

Contents

Remembering Your Facts

Addition Facts	xxii
Subtraction Facts	xxiii
Multiplication Facts	xxiv
Division Facts	xxv

CHAPTER

1

Whole Numbers and Decimals

Chapter Opener	xxvi
Reading Mathematics	2
1. Place Value to Hundred Thousands	4
2. Exponents	6
3. Compare, Order, and Round Whole Numbers	8
Practice Game: Digit Challenge . . .	11
4. Problem-Solving Skill: Estimated or Exact Amounts	12
5. Millions and Billions	14
Number Sense: Relative Magnitude	17
6. Round Large Numbers	18
7. Problem-Solving Strategy: Guess and Check	20
8. Place Value and Decimals	24
9. Compare and Order Decimals Less Than One	26
10. Round Decimals	28
11. Compare and Order Decimals and Whole Numbers	30
12. Negative Numbers and the Number Line	32
13. Problem-Solving Application: Use a Table	34
Extra Practice	38
Extra Practice • Problem Solving	41
Chapter Review	42
Chapter Test	44
Another Look	46
Enrichment: Scientific Notation	47

Addition, Subtraction, and Equations

Chapter Opener	48
Reading Mathematics	50
1. Add Whole Numbers	52
2. Subtract Whole Numbers	54
3. Problem-Solving Skill: Too Much or Too Little Information	56
4. Add Decimals	58
5. Subtract Decimals	60
6. Problem-Solving Strategy: Work Backward	62
7. Expressions and Equations	66
Number Sense: Moving Parentheses	69
8. Write and Evaluate Expressions	70
Practice Game: Express Yourself	73
9. Write and Solve Equations	74
10. Variables and Functions	76
11. Problem-Solving Application: Use an Equation	78
Extra Practice	82
Extra Practice • Problem Solving	85
Chapter Review	86
Chapter Test	88
Another Look	90
Enrichment: Balancing a Checkbook	91

CHAPTER
3

Multiplication

Chapter Opener	92
Reading Mathematics	94
1. Model The Distributive Property Hands-On Activity	96
2. Multiply by a One-Digit Number . .	98
3. Multiply With Zeros	100
4. Problem-Solving Skill: Estimated or Exact Answers	102
5. Mental Math: Multiply Multiples of 10, 100, and 1,000	106
Practice Game: How Many Factors?	109
6. Multiply by Multiples of 10	110
7. Problem-Solving Strategy: Write an Equation	112
8. Multiply by Two-Digit Numbers . .	114
9. Problem-Solving Application: Use Operations	116

Extra Practice	120	Chapter Test	126
Extra Practice • Problem Solving	123	Another Look	128
Chapter Review	124	Enrichment: Multiply by 11	129

Division and Equations

Chapter Opener	130		
Reading Mathematics	132		
1. One-Digit Divisors	134	12. Write and Evaluate Expressions	162
2. Zeros in the Quotient	136	Number Sense:	
3. Estimate Quotients	138	Reviewing Properties	165
4. Find the Mean	140	13. Write and Solve Equations	166
5. Problem-Solving Skill:		14. Model Equations	
Interpret Remainders	142	Hands-On Activity	168
6. Divide by Multiples		15. Functions and Variables	170
of 10, 100, and 1,000	146	Show What You Know	173
7. Divide by Two-Digit Numbers	148	16. Problem-Solving Application:	
8. Estimated Quotient Is Too Large	150	Use Equations	174
9. Estimated Quotient Is Too Small	152		
10. Four- and Five-Digit Dividends	154		
Practice Game: Quotient Quest	157		
11. Problem-Solving Strategy:			
Draw a Diagram	158		
Extra Practice	178	Chapter Test	184
Extra Practice • Problem Solving	181	Another Look	186
Chapter Review	182	Enrichment: Short Division	187

CHAPTER
5

Measurement and Integers

Chapter Opener	188
Reading Mathematics	190
1. Customary Units of Length	
Hands-On Activity	192
2. Perimeter and Area	
in Customary Units.	194
Number Sense:	
Two-Dimensional Thinking.	197
3. Customary Units of	
Weight and Capacity	198
4. Problem-Solving Skill:	
Solve Multistep Problems	200
5. Metric Units of Length	
Hands-On Activity	202
Practice Game:	
Estimating Measures	205
6. Metric Units of	
Mass and Capacity	206
7. Add and Subtract	
Units of Time	208
8. Problem-Solving Strategy:	
Make a Table	210
9. Integers and Absolute Value	214
10. Use Models to Add Integers	
Hands-On Activity	216
11. Add Integers on a Number Line	218
12. Use Models to Subtract	
Hands-On Activity	220
13. Subtract Integers	
on a Number Line	222
14. Add and Subtract Integers	224
15. Problem-Solving Application:	
Use Integers	226
Extra Practice	230
Extra Practice • Problem Solving	233
Chapter Review	234
Chapter Test	236
Another Look	238
Enrichment: Negative Decimals	239

Data, Statistics, and Probability

Chapter Opener	240
Reading Mathematics	242
1. Stem-and-Leaf Plots	244
2. Double Bar Graphs	246
Practice Game: Penny Drop	249
3. Histograms	250
Number Sense: Graphs and Means	253
4. Problem-Solving Skill: Choose Information From a Graph	254
5. Mean, Median, Mode, and Range	258
6. Line Plots	260
7. Interpret Line Graphs	262
8. Line and Double Line Graphs	264
9. Choose an Appropriate Graph	268
10. Problem-Solving Strategy: Make a Table	270
11. Make Choices	274
12. Probability	276
13. Find Probability	278
14. Problem-Solving Application: Use Data	280

Extra Practice	284
Extra Practice • Problem Solving	287
Chapter Review	288
Chapter Test	290
Another Look	292
Enrichment: Choosing a Graph Scale	293

CHAPTER
7

Number Theory and Addition and Subtraction of Fractions

Chapter Opener	294
Reading Mathematics	296
1. Prime and Composite Numbers	298
2. Prime Factorization	300
3. Divisibility	302
4. Common Factors and Greatest Common Factor	304
Show What You Know	307
5. Common Multiples and Least Common Multiple	308
Number Sense: Using Exponents	311
6. Problem-Solving Strategy: Use Logical Thinking	312
Quick Check	314
Test Prep	315
7. Write Fractions	316
8. Equivalent Fractions	318
9. Simplest Form	320
10. Fractions, Decimals, and Mixed Numbers	322
11. Compare Fractions	324
12. Problem-Solving Skill: Is the Answer Reasonable?	326
Quick Check	328
Test Prep	329
13. Add and Subtract Fractions With Like Denominators	330
14. Add Fractions With Unlike Denominators	332
15. Use the LCD to Add Fractions	334
16. Add Mixed Numbers	336
Number Sense: Compare and Order Rational Numbers	339
17. Rename Before You Subtract	340
Practice Game: Fraction Dominoes	343
18. Subtract Fractions With Unlike Denominators	344
19. Subtract Mixed Numbers	346
20. Problem-Solving Application: Use Patterns	348
Quick Check	350
Test Prep	351

Extra Practice	352
Extra Practice • Problem Solving	355
Chapter Review	356
Chapter Test	358
Another Look	360
Enrichment: Prime Numbers	361



Multiplication and Division of Fractions

Chapter Opener	362
Reading Mathematics	364
1. Model Multiplication of Fractions	
Hands-On Activity	366
2. Multiply Fractions	368
Show What You Know	371
3. Multiply Fractions and Mixed Numbers	372
4. Problem-Solving Skill: Choose the Operation	374
5. Divide by a Unit Fraction	378
6. Divide by a Counting Number	380
7. Problem-Solving Strategy: Solve a Simpler Problem	382
8. Divide by a Fraction	384
9. Divide With Mixed Numbers	386
Practice Game:	
Division Scramble	389
10. Problem-Solving Application: Use Circle Graphs	390
Extra Practice	394
Extra Practice • Problem Solving	397
Chapter Review	398
Chapter Test	400
Another Look	402
Enrichment: Estimating Products	403

Multiplication and Division of Decimals

Chapter Opener	404
Reading Mathematics	406
1. Multiply Whole Numbers and Decimals.	408
2. Estimate Products	410
3. Multiply Decimals.	412
4. Zeros in the Product.	414
5. Problem-Solving Strategy: Find a Pattern	416
6. Mental Math: Multiply and Divide Decimals by Powers of 10	420
7. Divide a Decimal by a Whole Number	422
8. Problem-Solving Skill: Interpret Remainders	424
9. Write Zeros in the Dividend.	426
10. Divide by a Decimal	428
Show What You Know	431
11. Divide a Decimal by a Decimal . .	432
Practice Game: Estimation Destination	435
12. Problem-Solving Application: Use Formulas	436
Extra Practice	440
Extra Practice • Problem Solving	443
Chapter Review	444
Chapter Test	446
Another Look	448
Enrichment: Changing Fractions to Decimals.	449

Geometry and Measurement

Chapter Opener	450
Reading Mathematics	452
1. Points, Lines, and Rays	454
2. Measure and Draw Angles Hands-On Activity	456
3. Triangles	460
4. Congruence	462
5. Quadrilaterals	464
6. Problem-Solving Strategy: Solve a Simpler Problem	466
7. Circles and Angles Hands-On Activity	470
8. Parallel and Perpendicular Lines Hands-On Activity	472
Show What You Know	475
9. Triangles and Rectangles Hands-On Activity	476
10. Symmetry	478
Practice Game: Tangrams	481
11. Problem-Solving Skill: Visual Thinking	482
12. Perimeter and Area of Complex Figures	486
13. Find the Area of a Parallelogram	488
14. Find the Area of a Triangle	490
15. Find the Circumference of a Circle	492
16. Solid Figures Hands-On Activity	494
17. Volume	498
18. Problem-Solving Application: Use Geometry	500
Extra Practice	504
Extra Practice • Problem Solving	507
Chapter Review	508
Chapter Test	510
Another Look	512
Enrichment: Right Triangles	513

CHAPTER
11

Ratio and Percent

Chapter Opener	514		
Reading Mathematics	516		
1. Meaning of Ratios	518	12. Percent of a Number	546
2. Equivalent Ratios	520	Number Sense:	
3. Rates	522	Unit Fractions and Percents	549
4. Scale Drawing		13. Compare Sets of Data	550
Hands-On Activity	524	Practice Game:	
5. Problem-Solving Skill: Choose a		Percent Concentration	553
Computation Method	526	14. Problem-Solving Application:	
		Use Percent	554
6. Understand Percent			
Hands-On Activity	530		
7. Ratio and Percent	532		
Show What You Know	535		
8. Decimals and Percent	536		
9. Use Fractions, Decimals, and			
Percents for Comparisons	538		
10. Problem-Solving Strategy:			
Choose a Strategy	540		
11. Mental Math: Find 10%			
of a Number	544		
Extra Practice	558	Chapter Test	564
Extra Practice • Problem Solving	561	Another Look	566
Chapter Review	562	Enrichment: Proportion	567

CHAPTER
12

Integers and the Coordinate Plane

Chapter Opener	568		
Reading Mathematics	570		
1. Transformations	572	7. Graph an Equation	588
2. Integers and the Coordinate Plane	574	8. Problem-Solving Application: Use a Graph	590
Practice Game: Where Is the Spaceship?	577		
3. Transformations in the Coordinate Plane	578		
4. Problem-Solving Strategy: Draw a Diagram	580		
5. Integers and Functions	584		
6. Problem-Solving Skill: Choose an Equation	586		
Extra Practice	594	Chapter Test	600
Extra Practice • Problem Solving	597	Another Look	602
Chapter Review	598	Enrichment: Change the Equation	603

Book Resources

Table Of Measures	604
Glossary	605
Index	613
Credits	622





CHAPTER

1

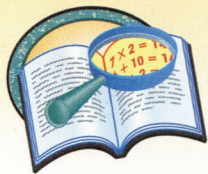
Whole Numbers, Decimals, and Integers

Why Learn About Whole Numbers, Decimals, and Integers?

For solving different kinds of problems, people need different kinds of numbers—whole numbers, decimals, positive numbers, and negative numbers.

Very large numbers are needed to describe some distances, such as the earth's distance from the sun. Negative numbers are used to describe temperatures below zero.

You can easily count the number of people who came to see the waterfalls, but you cannot count the number of gallons of water going over the falls.



Reading Mathematics

Reviewing Vocabulary

Understanding math language helps you become a successful problem solver. Here are some math vocabulary words you should know.

place value	the position of a digit in a number that determines the value of the digit
expanded form	a way to write a number as a sum of the values of the digits
standard form	a way to write a number using only numerals with commas and decimal points

Reading Words and Symbols

When you read mathematics, sometimes you read only words, sometimes you read words and symbols, and sometimes you read only symbols.

All of these statements represent the same number.

- ▶ one thousand, two hundred thirty-four
- ▶ $(1 \times 1000) + (2 \times 100) + (3 \times 10) + (4 \times 1)$
- ▶ 1,234



Try These

1. Write the place value of the 7 in each number.

- a. 7,412 _____ b. 40,763 _____
c. 38,527 _____ d. 716,413 _____
e. 2,671 _____ f. 574,621 _____

2. Write each number in standard or expanded forms.

a. three hundred sixty-five

b. four thousand, one hundred eleven

c. sixty-seven thousand, five hundred

d. seven hundred eighty-nine thousand, four hundred fifty-two

3. Fill in the blanks with the correct numbers.

a. In expanded form, 657 is (\times 100) + (\times 10) + (\times 1).

b. Eight thousand, five hundred twelve
is , in standard form.

Upcoming Vocabulary



Write About It Here are some other vocabulary words you will learn in this chapter. Watch for these words. Write their definitions in your journal.

base

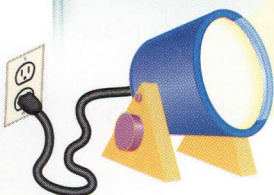
exponent

power of ten

negative numbers

opposite

integers



LESSON
1

Place Value to Hundred Thousands

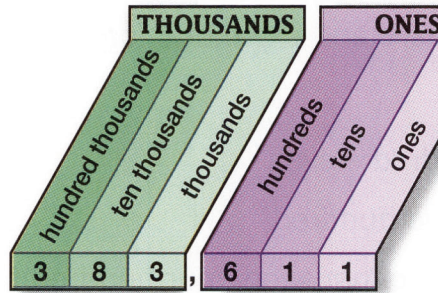
You will learn how to read and write numbers through hundred thousands in standard and expanded form.

Review Vocabulary
period
standard form
expanded form
place value

Learn About It

The United States has 383,611 square miles of protected land.

In a number, each group of 3 digits separated by a comma is called a **period**.



Different Ways to Read and Write Numbers

You can use **standard form**.

383,611

You can use **expanded form**.

$$300,000 + 80,000 + 3,000 + 600 + 10 + 1$$

$$= (3 \times 100,000) + (8 \times 10,000) + (3 \times 1,000) + (6 \times 100) + (1 \times 10) + (1 \times 1)$$

You can use **word form**.

three hundred eighty-three thousand, six hundred eleven

You can use **short word form**.

383 thousand, 611

Think About it

- What happens to each **place value** as you move from right to left in a number?

Guided Practice

Write each number in word form or expanded form.

- 25,078 _____
- 693,412 _____
- 151,940 _____

Ask Yourself

- What is the greatest place value in the number?
- What is the value for each place?

Independent Practice

Write the value of each underlined digit in short word form.

4. 2,346 _____ 5. 34,501 _____

6. 257,824 _____ 7. 649,192 _____

Read each number. Then write it in short word form.

8. 6,780 _____ 9. 48,309 _____

10. 586,147 _____ 11. 870,148 _____

Write each number in standard form.

12. 8 thousand, 752 _____ 13. 240 thousand, 357 _____

14. 872 thousand, 12 _____ 15. one hundred forty thousand, four _____

16. eight hundred thirty thousand, three hundred four _____

17. $800,000 + 800 + 8$ _____ 18. $900,000 + 10,000 + 4,000 + 60$ _____

19. $60,000 + 5$ _____ 20. $300,000 + 5,000 + 30 + 1$ _____

Problem Solving • Reasoning

Use Data Use the facts to answer Problems 21–22.

21. Which California park is the largest?

22. Which California park is the smallest?

23. **Analyze** Brazil has 552,191 square miles of protected land, more than any other country. What is the value of each 5 in 552,191? What is the value of each 1 in 552,191?

24. Greenland has three hundred seventy-nine thousand, three hundred forty-five square miles of protected land. Write this number in standard form.

Facts About California Parks

- King's Canyon Park is larger than Sequoia Park.
- Redwood Park is smaller than Sequoia Park.
- Yosemite Park is larger than King's Canyon.



Yosemite Falls, in Yosemite National Park.

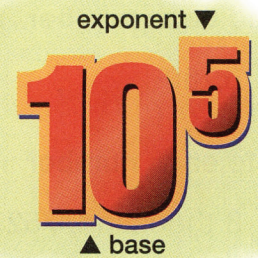
Exponents

You will learn how to read and write numbers through hundred thousands with exponents.

New Vocabulary
base
exponent
power of ten

Learn About It

A short way to write the product $10 \times 10 \times 10 \times 10 \times 10$ is 10^5 . To read 10^5 , say “ten to the fifth power.” The 10 is the base. The small raised 5 is the exponent. The **base** is the factor that is repeated in the product. The **exponent** shows the number of times the base is used as a factor.



THOUSANDS			ONES		
hundred thousands	ten thousands	thousands	hundreds	tens	ones
100,000	10,000	1,000	100	10	1
$10 \times 10 \times 10 \times 10 \times 10$	$10 \times 10 \times 10 \times 10$	$10 \times 10 \times 10$	10×10	10	1
10^5	10^4	10^3	10^2	10^1	10^0

Think:
Note the pattern.

$$\begin{aligned} 1,000 &= 10^3 \\ 100 &= 10^2 \\ 10 &= 10^1 \\ 1 &= 10^0 \end{aligned}$$

This place-value chart shows each place as a **power of ten**. You can use powers of ten when you write numbers in expanded form.

Different Ways to Write 562,412

You can use expanded form.

$$(5 \times 100,000) + (6 \times 10,000) + (2 \times 1,000) + (4 \times 100) + (1 \times 10) + (2 \times 1)$$

You can use expanded form with exponents.

$$(5 \times 10^5) + (6 \times 10^4) + (2 \times 10^3) + (4 \times 10^2) + (1 \times 10^1) + (2 \times 10^0)$$

Another Example

2 as the Base

$$2 \times 2 \times 2 \times 2 = 2^4$$

Read: “two to the fourth”

The base is 2. The exponent is 4.

Think About it

- What happens to the powers of ten as you move from left to right?
- Why does it make sense that 10^0 is equal to 1?

Guided Practice

Write each number in expanded form with exponents.

- 47,052 _____
- 712,943 _____
- 823,930 _____

Ask Yourself

- What power of ten represents the greatest place value?

Independent Practice

Write each number in standard form.

- 6×10^5 _____
- 4×10^2 _____
- 2×10^4 _____
- 3×10^1 _____
- 9×10^3 _____
- $(7 \times 10^4) + (5 \times 10^3) + (3 \times 10^2) + (2 \times 10^1) + (8 \times 10^0)$ _____
- $(6 \times 10^5) + (4 \times 10^4) + (3 \times 10^3) + (5 \times 10^1) + (7 \times 10^0)$ _____
- The base is five, and the exponent is two. _____

Complete each pattern.

- | | | |
|-----------------|----------------------------|-----------------|
| 12. $2^5 = 32$ | 13. $64 \div 2 = 32$ | 14. $3^5 = 243$ |
| $2^4 = 16$ | $32 \div 2 = 16$ | $3^4 = 81$ |
| $2^3 = 8$ | $16 \div 2 = 8$ | $3^3 = 27$ |
| $2^2 = 4$ | $8 \div 2 = 4$ | $3^2 = \square$ |
| $2^1 = \square$ | $4 \div 2 = \square$ | $3^1 = \square$ |
| $2^0 = \square$ | $\square \div 2 = \square$ | $3^0 = \square$ |

Problem Solving • Reasoning

- A googol is a very large number. It is 1 followed by 100 zeros. Write a googol as a power of ten.

- What is the sum of 3^3 and 2^4 ?

- Write About It** Without doing the calculations, how can you tell which number is greater, 5×10^4 or 7×10^3 ? Explain your thinking.



Using Algebra

What is n in each equation?

- $n = 6 \times 2^3$

- $300 = n \times 10^2$

- $2,000 = 2 \times 10^n$

- $2^n = 2$

- $2^n = 1$

LESSON
3

Compare, Order, and Round Whole Numbers

You will learn how to compare, order, and round numbers through hundred thousands.

Learn About It

A city named Springfield can be found in many states. Missouri and Massachusetts have cities named Springfield. Which Springfield has the greater population?



Compare 156,983 and 105,227.

Step 1 Line up the numbers by place value.

$$\begin{array}{r} 156,983 \\ 105,227 \end{array}$$

Step 2 Start from the left. Compare the digits until they are different.

$$\begin{array}{r} 156,983 \\ 105,227 \end{array}$$

The ten thousands digits are different. 5 is greater than 0, so $156,983 > 105,227$.

Solution: Springfield, Massachusetts, has the greater population.

On signs, city populations are often rounded. What is the population of Springfield, Massachusetts, to the nearest ten thousand?

Use these steps to round.

Step 1 Circle the place you want to round to.

$$\begin{array}{r} 156,983 \\ \uparrow \\ \text{rounding place} \end{array}$$

Step 2 Look at the digit to its right.

$$\begin{array}{r} 156,983 \\ \uparrow \\ \text{digit to the right} \end{array}$$

Step 3 If that digit is 5 or greater, increase the rounding place digit by 1. If that digit is less than 5, do not change the rounding place digit. Then replace all digits to the right with zeros.

$$\begin{array}{r} 156,983 \\ \downarrow \\ 160,000 \end{array} \quad \begin{array}{l} 6 > 5 \\ \text{Change 5 to 6.} \\ \text{Write zeros to} \\ \text{the right.} \end{array}$$

Solution: The population of Springfield, Massachusetts, is 160,000 to the nearest ten thousand.

Other Examples

A. Order 3 Numbers

Order 143,416, 143,687, and 142,825 from least to greatest.

- Line up the digits.
- Compare from the left.
- Continue comparing.

1 4 3, 4 1 6

1 4 3, 6 8 7 ← greatest number

1 4 2, 8 2 5 ← least number

142,825 < 143,416 < 143,687

B. Round a 9

Round 389,762 to the nearest thousand.

38 9,762

↑
7 > 5

So, the number rounds to 390,000.

Think About it

► Why do you start at the left to compare numbers?

► Why is the digit 5 used to decide how to round the digit to the left?

Guided Practice

Compare. Write >, <, or = for each .

1. 25,431 25,661

2. 725,042 724,742

Order each set of numbers from greatest to least.

3. 43,055 422,007 42,007 _____

4. 812,661 814,475 813,677 _____

Round to the place of the underlined digit.

5. 545 _____ 6. 28,621 _____ 7. 57,421 _____ 8. 275,813 _____

Ask Yourself

- Are the numbers lined up by place value?
- Where are the digits different?
- What is the digit to the right of the place I am rounding to?

Independent Practice

Compare. Write >, <, or = for each .

9. 12,198 1,219

10. 5,555 5,557

11. 46,117 46,117

12. 245,672 45,802

13. 138,042 138,024

14. 782,450 827,405

Order each set of numbers from least to greatest.

15. 1,374; 1,536; 1,437 _____

16. 8,714; 8,764; 8,734 _____

17. 44,991; 44,278; 44,717 _____

18. 21,672; 21,872; 2,924 _____

19. 541,536; 511,394; 601,345 _____

20. 316,725; 316,728; 316,825 _____

Round to the place of the underlined digit.

21. 581 _____ 22. 722 _____ 23. 5,261 _____
24. 6,652 _____ 25. 4,127 _____ 26. 19,014 _____
27. 35,722 _____ 28. 74,127 _____ 29. 645,024 _____
30. 752,814 _____ 31. 864,120 _____ 32. 592,107 _____

Round each number.

33. 28,652 to the nearest thousand. _____
34. 85,197 to the nearest ten thousand. _____
35. 259,802 to the nearest thousand. _____
36. 624,314 to the nearest hundred thousand. _____

Problem Solving • Reasoning

Use the table for Problems 37–40.

37. Arrange the cities in order from the least to the greatest population.

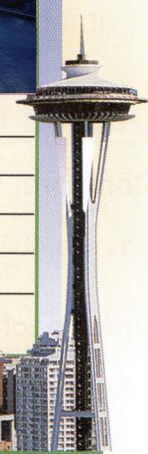
38. **Analyze** Round each city's population to the nearest hundred thousand. Order the rounded populations from least to greatest. What do you notice?

39. Which two cities have populations that round to the same number when they are rounded to the nearest hundred thousand?

40. **Write About It** Which city has a population that is closest to 800,000? Explain your thinking.



San Francisco	723,959
Boston	574,283
San Antonio	935,933
Seattle	516,259
Atlanta	394,017
St. Louis	396,685



Practice Game

Digit Challenge

Practice place value by playing this game with a partner or several friends. Two to six can play. Try to be the first person to score 10 points.

What You'll Need

- 4 sets of number cards, numbered 0–9
- a game board for each player with 6 rectangles, side by side

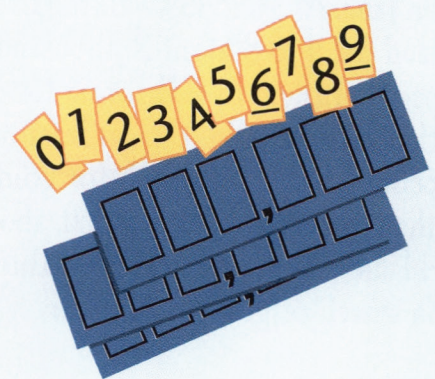
Players
2–6

Here's What to Do

- 1 Shuffle the cards and place them in a stack.
- 2 Each player draws a card and places it on his or her game board. Once placed, the card cannot be moved.
- 3 Repeat Step 2 until each player has drawn and placed 6 cards.
- 4 The player who makes the greatest number scores a point.
- 5 Return all the cards to the deck and reshuffle.

Repeat Steps 2–5.

The first player to score a total of 10 points is the winner.



Share Your Thinking How would your strategy change if you played this game to make the smallest possible number?



Problem-Solving Skill: Estimated or Exact Amounts

You will learn how to recognize whether amounts are estimates or are exact.

Numbers can be used to represent exact amounts or estimated amounts. Read this report about the California Gold Rush.

San Francisco, California Dec. 23, 1852

Gold was discovered near Sacramento on January 24, 1848. Walking over land for 4 to 8 months, thousands of people rushed to California to seek their fortunes. In 1849, at least 32,000 people arrived to search for gold in the California hills. In 1850, about 44,000 people rushed into California in search of gold.

The port of San Francisco was a busy place during these years. In addition to the people who came by land from other states, nearly 40,000 more people came to California by sea during 1849 and 1850. The California Gold Rush peaked in 1852 when more than \$80 million worth of gold was found.

Sometimes the amounts we use are exact.

We use an exact amount when an amount can be counted or measured.

Sometimes the amounts we use are estimates.

We use an estimate for an amount that cannot be measured easily. Any amount that is not exact is an estimate.

Some words in the report can help you identify that an amount is an estimate.

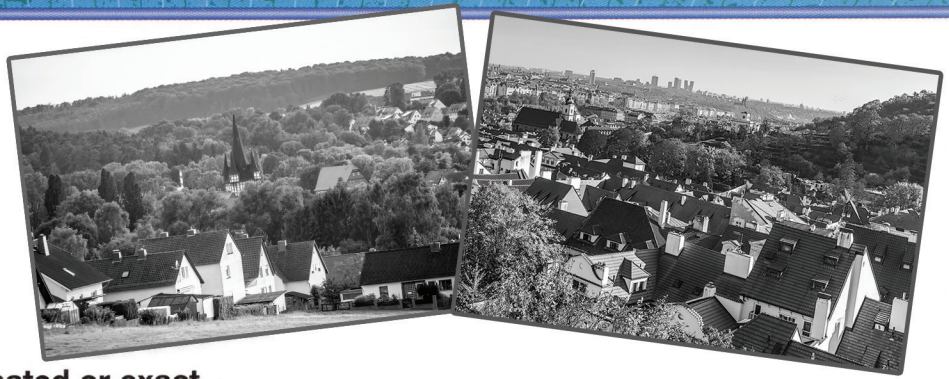
thousands	at least	4 to 8
about	nearly	more than



Look Back Is the number of travelers who came by sea exact? How can you decide whether an amount is exact or estimated?



Left: When gold was discovered in 1848, only 800 people lived in San Francisco. Right: By the early 1850s the population had exploded to about 250,000.



Guided Practice

Decide if an amount is estimated or exact.

- By 1853, nearly 250,000 people had rushed to California. Is the number of people who had rushed to California an exact amount or an estimated amount? Explain.
- Many gold seekers earned from \$12 to \$15 a day. One gold seeker was reported to have earned \$128 in one day. Which amount is exact? Which amount is an estimate?

Think:

What word will tell you whether the amount is estimated?

Think:

Which amount has been counted accurately?

Choose a Strategy

Solve. Use these or other strategies.

Problem-Solving Strategies

- Write an Equation
- Draw a Diagram
- Make a Table
- Guess and Check

Use the Gold Rush information on pages 12 and 13 to answer Problems 3–6.

- About how many people altogether traveled over land to California in 1849 and 1850?
- To the nearest thousand, by how much did San Francisco's population grow from 1848 to 1853?
- How many gold seekers altogether arrived in 1849 and 1850? Is your answer exact or an estimate?
- Could you say that about 300,000 people had rushed to California by 1853? Explain why or why not.
- Shua** has 4 more Gold Rush souvenirs than **Benny**. They have 32 souvenirs altogether. How many souvenirs does **Shua** have? How many souvenirs does **Benny** have?
- Suppose an ounce of gold is worth about \$300.00. **Miriam** has saved \$40 a week for 2 months. Does she have enough to buy an ounce of gold? Explain your thinking.
- At a Gold Rush gift shop, souvenir hats are \$7.95 each and gold pans are \$11.50 each. Is \$30 enough money to buy 2 hats and 1 gold pan? Explain.
- A newspaper article about the Gold Rush has 1,582 words. If the article fills 4 columns, about how many words are in each column?

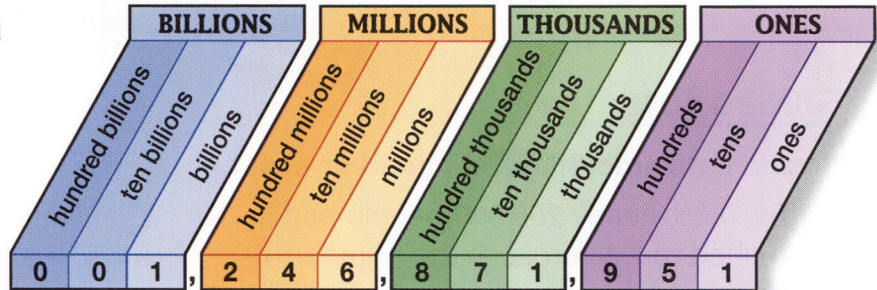


Millions and Billions

You will learn how to read, write, compare, and order numbers in the millions and billions.

Learn About It

In 1999, the population of China reached 1,246,871,951. The population of the United States reached 272,639,608 and the population of India reached 1,000,848,550.



How could you order the populations from least to greatest?

Different Ways to Read and Write Numbers

You can use standard form. 1,246,871,951

You can use expanded form. $(1 \times 1,000,000,000) + (2 \times 100,000,000) + (4 \times 10,000,000) + (6 \times 1,000,000) + (8 \times 100,000) + (7 \times 10,000) + (1 \times 1,000) + (9 \times 100) + (5 \times 10) + (1 \times 1)$

You can use expanded form with exponents. $(1 \times 10^9) + (2 \times 10^8) + (4 \times 10^7) + (6 \times 10^6) + (8 \times 10^5) + (7 \times 10^4) + (1 \times 10^3) + (9 \times 10^2) + (5 \times 10^1) + (1 \times 10^0)$

You can use short word form. 1 billion, 246 million, 871 thousand, 951

You can use word form. one billion, two hundred forty-six million, eight hundred seventy-one thousand, nine hundred fifty-one

Compare and order large numbers in the same way as small numbers.

- Line up the place values.
- Compare the digits in the places until they are different.

272,639,608	←	the least number
1,246,871,951	←	the greatest number
1,000,848,550		
↑		
2 > 0		

Solution: From least to greatest, the populations are 272,639,608; 1,000,848,550; 1,246,871,951.



Think About it

- Explain why a thousand million is the same as a billion.
- Why is 2.5 million the same as 2,500,000?

Guided Practice

Write the numbers in either short word form, expanded form, or expanded form using exponents.

1. 213,456,075 _____
2. 45,678,092,143 _____

Order each set of numbers from greatest to least.

3. 345,678,219 34,578,219 134,786,234 _____
4. 45,342,123 245,673,451 6,789,342,501 _____

Independent Practice

Write the value of the underlined digit in short word form.

5. 876,541 _____
6. 2,346,780,102 _____
7. 456,073,969,208 _____

Read the number. Then write it in short word form.

8. 796,806 _____
9. 234,158,672 _____
10. 7,542,908,685 _____

Write in standard form.

11. 8 million, 345 thousand, 752 _____
12. 92 billion, 34 million, 25 _____
13. one hundred nine million, three hundred forty-two _____
14. three billion, fourteen million, five hundred eighty-five _____
15. $(8 \times 10^{10}) + (5 \times 10^9) + (3 \times 10^8) + (2 \times 10^7) + (4 \times 10^6) + (6 \times 10^5) + (1 \times 10^4) + (7 \times 10^3) + (9 \times 10^2) + (5 \times 10^1) + (4 \times 10^0)$

16. $(9 \times 10^9) + (2 \times 10^7) + (8 \times 10^6) + (7 \times 10^3) + (3 \times 10^2) + (7 \times 10^0)$

Write in expanded form using exponents.

17. 78,056,432,941 _____
18. 245,087,705 _____
19. 19,650,120 _____

Ask Yourself

- What place comes before each comma?
- What power of ten is in the greatest place value?
- Where are the digits different?



The Chinese characters read, "China has more than one billion people."

Order each set of numbers from least to greatest.

20. 67,564,321 _____
 67,823,430 _____
 67,478,043 _____
21. 345,652,189,234 _____
 345,658,145,037 _____
 345,658,123,078 _____
22. 23,456,701 _____
 2,356,701 _____
 24,356,701 _____

72 Algebra • Equations Substitute the correct value for n .

23. $n - 1 = 999,999$ _____ 24. $n + 1 = 1,000,000,000$ _____
25. $n - 1,000 = 9,999,000$ _____

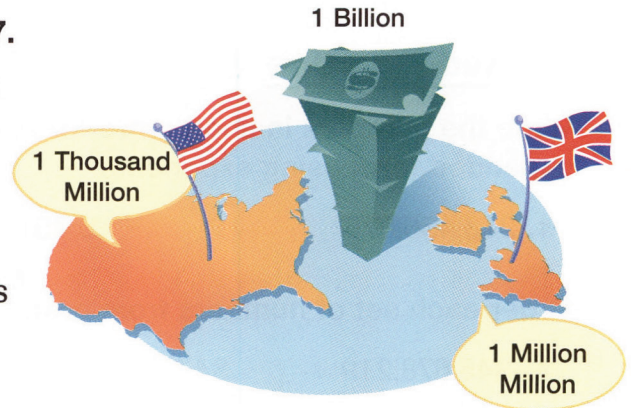
Problem Solving • Reasoning

Use Data Use the diagram for Problems 26 and 27.

26. **Compare** Use exponents to write an American billion and an English billion. Is the exponent the same for both numbers?
- _____
- _____

27. **Analyze** Would you rather have a billion dollars in England or in the United States? Explain.
- _____
- _____

28. Order the numbers 6×10^6 , 7×10^5 , and 4×10^2 from greatest to least.
- _____



In England, the word *billion* has a different meaning. There, it means one million million.

29. **Write About It** Write the number in standard form that represents one million tens. Explain your thinking.
- _____
- _____



Logical Thinking

Numbers

Use all of these digits exactly once to write the number described in standard form.



1. the greatest possible number _____
2. the smallest possible number if the first digit is greater than 0 _____

Number Sense

Relative Magnitude

Sometimes the same number can seem very large, very small, or about right.

When does 1,000,000 seem very large?

Few people in the world are able to spend \$1,000,000 on a work of art. So it is big news when it happens.

One million dollars is a large amount of money to spend on a single painting.

Millions Spent on Modern Art

Picassos accounted for more than \$164 million of the auction total, and were eight of the ten most expensive works. His cubist "Prince riding on a horse," sold for \$24.7 million.

When does 1,000,000 seem to be small?

Building an apartment complex costs tens of millions of dollars, even as much as \$100,000,000.

One million dollars seems a small amount of money to build a big apartment complex.

Low Budget Building Big Success!

Made with a budget of only \$1,000,000, the apartment complex has a simple but neat design, making it have a fresh and clean style. The tenants said this makes the apartments have easy upkeep.

When does 1,000,000 seem about right?

There are many cities in the world with populations of 1,000,000 or more.

One million seems about right for the population of a major city.

Urban Populations (rounded)

Münich, Germany	1,179,000
Philadelphia, U.S.	1,435,000
Lagos, Nigeria	1,704,000
Hangzhou, China	1,477,000

Think About it

- ▶ Think of other examples in which 1,000,000 seems large, small, or about right.
- ▶ When does 1,000 seem large? small? about right?

Round Large Numbers

You will learn how to round numbers to the nearest million and billion.

Learn About It

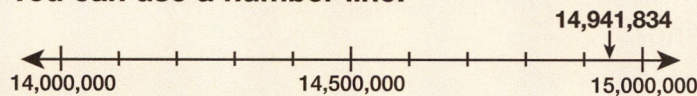
A newspaper reporter is doing a story on the number of books in The Library of Congress. The library has 14,941,834 books. The reporter wants to round this number to the nearest million.

Round **14,941,834** to the nearest million.



Different Ways to Round

You can use a number line.



The nearest million is 15,000,000.

You can use the rules for rounding.

Step 1 Find the rounding place digit.

14,941,834
 rounding place ↑ digit to the right ↑

Step 2 Round.

14,941,834
 ↑ 9 > 5
 So change 4 to 5.
 14,941,834 rounds to 15,000,000.

Solution: 14,941,834 rounded to the nearest million is 15,000,000.

Another Example

Round to the nearest billion.

25,632,127,689
 rounding place ↑ digit to the right ↑ 6 > 5

25,632,127,689 rounds to 26,000,000,000.

Think About it

- ▶ How are rounding to the nearest million and to the nearest billion similar? How are they different?

Guided Practice

Round each number to the nearest million.

1. 6,123,478 _____ 2. 473,892,315 _____

Round each number to the nearest billion.

3. 17,894,321,560 _____ 4. 236,289,562,012 _____

Ask Yourself

- What is the digit to the right of the place to which I am rounding?

Independent Practice

Round to the nearest million. Write the answers in short word form.

5. 2,478,923 _____ 6. 4,723,561 _____
7. 8,923,452 _____ 8. 25,178,029 _____
9. 57,690,345 _____ 10. 73,328,159 _____
11. 168,034,526 _____ 12. 367,236,854 _____

Round to the nearest billion. Write the answers in short word form.

13. 5,678,433,210 _____ 14. 6,493,451,723 _____
15. 8,765,430,921 _____ 16. 24,375,689,321 _____
17. 36,563,782,901 _____ 18. 67,834,526,019 _____
19. 124,784,361,093 _____ 20. 458,294,567,210 _____
21. 845,321,687,988 _____

Round to the place of the underlined digit.

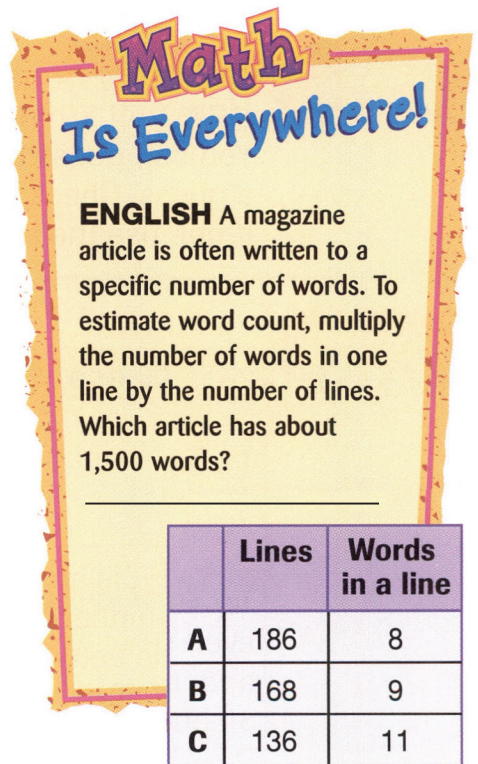
22. 899 _____ 23. 3,827 _____ 24. 54,328 _____
25. 35,642 _____ 26. 372,589 _____ 27. 564,378 _____
28. 29,567,452 _____ 29. 102,436,745 _____

Problem Solving • Reasoning

30. An encyclopedia contains 21,873,526 words. How many words is that to the nearest million? to the nearest ten million?
- _____

31. **Estimate** Another encyclopedia contains 6,315 articles. If the average article is 2,000 words long, how many words are there in the encyclopedia, to the nearest million words?
- _____

32. **Analyze** If ten-digit codes are used to catalog books, how many different codes are possible? Every code must have ten digits, but zeros can be used for any digit. For example, 0000000000 is the first acceptable code.
- _____



Math
Is Everywhere!

ENGLISH A magazine article is often written to a specific number of words. To estimate word count, multiply the number of words in one line by the number of lines. Which article has about 1,500 words?

	Lines	Words in a line
A	186	8
B	168	9
C	136	11

Problem-Solving Strategy: Guess and Check

You will learn how to solve a problem by guessing and checking.

Sometimes the quickest way to solve a problem is to try a few numbers and check the results.

Problem The quiz challenge host said, “A whole number can be divided by 5 and 2 with a remainder of 0. The number is greater than 30 and less than 50. What is the number?”



Understand

What is the question?

What is the number?

What do you know?

- It is a whole number that can be divided by 5 and 2.
- It is greater than 30, and it is less than 50.

Plan

How can you find the answer?

You can guess and check to help solve the problem. Make a guess. Check to see whether your guess is correct. If not, use the result to improve your guess.

Solve

Guess	Check		
Try 35.	$\begin{array}{r} 7 \\ 5 \overline{)35} \end{array}$	$\begin{array}{r} 17 \text{ R}1 \\ 2 \overline{)35} \end{array}$	The number 35 can be divided by 5 but not by 2. The answer is not 35.
Try 40. It is an even number and it is between 30 and 50.	$\begin{array}{r} 8 \\ 5 \overline{)40} \end{array}$	$\begin{array}{r} 20 \\ 2 \overline{)40} \end{array}$	The number 40 can be divided by 5 and by 2. A possible answer is 40.

Solution: The number is 40.

Look Back

Look back at the problem.

Check to make sure that 40 is the only possible answer.