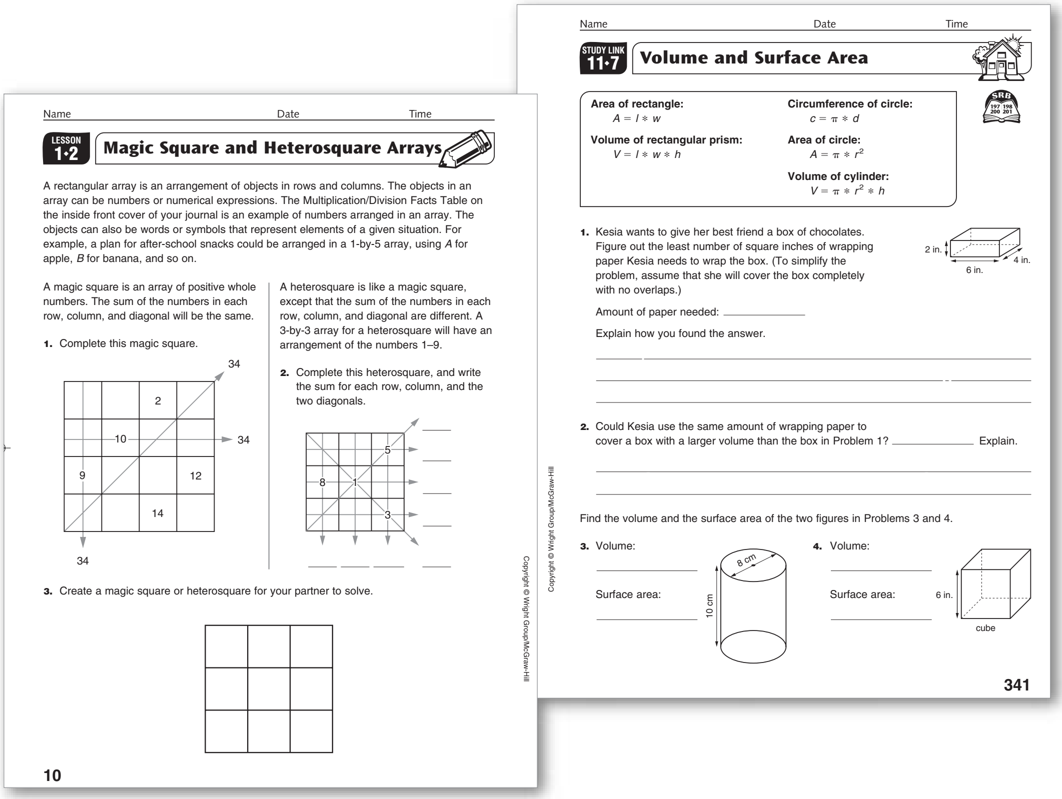
Teaching Masters and Study Link Masters



Name Date Time

LESSON 1·2 Magic Square and Heterosquare Arrays

A rectangular array is an arrangement of objects in rows and columns. The objects in an array can be numbers or numerical expressions. The Multiplication/Division Facts Table on the inside front cover of your journal is an example of numbers arranged in an array. The objects can also be words or symbols that represent elements of a given situation. For example, a plan for after-school snacks could be arranged in a 1-by-5 array, using *A* for apple, *B* for banana, and so on.

A magic square is an array of positive whole numbers. The sum of the numbers in each row, column, and diagonal will be the same.

1. Complete this magic square.

		2	
	10		
9			12
		14	

A heterosquare is like a magic square, except that the sum of the numbers in each row, column, and diagonal are different. A 3-by-3 array for a heterosquare will have an arrangement of the numbers 1–9.

2. Complete this heterosquare, and write the sum for each row, column, and the two diagonals.

		5
8	1	
		3

3. Create a magic square or heterosquare for your partner to solve.

Copyright © Wright Group/McGraw-Hill

10

Name Date Time

STUDY LINK 11·7 Volume and Surface Area

Area of rectangle:
$A = l * w$

Volume of rectangular prism:
$V = l * w * h$

Circumference of circle:
$c = \pi * d$

Area of circle:
$A = \pi * r^2$

Volume of cylinder:
$V = \pi * r^2 * h$

SRB 197 198 200 201

1. Kesia wants to give her best friend a box of chocolates. Figure out the least number of square inches of wrapping paper Kesia needs to wrap the box. (To simplify the problem, assume that she will cover the box completely with no overlaps.)

Amount of paper needed: ______

Explain how you found the answer.

2. Could Kesia use the same amount of wrapping paper to cover a box with a larger volume than the box in Problem 1? ______ Explain.

Find the volume and the surface area of the two figures in Problems 3 and 4.

3. Volume: ______

Surface area: ______

4. Volume: ______

Surface area: ______

Copyright © Wright Group/McGraw-Hill

341

Name Date Time

STUDY LINK 1·1

Number Poetry

Many poems have been written about mathematics. They are poems that share some of the ways that poets think about numbers and patterns.

1. Read the examples below.
2. The ideas in the examples are some of the ideas you have studied in *Everyday Mathematics.* Subtraction is one of these ideas. Name as many other ideas from the examples as you can on the back of this page.

Examples:

Arithmetic is where numbers fly like pigeons in and out of your head.
Arithmetic tells you how many you lose or win if you know how many you had
before you lost or won.

from "Arithmetic" by Carl Sandburg

A square is neither a line
nor circle; it is timeless.
Points don't chase around
a square. Firm, steady,
it sits there and knows
its place. A circle
won't be squared.

from "Finding Time" by JoAnne Growney

How many seconds in an hour?
How many in a day?
What size are the planets in the sky?
How far to the Milky Way?

How fast does lightning travel?
How slow do feathers fall?
How many miles to Istanbul?
Mathematics knows it all!

from "Marvelous Math" by Rebecca Kai Dotlich

Second Poem: "123"

.
1
12
123
1-32
1-21
1-10
2
21
21-31
2131
21-31-231
121
1
.

from "Asparagus X Plus Y"
by Ken Stange

3. Use a number pattern to make your own poem on the back of this page.

Name Date Time

STUDY LINK 1•1

Unit 1: Family Letter

Introduction to *Fifth Grade Everyday Mathematics*

Welcome to *Fifth Grade Everyday Mathematics.* This curriculum was developed by the University of Chicago School Mathematics Project to offer students a broad background in mathematics.

The features of the program described below are to help familiarize you with the structure and expectations of *Everyday Mathematics.*

A problem-solving approach based on everyday situations Students learn basic math skills in a context that is meaningful by making connections between their own knowledge and experience and mathematics concepts.

Frequent practice of basic skills Students practice basic skills in a variety of engaging ways. In addition to completing daily review exercises covering a variety of topics and working with multiplication and division fact families in different formats, students play games that are specifically designed to develop basic skills.

An instructional approach that revisits concepts regularly Lessons are designed to take advantage of previously learned concepts and skills and to build on them throughout the year.

A curriculum that explores mathematical content beyond basic arithmetic Mathematics standards around the world indicate that basic arithmetic skills are only the beginning of the mathematical knowledge students will need as they develop critical-thinking skills. In addition to basic arithmetic, *Everyday Mathematics* develops concepts and skills in the following topics—number and numeration; operations and computation; data and chance; geometry; measurement and reference frames; and patterns, functions, and algebra.

Everyday Mathematics provides you with ample opportunities to monitor your child's progress and to participate in your child's mathematical experiences. Throughout the year, you will receive Family Letters to keep you informed of the mathematical content your child is studying in each unit. Each letter includes a vocabulary list, suggested Do-Anytime Activities for you and your child, and an answer guide to selected Study Link (homework) activities.

Please keep this Family Letter for reference as your child works through Unit 1.

Fifth Grade Everyday Mathematics emphasizes the following content:

Number and Numeration Understand the meanings, uses, and representations of numbers; equivalent names for numbers, and common numerical relations.

Operations and Computation Make reasonable estimates and accurate computations; understand the meanings of operations.

Data and Chance Select and create appropriate graphical representations of collected or given data; analyze and interpret data; understand and apply basic concepts of probability.

Geometry Investigate characteristics and properties of 2- and 3-dimensional shapes; apply transformations and symmetry in geometric situations.

Measurement and Reference Frames Understand the systems and processes of measurement; use appropriate techniques, tools, units, and formulas in making measurements; use and understand reference frames.

Patterns, Functions, and Algebra Understand patterns and functions; use algebraic notation to represent and analyze situations and structures.

Unit 1: Number Theory

In Unit 1, students study properties of whole numbers by building on their prior work with multiplication and division of whole numbers.

Students will collect examples of arrays to form a class Arrays Museum. To practice using arrays with your child at home, use any small objects, such as beans, macaroni, or pennies.

Building Skills through Games

In Unit 1, your child will practice operations and computation skills by playing the following games. Detailed instructions for each game are in the *Student Reference Book.*

Factor Bingo This game involves 2 to 4 players and requires a deck of number cards with 4 each of the numbers 2–9, a drawn or folded 5-by-5 grid and 12 pennies or counters for each player. The goal of the game is to practice the skill of recognizing factors.

Factor Captor See *Student Reference Book,* page 306. This is a game for 2 players. Materials needed include a *Factor Captor* Grid, 48 counters the size of a penny, scratch paper, and a calculator. The goal of the game is to strengthen the skill of finding the factors of a number.

Multiplication Top-It See *Student Reference Book,* page 334. This game requires a deck of cards with 4 each of the numbers 1–10 and can be played by 2–4 players. *Multiplication Top-It* is used to practice the basic multiplication facts.

Name That Number See *Student Reference Book,* page 325. This game involves 2 or 3 players and requires a complete deck of number cards. *Name That Number* provides practice with computation and strengthens skills related to number properties.

STUDY LINK 1·1

Unit 1: Family Letter *cont.*

Vocabulary

Important terms in Unit 1:

composite number A counting number greater than 1 that has more than two *factors.* For example, 4 is a composite number because it has three factors: 1, 2, and 4.

divisible by If the larger of two counting numbers can be divided by the smaller with no remainder, then the larger is divisible by the smaller. For example, 28 is divisible by 7 because 28 / 7=4 with no remainder.

exponent The small, raised number in exponential notation that tells how many times the base is used as a *factor.*

Example:

$5^{2 \leftarrow \text{exponent}}$ $5^2 = 5 * 5 = 25.$

$10^{3 \leftarrow \text{exponent}}$ $10^3 = 10 * 10 * 10 = 1{,}000.$

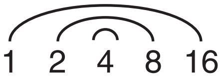
$2^{4 \leftarrow \text{exponent}}$ $2^4 = 2 * 2 * 2 * 2 = 16.$

factor One of two or more numbers that are multiplied to give a *product.*

$\underbrace{3 * 5}_{\text{Factors}} = \underbrace{15}_{\text{Product}}$ $\underbrace{15 * 1}_{\text{Factors}} = \underbrace{15}_{\text{Product}}$

factor rainbow A way to show factor pairs in a list of all the factors of a number. A factor rainbow can be used to check whether a list of factors is correct.

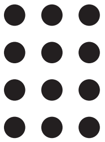
Factor rainbow for 16:



number model A number sentence or expression that models a number story or situation. For example, a number model for the array below is 4 * 3 = 12.

prime number A whole number that has exactly two factors: itself and 1. For example, 5 is a prime number because its only factors are 5 and 1.

product The result of multiplying two or more numbers, called *factors.*



rectangular array A rectangular arrangement of objects in rows and columns such that each row has the same number of objects and each column has the same number of objects.

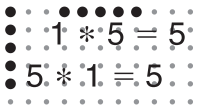
square number A number that is the product of a counting number multiplied by itself. For example, 25 is a square number, because 25 = 5 * 5.

As You Help Your Child with Homework

As your child brings assignments home, you might want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

Study Link 1•2

1.



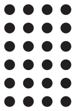
2. 1 * 14 = 14; 14 * 1 = 14
2 * 7 = 14; 7 * 2 = 14

3. 1 * 18 = 18; 18 * 1 = 18; 2 * 9 = 18;
9 * 2 = 18; 3 * 6 = 18; 6 * 3 = 18

4. 795 **5.** 271 **6.** 98 **7.** 984 **8.** 5

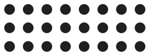
Study Link 1•3

1.



24; 24

3.



24; 3, 8; 24

6.

1 * 5 = 5; 1, 5

7. 4 **8.** 3,919 **9.** 2,763 **10.** 159

Study Link 1•4

1. The next number to try is 5, but 5 is already listed as a factor. Also, any factor greater than 5 would already be named because it would be paired with a factor less than 5.

2. 1, 5, 25 **3.** 1, 2, 4, 7, 14, 28

4. 1, 2, 3, 6, 7, 14, 21, 42

5. 1, 2, 4, 5, 10, 20, 25, 50, 100

6. 9,551 **7.** 48 **8.** 41,544 **9.** 441 **10.** 7

Study Link 1•5

1. Divisible by 2: 998,876; 5,890; 36,540; 1,098
Divisible by 3: 36,540; 33,015; 1,098
Divisible by 9: 36,540; 1,098
Divisible by 5: 5,890; 36,540; 33,015

2. Divisible by 4: 998,876; 36,540

3. 1,750 **4.** 8,753 **5.** 250 **6.** 13

Study Link 1•6

1. 11; 1, ⑪; p
2. 18; 1, ②, ③, 6, 9, 18; c
3. 24; 1, ②, ③, 4, 6, 8, 12, 24; c
4. 28; 1, ②, 4, ⑦, 14, 28; c
5. 36; 1, ②, ③, 4, 6, 9, 12, 18, 36; c
6. 49; 1, ⑦, 49; c
7. 50; 1, ②, ⑤, 10, 25, 50; c
8. 70; 1, ②, ⑤, ⑦, 10, 14, 35, 70; c
9. 100; 1, ②, 4, ⑤, 10, 20, 25, 50, 100; c

10. 9,822 **11.** 234 **12.** 21,448 **13.** 9 R3

Study Link 1•7

1. 16 **2.** 49 **3.** 6 **4.** 64 **5.** 25

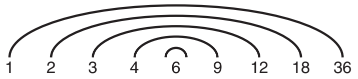
6. 81 **7.** 4 * 9 = 36 **8.** 5 * 5 = 25

9. a. 5 * 5 = 25

b. 5 * 5 = 25 shows a square number because there are the same number of rows and columns. A square can be drawn around this array.

Study Link 1•8

1. 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; $6^2 = 36$ The square root of 36 is 6.



3. $11^2 = 121$; the square root of 121 is 11.

5. 6,219 **6.** 3,060 **8.** 8 R2 **9.** 42

Study Link 1•9

1. b. $7^2 = 7 * 7 = 49$

c. $20^3 = 20 * 20 * 20 = 8{,}000$

2. a. 11^2 **b.** 9^3 **c.** 50^4

3. a. $2 * 3^3 * 5^2 = 2 * 3 * 3 * 3 * 5 * 5 = 1{,}350$

b. $2^4 * 4^2 = 2 * 2 * 2 * 2 * 4 * 4 = 256$

4. a. $40 = 2 * 2 * 2 * 5 = 2^3 * 5$

b. $90 = 2 * 3 * 3 * 5 = 2 * 3^2 * 5$

5. 5,041 **6.** 720 **7.** 50 R4 **8.** 99,140

9. 12 **10.** 47,668

Name Date Time

LESSON 1•1

Following Written Directions

Read the directions *carefully.* Do *not* do anything until you have read all ten instructions.

1. Draw a square inside of a rectangle on this page.
2. Find the sum of the student fingers and toes in your class.
3. Stand up. Cover your eyes with your hands, and turn 90 degrees to the right.
4. Pat the top of your head with your right hand and, at the same time, rub your stomach in a clockwise direction with your left hand. Sit down.
5. As loudly as you can, count backwards from 10.
6. Find the sum of the digits for today's date.
7. Estimate how many miles you walked in the last 2 months.
8. Try to touch the tip of your nose with your tongue.
9. If you reach into a bag where there is a $1 bill, a $5 bill, and a $10 bill, what is the chance that, without looking, you will pull a $10 bill? Whisper your answer to a neighbor.
10. Do not do any of the first 9 activities. Instead, turn over your paper and wait for your teacher's instructions.

Name Date Time

LESSON 1•1

Following Written Directions

Read the directions *carefully.* Do *not* do anything until you have read all ten instructions.

1. Draw a square inside of a rectangle on this page.
2. Find the sum of the student fingers and toes in your class.
3. Stand up. Cover your eyes with your hands, and turn 90 degrees to the right.
4. Pat the top of your head with your right hand and, at the same time, rub your stomach in a clockwise direction with your left hand. Sit down.
5. As loudly as you can, count backwards from 10.
6. Find the sum of the digits for today's date.
7. Estimate how many miles you walked in the last 2 months.
8. Try to touch the tip of your nose with your tongue.
9. If you reach into a bag where there is a $1 bill, a $5 bill, and a $10 bill, what is the chance that, without looking, you will pull a $10 bill? Whisper your answer to a neighbor.
10. Do not do any of the first 9 activities. Instead, turn over your paper and wait for your teacher's instructions.

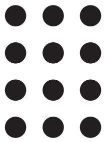
Name Date Time

STUDY LINK 1·2

More Array Play

SRB 10

A **rectangular array** is an arrangement of objects in rows and columns. Each row has the same number of objects, and each column has the same number of objects. We can write a multiplication number model to describe a rectangular array.



4 * 3 = 12

For each number below, use pennies or counters to make as many different arrays as possible. Draw each array on the grid with dots. Write the number model next to each array.

1. 5

2. 14

3. 18

Practice

4. 487 + 308 = _________

5. 679 − 408 = _________

6. 14 * 7 = _________

7. 164 * 6 = _________

8. 45 ÷ 9 = _________

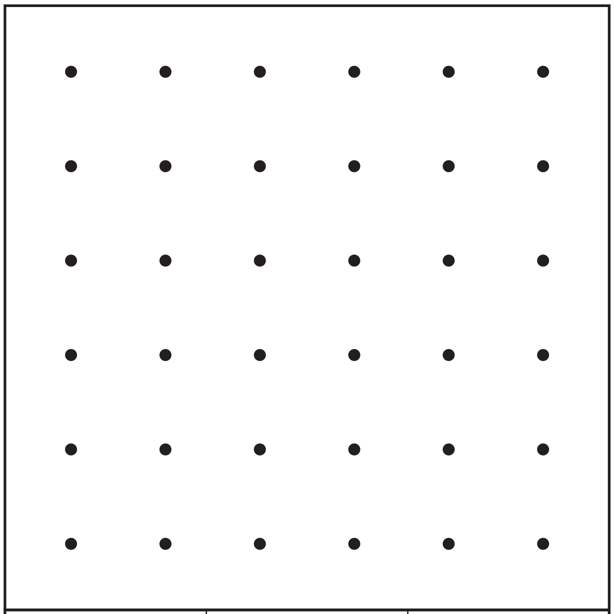
Name Date Time

LESSON 1·2

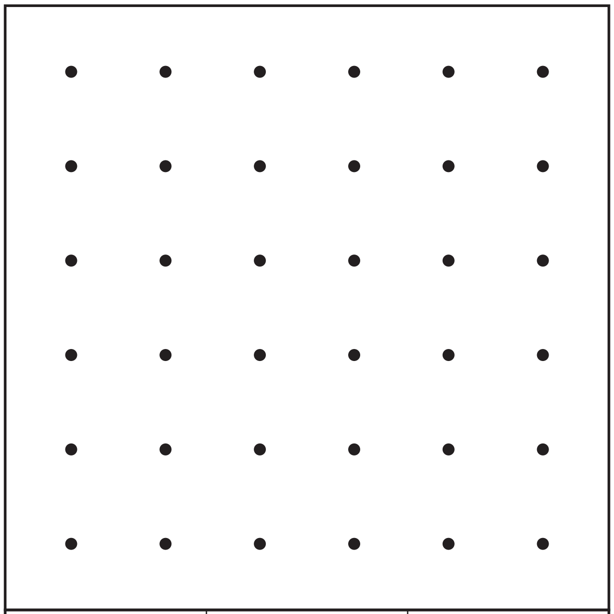
Rows and Columns

A rectangular array is an arrangement of objects in rows and columns. Each row has the same number of objects, and each column has the same number of objects.

Work with a partner to build arrays. For each array, take turns rolling dice. The first die is the number of rows. Write this number in the table under Rows. The second die is the number of cubes in each row. Write this number under Columns. Then use centimeter cubes to build the array on the dot grid. How many cubes are in the array? Write this number under Array Total on the dot grid table.



Rows	Columns	Array Total



Rows	Columns	Array Total

Name Date Time

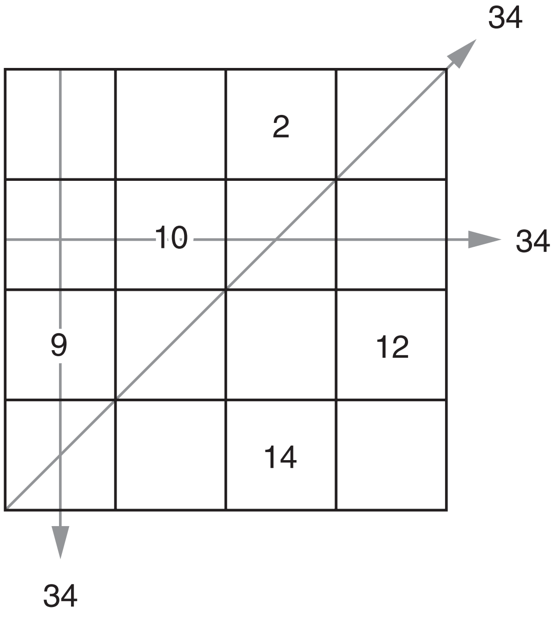
LESSON 1·2

Magic Square and Heterosquare Arrays

A rectangular array is an arrangement of objects in rows and columns. The objects in an array can be numbers or numerical expressions. The Multiplication/Division Facts Table on the inside front cover of your journal is an example of numbers arranged in an array. The objects can also be words or symbols that represent elements of a given situation. For example, a plan for after-school snacks could be arranged in a 1-by-5 array, using *A* for apple, *B* for banana, and so on.

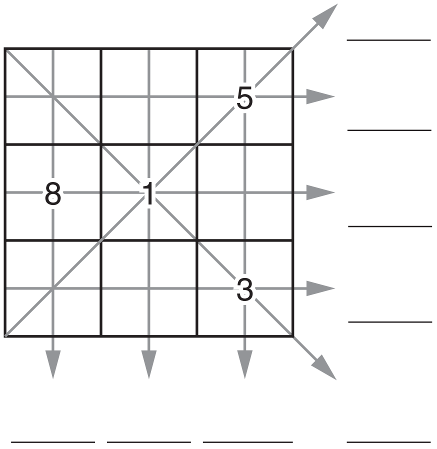
A magic square is an array of positive whole numbers. The sum of the numbers in each row, column, and diagonal will be the same.

1. Complete this magic square.



A heterosquare is like a magic square, except that the sum of the numbers in each row, column, and diagonal are different. A 3-by-3 array for a heterosquare will have an arrangement of the numbers 1–9.

2. Complete this heterosquare, and write the sum for each row, column, and the two diagonals.



3. Create a magic square or heterosquare for your partner to solve.

Name Date Time

LESSON
1·3

Multiplication Facts

A List					
6 * 7 = 42					
6 * 8 = 48					
6 * 9 = 54					
8 * 7 = 56					
8 * 9 = 72					
7 * 6 = 42					
8 * 6 = 48					
9 * 6 = 54					
7 * 8 = 56					
9 * 8 = 72					
6 * 6 = 36					
7 * 7 = 49					
8 * 8 = 64					
9 * 9 = 81					

B List					
6 * 3 = 18					
7 * 3 = 21					
8 * 3 = 24					
9 * 3 = 27					
6 * 4 = 24					
7 * 4 = 28					
8 * 4 = 32					
9 * 4 = 36					

Bonus Problems					
11 * 11 = 121					
11 * 12 = 132					
5 * 12 = 60					
12 * 6 = 72					
7 * 12 = 84					
12 * 8 = 96					
9 * 12 = 108					
10 * 12 = 120					
5 * 13 = 65					
15 * 7 = 105					
12 * 12 = 144					
6 * 14 = 84					

Name Date Time

STUDY LINK 1·3

Number Models for Arrays

SRB 10

Complete the chart. You will need to find each missing part and write it in the correct space.

	Array	Number Model	Factors	Product
1		6 ∗ 4 = ______	6, 4	
2			2, 12	
3		3 ∗ 8 = ______		
4			1, 15	
5				15
6				5

Reminder: Look for examples of arrays and bring them to school.

Practice

7. 12 / 3 = ________

8. 1,288 + 2,631 = ________

9. 307 ∗ 9 = ________

10. 306 − 147 = ________

Name Date Time

LESSON 1·3

Factoring Numbers with Cube Arrays

SRB 10

Use centimeter cubes to build arrays for the following numbers. With each array write the **factor pair.** Remember that the number of rows in the array is one **factor** and that the number of columns in the array is the other **factor.**

Continue to build every possible array until you have all of the factors for the number.

1. 14

Factors: ______________________

2. 8

Factors: ______________________

3. 10

Factors: ______________________

4. 20

Factors: ______________________

5. 33

Factors: ______________________

6. Can you tell when you have all of the factors for a number before you have built every possible array?

________ Explain. ____

____

____

____

Try This

7. Write three true statements about factors.

____

____

____

____

____

Name Date Time

STUDY LINK
1•4

Factors

SRB
10

To find the factors of a number, ask yourself: *Is 1 a factor of the number? Is 2 a factor? Is 3 a factor?* Continue with larger numbers. For example, to find all the factors of 15, ask yourself these questions.

	Yes/No	Number Sentence	Factor Pair
Is 1 a factor of 15?	Yes	1 * 15 = 15	1, 15
Is 2 a factor of 15?	No		
Is 3 a factor of 15?	Yes	3 * 5 = 15	3, 5
Is 4 a factor of 15?	No		

1. You don't need to go any further. Can you tell why?

So the factors of 15 are 1, 3, 5, and 15.

List as many factors as you can for each of the numbers below.

2. 25 _____

3. 28 _____

4. 42 _____

5. 100 _____

Practice

6. 8,417 + 1,134 = _____

7. 73 − 25 = _____

8. 6,924 * 6 = _____

9. 634 − 193 = _____

10. 56 / 8 = _____

Name Date Time

STUDY LINK
1•5

Divisibility Rules

- All even numbers are divisible by 2.
- A number is divisible by 3 if the sum of its digits is divisible by 3.
- 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.
- A number is divisible by 5 if it ends in 0 or 5.
- A number is divisible by 10 if it ends in 0.

1. Use divisibility rules to test whether each number is divisible by 2, 3, 5, 6, 9, or 10.

Number	Divisible...					
	by 2?	by 3?	by 6?	by 9?	by 5?	by 10?
998,876						
5,890						
36,540						
33,015						
1,098						

A number is divisible by 4 if the tens and ones digits form a number that is divisible by 4.

Example: 47,8**36** is divisible by 4 because 36 is divisible by 4.

It isn't always easy to tell whether the last two digits form a number that is divisible by 4. A quick way to check is to divide the number by 2 and then divide the result by 2. It's the same as dividing by 4, but is easier to do mentally.

Example: 5,3**84** is divisible by 4 because 84 / 2 = 42 and 42 / 2 = 21.

2. Place a star next to any number in the table that is divisible by 4.

Practice

3. 250 ∗ 7 = __________

4. 1,931 + 4,763 + 2,059 = __________

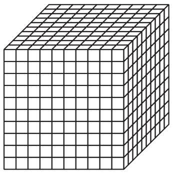
5. (20 + 30) ∗ 5 = __________

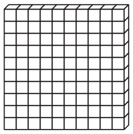
6. 78 ÷ 6 = __________

Name Date Time

LESSON
1·5

Divisibility by 4


1,000 cubes


100 cubes


10 cubes


1 cube

1. What number is shown by the base-10 blocks? ____________

2. Which of the base-10 blocks could be divided evenly into 4 groups of cubes?

____

____

3. Is the number shown by the base-10 blocks divisible by 4? _________

4. Circle the numbers that you think are divisible by 4.

324 5,821 7,430 35,782,916

Use a calculator to check your answers.

5. Use what you know about base-10 blocks to explain why you only need to look at the last two digits of a number to decide whether it is divisible by 4.

____

____

____

____

____

____

Name Date Time

STUDY LINK 1·6

Prime and Composite Numbers

A **prime number** is a whole number that has exactly two factors—1 and the number itself. A **composite number** is a whole number that has more than two factors.

For each number:

- ◆ List all of its factors.
- ◆ Write whether the number is prime or composite.
- ◆ Circle all of the factors that are prime numbers.

Number		Factors	Prime or Composite?
1	11		
2	18		
3	24		
4	28		
5	36		
6	49		
7	50		
8	70		
9	100		

Practice

10. 4,065 + 2,803 + 2,954 = ____________

11. 392 − 158 = ____________

12. 1,532 ∗ 14 = ____________

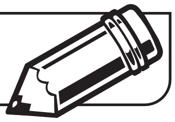
13. 39 / 4 → ____________

14. 48 ∗ 15 = ____________

Name ____________________ Date ____________________ Time ____________________

LESSON **1•6**

Goldbach's Conjecture



1. Write each of the following numbers as the sum of two prime numbers.

Examples: 56 = 43 + 13 26 = 13 + 13

a. 6 = ________________ **b.** 12 = ________________

c. 18 = ________________ **d.** 22 = ________________

e. 24 = ________________ **f.** 34 = ________________

The answers to these problems are examples of **Goldbach's Conjecture.** A **conjecture** is something you believe is true even though you can't be certain that it is true. Goldbach's Conjecture might be true, but no one has ever proven it. Anyone who can either prove or disprove Goldbach's Conjecture will become famous.

2. Work with a partner. Find and write as many of the addition expressions as you can for the numbers in the grid on page 19.

3. Can any of the numbers in the grid be written as the sum of two prime numbers in more than one way? If so, give an example. Show all possible ways.

____

____

____

Try This

4. Write 70 as the sum of two primes in as many ways as you can.

____

____

Name Date Time

LESSON 1·6

Goldbach's Conjecture *continued*

Write each number below as the sum of two prime numbers.

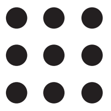
4 2 + 2	6	8	10	12
14	16	18	20	22
24	26	28	30	32
34	36	38	40	42
44	46	48	50	52
54	56	58	60	62
64	66	68	70	72
74	76	78	80	82
84	86	88	90	92
94	96	98	100	102

Name ______________________ Date ______________ Time ______________

STUDY LINK 1·7

Exploring Square Numbers

A **square number** is a number that can be written as the product of a number multiplied by itself. For example, the square number 9 can be written as 3 * 3.



$9 = 3 * 3 = 3^2$

Fill in the missing numbers.

1. 4 * 4 = ________

2. ________ = 7 * 7

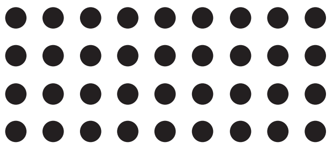
3. ________ * 6 = 36

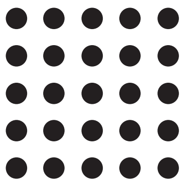
4. 8^2 = ________

5. 5^2 = ________

6. ________ = 9^2

Write a number model to describe each array.





7. Number model: ____________________

8. Number model: ____________________

9. **a.** Which of the arrays above shows a square number? ____________________

b. Explain your answer.

____

____

____

Practice

10. 97 * 43 = ____________

11. 4,006 − 2,675 = ____________

12. 1,416 + 8,348 = ____________

13. 725 − 414 = ____________

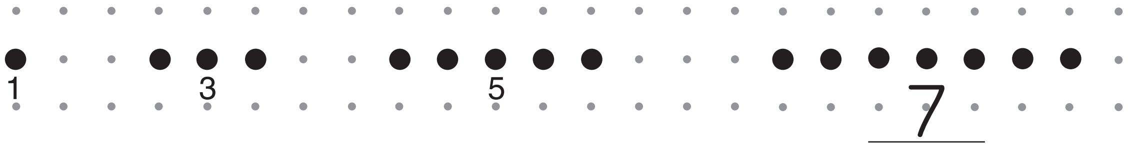
Name Date Time

LESSON 1·7

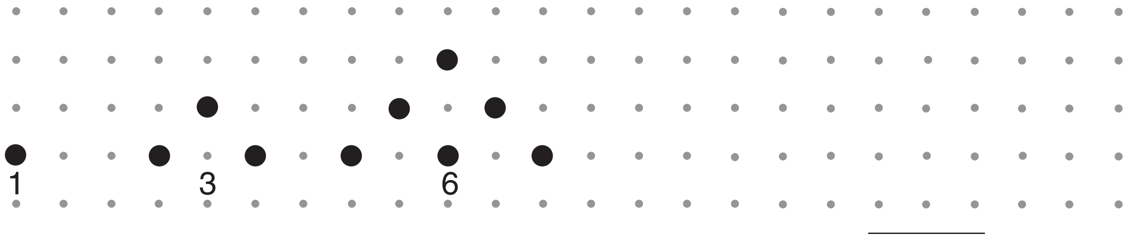
Completing Patterns

Build these patterns with counters. Draw the dot pattern that comes next and record the number of dots in the pattern.

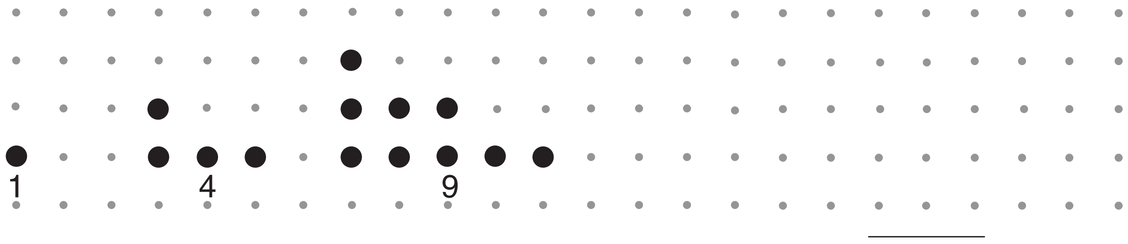
Example:



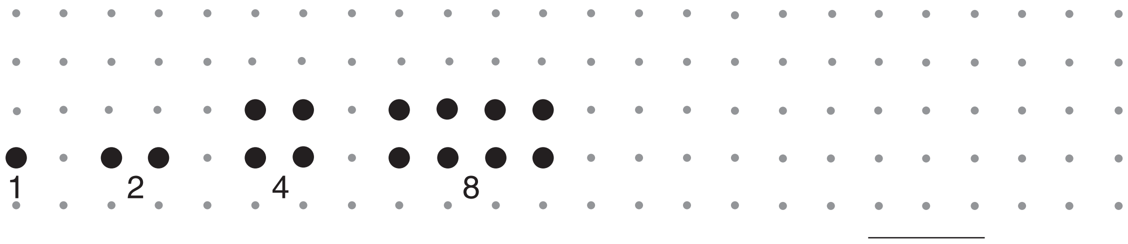
1.



2.



3.



4. Write a description of the pattern in Problem 3.

Name Date Time

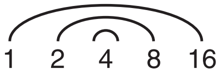
STUDY LINK 1•8

Factor Rainbows, Squares, and Square Roots

SRB 271

1. List all the factors of each square number. Make a **factor rainbow** to check your work. Then fill in the missing numbers.

Reminder: In a factor rainbow, the product of each connected factor pair should be equal to the number itself. For example, the factor rainbow for 16 looks like this:



1 ∗ 16 = 16 2 ∗ 8 = 16 4 ∗ 4 = 16

Example: 4: 1, 2, 4  $\underline{2}^2$ = 4 The square root of 4 is $\underline{2}$.	9: ___^{2} = 9 The square root of 9 is ___.
25: ___^{2} = 25 The square root of 25 is ___.	36: ___^{2} = 36 The square root of 36 is ___.

2. Do all square numbers have an odd number of factors? _________

Unsquare each number. The result is its square root. Do not use the square root key (√) on your calculator.

3. _____^{2} = 121

The square root of 121 is _____.

4. _____^{2} = 2,500

The square root of 2,500 is _____.

Practice

5. 4,318 + 1,901

6. 36 × 85

7. 2,852 × 5

8. 50 ÷ 6 → ____________

9. 333 − 291 = ____________

Name ______________________ Date ______________ Time ______________

LESSON 1·8

Comparing Numbers with Their Squares

1. a. Unsquare the number 1. _____^{2} = 1

b. Unsquare the number 0. _____^{2} = 0

2. a. Is 5 greater than or less than 1? ______________________

b. $5^2 =$ _______

c. Is 5^2 greater than or less than 5? ______________________

3. a. Is 0.50 greater than or less than 1? ______________________

b. Use your calculator. $0.50^2 =$ _________

c. Is 0.50^2 greater than or less than 0.50? ______________________

4. a. When you square a number, is the result always greater than the number you started with? _________

b. Can it be less? _________

c. Can it be the same? _________

5. Write 3 true statements about squaring and unsquaring numbers.

____

____

____

____

____

____

Name ____ Date ____ Time ____

STUDY LINK 1·9

Exponents

SRB 16

An **exponent** is a raised number that shows how many times the number to its left is used as a factor.

Examples:

5^2 ← exponent $\quad 5^2$ means $5 * 5$, which is 25.

10^3 ← exponent $\quad 10^3$ means $10 * 10 * 10$, which is 1,000.

2^4 ← exponent $\quad 2^4$ means $2 * 2 * 2 * 2$, which is 16.

1. Write each of the following as a factor string. Then find the product.

Example: $2^3 = 2 * 2 * 2 = 8$

a. $10^4 =$ ____ $=$ ____

b. $7^2 =$ ____ $=$ ____

c. $20^3 =$ ____ $=$ ____

2. Write each factor string using an exponent.

Example: $6 * 6 * 6 * 6 = 6^4$

a. $11 * 11 =$ ____

b. $9 * 9 * 9 =$ ____

c. $50 * 50 * 50 * 50 =$ ____

3. Write each of the following as a factor string that does *not* have any exponents. Then use your calculator to find the product.

Example: $2^3 * 3 = 2 * 2 * 2 * 3 = 24$

a. $2 * 3^3 * 5^2 =$ ____ $=$ ____

b. $2^4 * 4^2 =$ ____ $=$ ____

4. Write the prime factorization of each number. Then write it using exponents.

Example: $18 = 2 * 3 * 3 = 2 * 3^2$

a. $40 =$ ____ $=$ ____

b. $90 =$ ____ $=$ ____

Practice

5. $6{,}383 - 1{,}342 =$ ____

6. $48 * 15 =$ ____

7. $7\overline{)354}$ → ____

8. $50{,}314 + 48{,}826 =$ ____

9. $84 \div 7 =$ ____

10. $701 * 68 =$ ____

Name Date Time

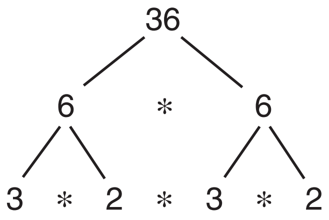
LESSON 1·9

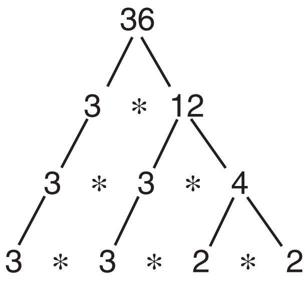
Using Factor Trees

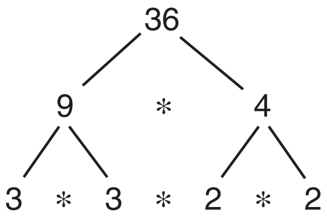
Factor Trees

One way to find all the prime factors of a number is to make a **factor tree.** First write the number. Then, underneath, write any two factors whose product is that number. Then write factors of each of these factors. Continue until all the factors are prime numbers.

Below are three factor trees for 36.







It does not matter which two factors you begin with. You always end with the same prime factors—for 36, they are 2, 2, 3, and 3. The **prime factorization** of 36 is 2 ∗ 2 ∗ 3 ∗ 3.

Make a factor tree for each number. Then write the prime factorization for each number.

24

50

24 = ______________________

50 = ______________________

48

100

48 = ______________________

100 = ______________________

Name Date Time

LESSON
1·9

The Sieve of Eratosthenes

The mathematician Eratosthenes, born in 276 B.C., developed this method for finding prime numbers. Follow the directions below for *Math Masters,* page 27. When you have finished, you will have crossed out every number from 1 to 30 in the grid that is not a prime number.

1. Since 1 is not a prime number, cross it out.

2. Circle 2 with a colored marker or crayon. Then count by 2, crossing out all multiples of 2—that is, 4, 6, 8, 10, and so on.

3. Circle 3 with a color different from Step 2. Cross out every third number after 3 (6, 9, 12, and so on). If a number is already crossed out, make a mark in a corner of the box. The numbers you have crossed out or marked are multiples of 3.

4. Skip 4 on the grid because it is already crossed out, and go on to 5. Use a new color to circle 5 and cross out the multiples of 5.

5. Continue. Start each time by circling the next number that is not crossed out. Cross out all multiples of that number. If a number is already crossed out, make a mark in a corner of the box. If there are no multiples for a number, start again. Use a different color for each new set of multiples.

6. Stop when there are no more numbers to be circled or crossed out. The circled numbers are the prime numbers from 1 to 30.

7. List the prime numbers from 1 to 30.

Name Date Time

LESSON 1·9

The Sieve of Eratosthenes *continued*

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

Name Date Time

LESSON 1•9

Palindromic Squares

Palindrome numbers are numbers that read the same forward or backward. A single-digit number is also a palindrome. The two-digit palindrome numbers are 11, 22, 33, 44, 55, 66, 77, 88, and 99. The table below lists samples of 3-digit and 4-digit palindromes.

1. Find 3-digit and 4-digit numbers to add to the table.

Palindrome Numbers	
3-digit	**4-digit**
101, 111	1,001; 1,111
202, 222	2,002; 2,222
303, 333	3,003; 3,333

Sometimes finding the square of a palindrome number results in a square number that is also a palindrome number—a palindromic square. For example, $111^2 = 12{,}321$.

2. Which 3 single-digit numbers have palindromic squares? __________

3. Which 2-digit numbers have palindromic squares? __________

4. Find the numbers from the table that have a palindromic square and write the number model.

Example: $101^2 = 10{,}201$

Name Date Time

STUDY LINK 1·10

Unit 2: Family Letter

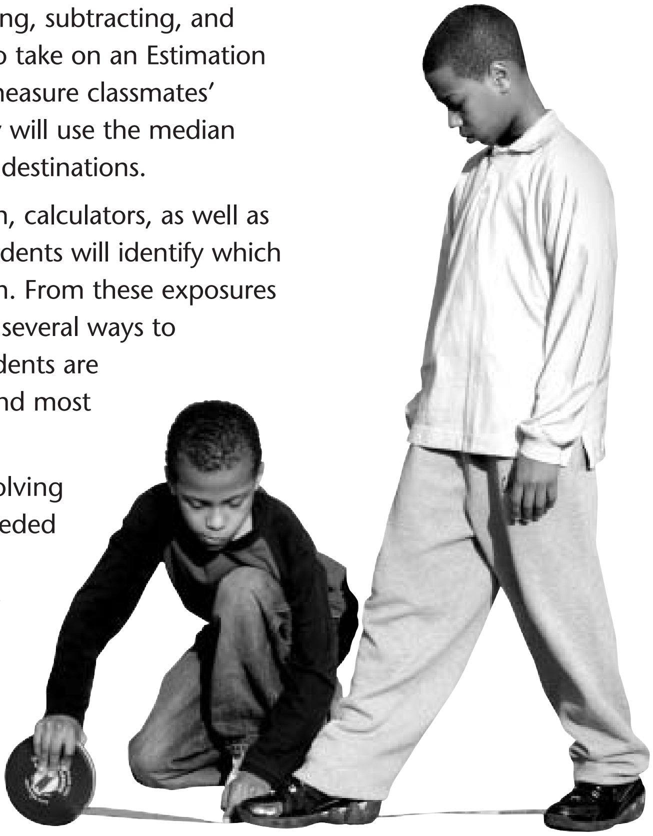
Estimation and Calculation

Computation is an important part of problem solving. Many of us were taught that there is just one way to do each kind of computation. For example, we may have learned to subtract by borrowing, without realizing that there are many other methods of subtracting numbers.

In Unit 2, students will investigate several methods for adding, subtracting, and multiplying whole numbers and decimals. Students will also take on an Estimation Challenge in Unit 2. For this extended problem, they will measure classmates' strides, and find a median length for all of them. Then they will use the median length to estimate how far it would take to walk to various destinations.

Throughout the year, students will practice using estimation, calculators, as well as mental and paper-and-pencil methods of computation. Students will identify which method is most appropriate for solving a particular problem. From these exposures to a variety of methods, they will learn that there are often several ways to accomplish the same task and achieve the same result. Students are encouraged to solve problems by whatever method they find most comfortable.

Computation is usually not the first step in the problem-solving process. One must first decide what numerical data are needed to solve the problem and which operations need to be performed. In this unit, your child will continue to develop his or her problem-solving skills with a special focus on writing and solving equations for problems.



Please keep this Family Letter for reference as your child works through Unit 2.

Vocabulary

Important terms in Unit 2:

Estimation Challenge A problem for which it is difficult, or even impossible, to find an exact answer. Your child will make his or her best estimate and then defend it.

magnitude estimate A rough estimate. A magnitude estimate tells whether an answer should be in the tens, hundreds, thousands, and so on.

Example: Give a magnitude estimate for 56 ∗ 32

Step 1: Round 56 to 60.

Step 2: Round 32 to 30.

60 ∗ 30 = 1,800, so a magnitude estimate for 56 ∗ 32 is in the thousands.

10s	100s	[✓ 1,000s]	10,000s

maximum The largest amount; the greatest number in a set of data.

mean The sum of a set of numbers divided by the number of numbers in the set. The mean is often referred to simply as the average.

median The middle value in a set of data when the data are listed in order from smallest to largest or vice versa. If there is an even number of data points, the median is the *mean* of the two middle values.

minimum The smallest amount; the smallest number in a set of data.

partial-sums addition A method, or algorithm, for adding in which sums are computed for each place (ones, tens, hundreds, and so on) separately and are then added to get a final answer.

	268
	+ 483
1. Add 100s	600
2. Add 10s	140
3. Add 1s	+ 11
4. Add partial sums.	751

Partial-sums algorithm

place value A number system that values a digit according to its position in a number. In our number system, each place has a value ten times that of the place to its right and one-tenth the value of the place to its left. For example, in the number 456, the 4 is in the hundreds place and has a value of 400.

range The difference between the *maximum* and *minimum* in a set of data.

reaction time The amount of time it takes a person to react to something.

trade-first subtraction A method, or algorithm, for subtracting in which all trades are done before any subtractions are carried out.

Example: 352 − 164

100s	10s	1s
	4	12
3	$\cancel{5}$	$\cancel{2}$
−1	6	4

Trade 1 ten for 10 ones.

100s	10s	1s
	14	
2	$\cancel{4}$	12
$\cancel{3}$	$\cancel{5}$	$\cancel{2}$
−1	6	4
1	8	8

Trade 1 hundred for 10 tens and subtract in each column.

Building Skills through Games

In Unit 2, your child will practice computation skills by playing these games. Detailed instructions are in the *Student Reference Book.*

Addition Top-It See *Student Reference Book,* page 333. This game for 2 to 4 players requires a calculator and 4 each of the number cards 1–10, and provides practice with place–value concepts and methods of addition.

High-Number Toss See *Student Reference Book,* pages 320 and 321. Two players need one six-sided die for this game. *High-Number Toss* helps students review reading, writing, and comparing decimals and large numbers.

Multiplication Bull's-Eye See *Student Reference Book,* page 323. Two players need 4 each of the number cards 0–9, a six-sided die, and a calculator to play this game. *Multiplication Bull's Eye* provides practice in estimating products.

Number Top-It See *Student Reference Book,* page 326. Two to five players need 4 each of the number cards 0–9 and a Place-Value Mat. Students practice making large numbers.

Subtraction Target Practice See *Student Reference Book,* page 331. One or more players need 4 each of the number cards 0–9 and a calculator. In this game, students review subtraction with multidigit whole numbers and decimals.

Do-Anytime Activities

To work with your child on the concepts taught in Units 1 and 2, try these activities:

1. When your child adds or subtracts multidigit numbers, talk about the strategy that works best. Try not to impose the strategy that works best for you! Here are some problems to try:

467 + 343 = _______

_______ = 761 + 79

894 − 444 = _______

842 − 59 = _______

2. As you encounter numbers while shopping or on license plates, ask your child to read the numbers and identify digits in various places—thousands place, hundreds place, tens place, ones place, tenths place, and hundredths place.

As You Help Your Child with Homework

As your child brings assignments home, you might want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through this unit's Study Links.

Study Link 2•1

Answers vary for Problems 1-5.

6. 720 **7.** 90,361 **8.** 12 **9.** 18

Study Link 2•2

Sample answers:

1. 571 and 261 **2.** 30, 20, and 7

3. 19 and 23 **4.** 533 and 125

5. 85.2 and 20.5, or 88.2 and 17.5; Because the sum has a 7 in the tenths place, look for numbers with tenths that add to 7: 85.2 + 20.5 = 105.7; and 88.2 + 17.5 = 105.7.

6. 4,572 **7.** 4.4 **8.** 246 **9.** 1.918

10. 47 **11.** 208 **12.** 3 **13.** 8 R2

Study Link 2•3

1. 451 and 299 **2.** 100.9 and 75.3

3. Sample answer: 803 and 5,000

4. 17 and 15 **5.** 703 and 1,500

6. 25 and 9 **7.** 61 **8.** 137 **9.** 5.8

10. 18.85 **11.** 6 **12.** 84,018 **13.** $453.98

14. 98 **15.** 14

Study Link 2•4

1. a. 148 and 127 **b.** Total number of cards

c. 148 + 127 = *b* **d.** *b* = 275

e. 275 baseball cards

2. a. 20.00; 3.89; 1.49 **b.** The amount of change

c. 20.00 − 3.89 − 1.49 = *c*,

or 20 − (3.89 + 1.49) = *c*

d. *c* = 14.62 **e.** $14.62

3. a. 0.6; 1.15; 1.35; and 0.925

b. The length of the ribbons

c. *b* = 0.6 + 1.15 + 1.35 + 0.925

d. *b* = 4.025 **e.** 4.025 meters

Study Link 2•5

Answers vary for Problems 1–5.

6. 5,622 **7.** 29,616 **8.** 518 **9.** 13

Study Link 2•6

1. Unlikely: 30% Very likely: 80%
Very unlikely: 15% Likely: 70%
Extremely unlikely: 5%

2. 30%: Unlikely 5%: Extremely unlikely
99%: Extremely unlikely 20%: Very unlikely
80%: Very likely 35%: Unlikely
65%: Likely 45%: 50-50 chance

Study Link 2•7

1. 1,000s; 70 ∗ 30 = 2,100

2. 1,000s; 10 ∗ 700 = 7,000

3. 10,000s; 100 ∗ 100 = 10,000

4. 10s; 20 ∗ 2 = 40

5. 10s; 3 ∗ 4 = 12

6. Sample answers: 45 ∗ 68 = 3,060; 684 ∗ 5 = 3,420; and 864 ∗ 5 = 4,320

Study Link 2•8

1. 152; 100s; 8 ∗ 20 = 160

2. 930; 100s; 150 ∗ 6 = 900

3. 2,146; 1,000s; 40 ∗ 60 = 2,400

4. 21; 10s; 5 ∗ 4 = 20.

5. 26.04; 10s; 9 ∗ 3 = 27

Study Link 2•9

1. 6,862; 1,000s **2.** 88.8; 10s **3.** 33.372; 10s

4. 100,224; 100,000s **5.** 341.61; 100s

6. 9,989 **7.** 5 R2 **8.** 91 **9.** $19.00

Study Link 2•10

1. 390.756 **2.** 3,471.549 **3.** 9,340

4. 244 **5.** 44,604 **6.** 19 R2