see Do You Remember? Check Your Progress, Still More Practice, and Cumulative Reviews)

Representations (see Decimals, Fractions, Whole Numbers and the four operations with each of these number types. See also Place value.)

Roman numerals, 121

Round (rules for, see Estimation; for computation, see Estimation strategies)

Skills Update, 1(SU)–27(SU)

Skip count, 42–3, 227, 228–9, 306

Square numbers, 201

Square units, 360–1, 362–3, 373, 375

Standard form (see Place value, decimals and whole numbers)

Statistics averages/mean, 194–5
data
collect data/information, 195, 255
derect outliers, 195, 246–7
interpret, 69, 240–1, 243, 244–5, 246–7, 256–7, 258–9, 261
make an organized list, 58–9, 60–1, 250–1
misleading graphs (data), 243
predict change, 244–5
organize, 25(SU), 240–1, 240–1, 243, 245, 247, 250–1, 255
survey, 246–7
graphing sense, 26(SU), 240, 242–3, 244–5, 246–7
graphs
bar
double bar graph, 261
half interval, 240–1, 258, 405, 456
interpret, 26(SU), 118, 157, 240–1, 242–3, 256, 258, 405, 456
make, 242–3, 245, 255
circle, 26(SU), 248–9, 257, 258, 288, 289, 309, 314, 315
line
broken scale, 244–245
half interval, 244–5
interpret, 26(SU), 244–5, 254, 257, 259, 435
make, 245
line plot
interpret, 246–7
make, 247
pictograph
half symbol, 198, 240–1, 258
interpret, 26(SU), 198, 240–1, 319
make, 240–1, 258
stem-and-leaf plot, 247
median, 240, 241, 285
mode, 246–7, 285
range, 246–7
computation
tenths/hundredths, 428–9
estimating (see Estimation strategies)
representations, 428
tables
complete, 25(SU), 51, 58–9, 60, 61, 86, 87, 170–1, 177, 191, 208–9, 213, 214, 218, 220, 222, 227, 365, 371, 446–7, 449
tally chart, 25(SU), 240–1, 246–7, 255, 257
Still More Practice, 461–72
Subtraction of decimals, 482–9
Subtraction of fractions and mixed numbers
computation
fractions with like denominators, 298–9, 304–5, 452–3
fractions with unlike denominators, 310–1
mixed numbers, 304–5, 316–7
estimate (see Estimation strategies)
on a number line, 298
rename differences, 310
representations, 298
Subtraction of whole numbers and money
basic facts, 4(SU), 5(SU), 72–3, 74–5, 76–7, 442–3, 444–5, 450–1, 452–3
check, 83–4, 106, 108, 110, 112
computation
no regrouping, 6(SU), 82–3
regroup
through millions, 111
zeroes in the minuend, 112–3, 116, 118
money, 4(SU), 82–3, 106–7, 108–9, 110–1, 112–3
measurement, 210–1, 225
concepts, 72–3
difference, 4(SU), 73, 76, 84, 141, 215
estimate (see Estimation strategies)
fact families, 5(SU)
mental math, 78–9
minuend/subtrahend, 76–7, 84, 115, 215
missing minuend/subtrahend, 5(SU), 74–5, 76–7, 443, 444–5, 447, 450–1
number sentences (see Algebra)
related to addition, 5(SU), 76–7, 84–5
related to division, 5(SU)
representations, 4(SU), 72
rules for, 73
Symmetry, 22(SU), 344–5, 349
Tables (see Statistics)
Tally (see Statistics)
Tell About It (see Assessment)
Temperature (see Measurement)
Tests/Test Preparation (see Assessment)
Time (see Measurement)
Transformations
translations/reflections, 343, 347
rotations, 344–5
Tree diagrams, 250–1
Volume, 370–1, 377
Whole numbers
as a fraction, 281
compare, 2(SU), 46–7, 450–1
count on/back, 42–3
even and odd, 171
mental math, 78–9, 85, 145
on a number line, 48–9
operations (see Addition, Division, Multiplication, and Subtraction of Whole numbers and money)
order, 46–7
place-value topics (see Place Value)
round: rules for, 54–5
square numbers, 201
word names, 1(SU), 36–7, 38–9, 40–1, 63
write and read, 1(SU), 36–7, 38–9, 40–1, 42–3, 63
Write About It, 41, 61, 113, 133, 143, 151, 167, 217, 225, 255, 267, 337, 347, 369, 371, 385, 427
Write Your Own, 59, 73, 87, 119, 197, 199, 317, 351, 375
Zero
identity property of addition, 68–9
as a place holder, 36, 37
property of multiplication, 126–7
in division, 164–5, 186–7, 398–9
Mathematical Symbols

- is equal to
≠ is not equal to
< is less than
> is greater than
$ dollars
¢ cents

. decimal point
° degree
⁺ plus
⁻ minus
× times
÷ divided by

$\overrightarrow{AB}$ line $AB$
$\overrightarrow{AB}$ line segment $AB$
$\overrightarrow{AB}$ ray $AB$
$\angle ABC$ angle $ABC$
Ⅰ parallel to
Ⅱ perpendicular to
$\left(3, 4\right)$ ordered pair

Table of Measures

<table>
<thead>
<tr>
<th>Time</th>
<th>Money</th>
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<tbody>
<tr>
<td>60 seconds (s)</td>
<td>1 nickel = 5¢ or $.05</td>
</tr>
<tr>
<td>60 minutes</td>
<td>1 dime = 10¢ or $.10</td>
</tr>
<tr>
<td>24 hours</td>
<td>1 quarter = 25¢ or $.25</td>
</tr>
<tr>
<td>7 days</td>
<td>1 half dollar = 50¢ or $.50</td>
</tr>
<tr>
<td>12 months (mo)</td>
<td>1 dollar = 100¢ or $1.00</td>
</tr>
<tr>
<td>52 weeks</td>
<td>2 nickels = 1 dime</td>
</tr>
<tr>
<td>365 days</td>
<td>10 dimes = 1 dollar</td>
</tr>
<tr>
<td>366 days</td>
<td>4 quarters = 1 dollar</td>
</tr>
<tr>
<td></td>
<td>2 half dollars = 1 dollar</td>
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Metric Units

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<th>Length</th>
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<td>10 millimeters (mm)</td>
<td>1000 milliliters (mL)</td>
<td>1000 grams (g)</td>
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<tr>
<td>1 centimeter (cm)</td>
<td>1 liter (L)</td>
<td>1 kilogram (kg)</td>
</tr>
<tr>
<td>1 meter (m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 decimeter (dm)</td>
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<td></td>
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<td>1 meter (m)</td>
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Customary Units

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<th>Length</th>
<th>Capacity</th>
<th>Weight</th>
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<tr>
<td>12 inches (in.)</td>
<td>8 fluid ounces (fl oz)</td>
<td>16 ounces (oz)</td>
</tr>
<tr>
<td>3 feet</td>
<td>2 cups</td>
<td>1 pound (lb)</td>
</tr>
<tr>
<td>36 inches</td>
<td>2 pints</td>
<td></td>
</tr>
<tr>
<td>5280 feet</td>
<td>4 quarts</td>
<td></td>
</tr>
<tr>
<td>1760 yards</td>
<td></td>
<td>2000 pounds = 1 ton (T)</td>
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