Whole Numbers:
How to Dissect and
Solve Word Problems

A Foot Long but a Dollar Short

New numbers released this week prove it: There are more Subway stores on the planet then McDonald's. Has McDonald's lost its grip? Not overseas, where it has nearly twice as many stores as the sandwich chain, and not in terms of world-wide sales. Still, it's a coup for Subway. The chain has been promoting the healthful aspects of its food since 1996, well before Jared went on TV with his Subway diet in 2000, and this without even 'reformulating the meat,' according to Subway spokesman Les Winograd.

—*Sarah Slobin*

TOTAL STORES IN 2010

	U.S.	International
33,749 Subway	23,722	10,027
32,737 McDonald's	14,027	18,710
17,009 Starbucks	11,158	5,851
16,756 KFC	4,986	11,770
13,356 Pizza Hut	7,528	5,828

Are You What You Eat?

Some of the most popular sandwiches world-wide and their vital statistics.

	6" turkey breast sub	Big Mac
Serving size (g)	219	214
Calories	280	540
Calories from fat	30	260
Total fat (g)	3.5	29
Saturated fat (g)	1.0	10
Trans fat	0.0	1.5
Cholesterol (mg)	20	75
Sodium (mg)	920	1,040
Carbohydrates	47	45
Dietary fiber (g)	5	3
Sugars (g)	6	9
Protein (g)	18	25

Sources: Technomic Top 500 Report; the companies

LU 1–1: Reading, Writing, and Rounding Whole Numbers

1. Use place values to read and write numeric and verbal whole numbers *(pp. 4–6)*.
2. Round whole numbers to the indicated position *(pp. 6–7)*.
3. Use blueprint aid for dissecting and solving a word problem *(pp. 7–8)*.

LU 1–2: Adding and Subtracting Whole Numbers

1. Add whole numbers; check and estimate addition computations *(pp. 10–11)*.
2. Subtract whole numbers; check and estimate subtraction computations *(pp. 11–12)*.

LU 1–3: Multiplying and Dividing Whole Numbers

1. Multiply whole numbers; check and estimate multiplication computations *(pp. 14–16)*.
2. Divide whole numbers; check and estimate division computations *(pp. 16–17)*.

VOCABULARY PREVIEW

Here are key terms in this chapter. After completing the chapter, if you know the term, place a checkmark in the parentheses. If you don't know the term, look it up and put the page number where it can be found.

Addends ( ) Decimal point ( ) Decimal system ( ) Difference ( ) Dividend ( ) Divisor ( ) Minuend ( )
Multiplicand ( ) Multiplier ( ) Partial products ( ) Partial quotient ( ) Product ( ) Quotient ( )
Remainder ( ) Rounding all the way ( ) Subtrahend ( ) Sum ( ) Whole number ( )

In the chapter opener we see that Subway has more total stores in the United States (23,722) than does McDonald's (14,027). Keeping track of store count is just one way numbers tell us something about a business.

GLOBAL

People of all ages make personal business decisions based on the answers to number questions. Numbers also determine most of the business decisions of companies. For example, go to the website of a company such as Starbucks and note the importance of numbers in the company's business decision-making process.

The following *Wall Street Journal* clipping "Starbucks Menu Expands in China" announces plans to reach a greater number of people in China:

© Yan daming–Imaginechina via AP Images

Starbucks Menu Expands in China

BY LAURIE BURKITT

BEIJING—Starbucks Corp. is introducing its instant-coffee packets in China, expanding beyond coffee stores to also sell consumer packaged goods.

The Seattle-based coffee company's Via single-serving coffee packets will be available in at least 800 Starbucks stores across China, Hong Kong and Taiwan beginning on April 6, John Culver, president of Starbucks International, said Tuesday at a news conference here.

The packets also will be distributed in grocery and convenience stores and later in hotels and entertainment venues, Mr.

Culver said. He added that a schedule hasn't been set. "We see a big opportunity in packaged goods in China," he said.

The move signals Starbucks's intention to expand not only its coffee business in China but beyond the beverage as well.

Starbucks has been exploring new tactics in the U.S. and internationally to boost its offerings into a broader array of consumer goods. Starbucks dropped the company's name and the word "coffee" from its logo in January.

The company rolled out the new logo Tuesday in China.

Companies often follow a general problem-solving procedure to arrive at a change in company policy. Using Starbucks as an example, the following steps illustrate this procedure:

Step 1. State the problem(s).   Globally increase market share and profitability.

Step 2. Decide on the best methods to solve the problem(s).   Expand operations in China beyond coffee sales.

Step 3. Does the solution make sense?   Adapt to Chinese eating habits—more tea products and consumer packaged goods.

Step 4. Evaluate the results.   Starbucks will evaluate new plan.

Your study of numbers begins with a review of basic computation skills that focuses on speed and accuracy. You may think, "But I can use my calculator." Even if your instructor allows you to use a calculator, you still must know the basic computation skills. You need these skills to know what to calculate, how to interpret your calculations, how to make estimates to recognize errors you made in using your calculator, and how to make calculations when you do not have a calculator.

The United States' numbering system is the **decimal system** or *base 10 system.* Your calculator gives the 10 single-digit numbers of the decimal system—0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The center of the decimal system is the **decimal point.** When you have a number with a decimal point, the numbers to the left of the decimal point are **whole numbers** and the numbers to the right of the decimal point are decimal numbers (discussed in Chapter 3). When you have a number *without* a decimal, the number is a whole number and the decimal is assumed to be after the number.

This chapter discusses reading, writing, and rounding whole numbers; adding and subtracting whole numbers; and multiplying and dividing whole numbers.

Learning Unit 1–1: Reading, Writing, and Rounding Whole Numbers

LO 1

Whole Foods Market has more than 2,100,000 followers on Twitter. Tweets involve recipes, food tips, and answers to customer questions. Are you one of those two million, one hundred thousand followers?

Now let's begin our study of whole numbers.

Reading and Writing Numeric and Verbal Whole Numbers

GLOBAL

The decimal system is a *place-value system* based on the powers of 10. Any whole number can be written with the 10 digits of the decimal system because the position, or placement, of the digits in a number gives the value of the digits.

To determine the value of each digit in a number, we use a place-value chart (Figure 1.1) that divides numbers into named groups of three digits, with each group separated by a comma. To separate a number into groups, you begin with the last digit in the number and insert commas every three digits, moving from right to left. This divides the number into the named groups (units, thousands, millions, billions, trillions) shown in the place-value chart. Within each group, you have a ones, tens, and hundreds place. Keep in mind that the leftmost group may have fewer than three digits.

In Figure 1.1 (p. 5), the numeric number 1,605,743,891,412 illustrates place values. When you study the place-value chart, you can see that the value of each place in the chart is 10 times the value of the place to the right. We can illustrate this by analyzing the last four digits in the number 1,605,743,891,412:

$$1,412 = (1 \times 1,000) + (4 \times 100) + (1 \times 10) + (2 \times 1)$$

So we can also say, for example, that in the number 745, the "7" means seven hundred (700); in the number 75, the "7" means 7 tens (70).

To read and write a numeric number in verbal form, you begin at the left and read each group of three digits as if it were alone, adding the group name at the end (except the last units group and groups of all zeros). Using the place-value chart in Figure 1.1, the number 1,605,743,891,412 is read as one trillion, six hundred five billion, seven hundred forty-three million, eight hundred ninety-one thousand, four hundred twelve. You do not read zeros. They fill vacant spaces as placeholders so that you can correctly state the number values. Also, the numbers twenty-one to ninety-nine must have a hyphen. And most important, when you read or write whole numbers in

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Whole Number Groups

		Trillions				Billions				Millions				Thousands				Units		
Hundred trillions	Ten trillions	Trillions	Comma	Hundred billions	Ten billions	Billions	Comma	Hundred millions	Ten millions	Millions	Comma	Hundred thousands	Ten thousands	Thousands	Comma	Hundreds	Tens	Ones (units)	Decimal Point
		1	,	6	0	5	,	7	4	3	,	8	9	1	,	4	1	2	.

verbal form, do not use the word *and*. In the decimal system, *and* indicates the decimal, which we discuss in Chapter 3.

By reversing this process of changing a numeric number to a verbal number, you can use the place-value chart to change a verbal number to a numeric number. Remember that you must keep track of the place value of each digit. The place values of the digits in a number determine its total value.

Before we look at how to round whole numbers, we should look at how to convert a number indicating parts of a whole number to a whole number. We will use the following *Wall Street Journal* clip about Whole Foods as an example.

@WholeFoods

FOLLOWERS:
2.1 MILLION
Recipes, food tips and answers to customers' questions

WRITTEN BY:
One person who tweets from the main account; individual accounts are created for, and handled by, each store

Whole Foods' 2,100,000 followers on Twitter could be written as 2.1 million. This amount is two million plus one hundred thousand of an additional million. The following steps explain how to convert these decimal numbers into a regular whole number:

CONVERTING PARTS OF A MILLION, BILLION, TRILLION, ETC., TO A REGULAR WHOLE NUMBER
Step 1. Drop the decimal point and insert a comma.
Step 2. Add zeros so the leftmost digit ends in the word name of the amount you want to convert. Be sure to add commas as needed.

EXAMPLE   Convert 2.1 million to a regular whole number.

Step 1. 2.1 million

2,1   Change the decimal point to a comma.

Step 2. 2,100,000   Add zeros and commas so the whole number indicates million.

Rounding Whole Numbers

Many of the whole numbers you read and hear are rounded numbers. Government statistics are usually rounded numbers. The financial reports of companies also use rounded numbers. All rounded numbers are *approximate* numbers. The more rounding you do, the more you approximate the number.

Rounded whole numbers are used for many reasons. With rounded whole numbers you can quickly estimate arithmetic results, check actual computations, report numbers that change quickly such as population numbers, and make numbers easier to read and remember.

Numbers can be rounded to any identified digit place value, including the first digit of a number (rounding all the way). To round whole numbers, use the following three steps:

ROUNDING WHOLE NUMBERS
Step 1. Identify the place value of the digit you want to round.
Step 2. If the digit to the right of the identified digit in Step 1 is 5 or more, increase the identified digit by 1 (round up). If the digit to the right is less than 5, do not change the identified digit.
Step 3. Change all digits to the right of the rounded identified digit to zeros.

EXAMPLE 1   Round 9,362 to the nearest hundred.

Step 1. 9,362   The digit 3 is in the hundreds place value.

Step 2.   The digit to the right of 3 is 5 or more (6). Thus, 3, the identified digit in Step 1, is now rounded to 4. You change the identified digit only if the digit to the right is 5 or more.

9,462

Step 3. 9,400   Change digits 6 and 2 to zeros, since these digits are to the right of 4, the rounded number.

By rounding 9,362 to the nearest hundred, you can see that 9,362 is closer to 9,400 than to 9,300.

Next, we show you how to round to the nearest thousand.

EXAMPLE 2   Round 67,951 to the nearest thousand.

Step 1. 67,951   The digit 7 is in the thousands place value.

Step 2.   The digit to the right of 7 is 5 or more (9). Thus, 7, the identified digit in Step 1, is now rounded to 8.
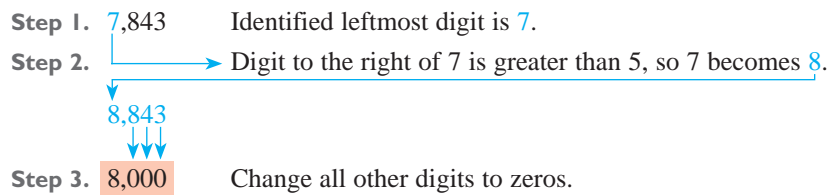
68,951

Step 3. 68,000   Change digits 9, 5, and 1 to zeros, since these digits are to the right of 8, the rounded number.

By rounding 67,951 to the nearest thousand, you can see that 67,951 is closer to 68,000 than to 67,000.

Now let's look at **rounding all the way.** To round a number all the way, you round to the first digit of the number (the leftmost digit) and have only one nonzero digit remaining in the number.

EXAMPLE 3   Round 7,843 all the way.

Step 1.   7,843   Identified leftmost digit is 7.

Step 2.   Digit to the right of 7 is greater than 5, so 7 becomes 8.

8,843

Step 3.   8,000   Change all other digits to zeros.

Rounding 7,843 all the way gives 8,000.

Remember that rounding a digit to a specific place value depends on the degree of accuracy you want in your estimate. For example, in the *Wall Street Journal* clip "Phineas and Ferb," 628,000 rounds all the way to 600,000 because the digit to the right of 6 (leftmost digit) is less than 5. The 600,000 is 28,000 less than the original 628,000. You would be more accurate if you rounded 628,000 to the ten thousand place value of 1 identified digit, which is 630,000.

Before concluding this unit, let's look at how to dissect and solve a word problem.

Disney Channel
628,000 boys 6 to 11, on average, watching per episode

Phineas and Ferb

© Disney XD/Photofest

How to Dissect and Solve a Word Problem

As a student, your author found solving word problems difficult. Not knowing where to begin after reading the word problem caused the difficulty. Today, students still struggle with word problems as they try to decide where to begin.

Solving word problems involves *organization* and *persistence*. Recall how persistent you were when you learned to ride a two-wheel bike. Do you remember the feeling of success you experienced when you rode the bike without help? Apply this persistence to word problems. Do not be discouraged. Each person learns at a different speed. Your goal must be to FINISH THE RACE and experience the success of solving word problems with ease.

To be organized in solving word problems, you need a plan of action that tells you where to begin—a blueprint aid. Like a builder, you will refer to this blueprint aid constantly until you know the procedure. The blueprint aid for dissecting and solving a word problem appears below. Note that the blueprint aid serves an important function—**it decreases your math anxiety.**

Blueprint Aid for Dissecting and Solving a Word Problem

LO 3

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT				

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Now let's study this blueprint aid. The first two columns require that you *read* the word problem slowly. Think of the third column as the basic information you must know or calculate before solving the word problem. Often this column contains formulas that provide the foundation for the step-by-step problem solution. The last column reinforces the key points you should remember.

It's time now to try your skill at using the blueprint aid for dissecting and solving a word problem.

The Word Problem On the 100th anniversary of Tootsie Roll Industries, the company reported sharply increased sales and profits. Sales reached one hundred ninety-four million dollars and a record profit of twenty-two million, five hundred fifty-six thousand dollars. The company president requested that you round the sales and profit figures all the way.

Study the following blueprint aid and note how we filled in the columns with the information in the word problem. You will find the organization of the blueprint aid most helpful. Be persistent! You *can* dissect and solve word problems! When you are finished with the word problem, make sure the answer seems reasonable.

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	*Sales:* One hundred ninety-four million dollars. *Profit:* Twenty-two million, five hundred fifty-six thousand dollars.	Sales and profit rounded all the way.	Express each verbal form in numeric form. Identify leftmost digit in each number.	Rounding all the way means only the leftmost digit will remain. All other digits become zeros.

Steps to solving problem

1. Convert verbal to numeric.
   One hundred ninety-four million dollars ⟶ $194,000,000
   Twenty-two million, five hundred fifty-six thousand dollars ⟶ $ 22,556,000

2. Identify leftmost digit of each number.
   $194,000,000 $22,556,000

3. Round.
   $200,000,000 $20,000,000

Note that in the final answer, $200,000,000 and $20,000,000 have only one nonzero digit.

Remember that you cannot round numbers expressed in verbal form. You must convert these numbers to numeric form.

Now you should see the importance of the information in the third column of the blueprint aid. When you complete your blueprint aids for word problems, do not be concerned if the order of the information in your boxes does not follow the order given in the text boxes. Often you can dissect a word problem in more than one way.

Your first Practice Quiz follows. Be sure to study the paragraph that introduces the Practice Quiz.

MONEY tips

Do not carry your Social Security card in your wallet. Keep it and other important documents in a safe deposit box or fireproof container. Shred any document that contains personal information, such as anything with your Social Security number on it, old bank statements, applications for loans, and so on.

TEACHER'S TIP:

If you would like to assign homework by learning unit instead of at the end of the chapter, assign Appendix A for LU 1–1.

LU 1–1 | **PRACTICE QUIZ**

Complete this **Practice Quiz** to see how you are doing.

At the end of each learning unit, you can check your progress with a Practice Quiz. If you had difficulty understanding the unit, the Practice Quiz will help identify your area of weakness. Work the problems on scrap paper. Check your answers with the worked-out solutions that follow the quiz. Ask your instructor about specific assignments and the videos available on your DVD for each unit Practice Quiz.

1. Write in verbal form:
   a. 7,948   **b.** 48,775   **c.** 814,410,335,414

2. Round the following numbers as indicated:

Nearest ten	Nearest hundred	Nearest thousand	Rounded all the way
a. 92	**b.** 745	**c.** 8,341	**d.** 4,752

3. Kellogg's reported its sales as five million, one hundred eighty-one thousand dollars. The company earned a profit of five hundred two thousand dollars. What would the sales and profit be if each number were rounded all the way? (*Hint:* You might want to draw the blueprint aid since we show it in the solution.)

*For **extra help** from your authors–Sharon and Jeff–see the student DVD*

✓ **Solutions**

1. a. Seven thousand, nine hundred forty-eight

b. Forty-eight thousand, seven hundred seventy-five

c. Eight hundred fourteen billion, four hundred ten million, three hundred thirty-five thousand, four hundred fourteen

2. a. 90   **b.** 700   **c.** 8,000   **d.** 5,000

3. Kellogg's sales and profit:

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	*Sales:* Five million, one hundred eighty-one thousand dollars. *Profit:* Five hundred two thousand dollars.	Sales and profit rounded all the way.	Express each verbal form in numeric form. Identify leftmost digit in each number.	Rounding all the way means only the left-most digit will remain. All other digits become zeros.

Steps to solving problem

1. Convert verbal to numeric.

Five million, one hundred eighty-one thousand ────────────→ $5,181,000

Five hundred two thousand ────────────→ $ 502,000

2. Identify leftmost digit of each number.

$5,181,000 $502,000

3. Round.

$5,000,000 $500,000

LU 1–1a **EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS**

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer, p. 21). Worked-out Solutions can be found in Appendix B at end of text.

1. Write in verbal form:

a. 8,682   **b.** 56,295   **c.** 732,310,444,888

2. Round the following numbers as indicated:

Nearest ten	Nearest hundred	Nearest thousand	Rounded all the way
a. 43	**b.** 654	**c.** 7,328	**d.** 5,980

3. Kellogg's reported its sales as three million, two hundred ninety-one thousand dollars. The company earned a profit of four hundred five thousand dollars. What would the sales and profit be if each number were rounded all the way?

# Learning Unit 1–2: Adding and Subtracting Whole Numbers

LO 1

We all know the cost of car rentals and hotel rates vary around the world. The following *Wall Street Journal* clip identifies some of the most and least expensive car rental and hotel rates in the world. For example, note the difference in daily costs between the hotel rates in Brisbane, Australia, and Albuquerque, New Mexico.

Brisbane	$259
Albuquerque	− 65
	$194

CAR RENTAL		$187		HOTEL RATE		$103
MOST EXPENSIVE		**LEAST EXPENSIVE**		**MOST EXPENSIVE**		**LEAST EXPENSIVE**
Rome	$440	Hong Kong	$62	Perth, Australia $284	Tulsa, Okla.	$64
Barcelona, Spain	$428	Bangalore, India	$69	Brisbane, Australia $259	Albuquerque, N.M.	$65
Seoul, South Korea	$417	Mumbai, India	$75	Sydney, Australia $255	Jacksonville, Fla.	$69

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"Mistakes were made."
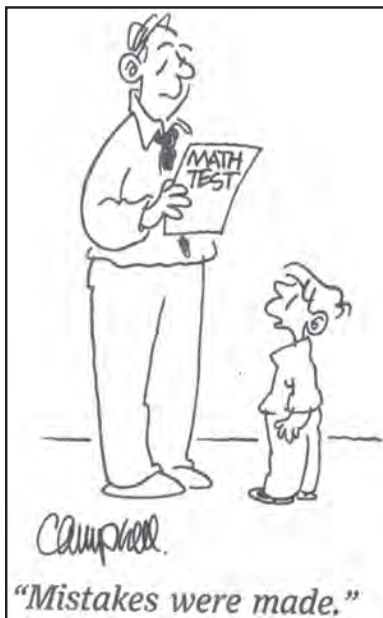
From The Wall Street Journal, copyright © 2010, permission of Cartoon Features Syndicate.

This unit teaches you how to manually add and subtract whole numbers. When you least expect it, you will catch yourself automatically using this skill.

Addition of Whole Numbers

To add whole numbers, you unite two or more numbers called **addends** to make one number called a **sum**, *total,* or *amount.* The numbers are arranged in a column according to their place values—units above units, tens above tens, and so on. Then, you add the columns of numbers from top to bottom. To check the result, you re-add the columns from bottom to top. This procedure is illustrated in the steps that follow.

ADDING WHOLE NUMBERS
Step 1. Align the numbers to be added in columns according to their place values, beginning with the units place at the right and moving to the left.
Step 2. Add the units column. Write the sum below the column. If the sum is more than 9, write the units digit and carry the tens digit.
Step 3. Moving to the left, repeat Step 2 until all place values are added.

EXAMPLE

	2 11		**Alternate check**
Adding	1,362	Checking	Add each column as a
top	5,913	bottom to	separate total and then
bottom	8,924	to top	combine. The end
	+6,594		result is the same.
	22,793		

$$
\begin{array}{r}
1,362 \\
5,913 \\
8,924 \\
+\ 6,594 \\
\hline
13 \\
18 \\
2\ 6 \\
20 \\
\hline
22,793
\end{array}
$$

How to Quickly Estimate Addition by Rounding All the Way   In Learning Unit 1–1, you learned that rounding whole numbers all the way gives quick arithmetic estimates. Using the following *Wall Street Journal* clipping "International Ambitions" note how you can round each number all the way and the total will not be rounded all the way. Remember that rounding all the way does not replace actual computations, but it is helpful in making quick commonsense decisions.

GLOBAL

International Ambitions
Number of Wal-Mart stores outside the U.S., as of Oct. 31

1,578
452 414 379 321 298 264 172 170 77 57 55 52 3

Mexico Brazil Japan U.K. Canada China Chile Costa Rica Guatemala El Salvador Nicaragua Honduras Argentina India

Source: the company

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Rounded all the way

$$
\begin{array}{r}
2,000 \\
500 \\
400 \\
400 \\
300 \\
300 \\
300 \\
200 \\
200 \\
80 \\
60 \\
60 \\
50 \\
+\quad 3 \\
\hline
4,853
\end{array}
$$

Rounding all the way means each number has only one nonzero digit.

Note: The final answer could have more than one nonzero digit since the total is not rounded all the way.

LO 2

Subtraction of Whole Numbers

Subtraction is the opposite of addition. Addition unites numbers; subtraction takes one number away from another number. In subtraction, the top (largest) number is the **minuend.** The number you subtract from the minuend is the **subtrahend,** which gives you the **difference** between the minuend and the subtrahend. The steps for subtracting whole numbers follow.

SUBTRACTING WHOLE NUMBERS
Step 1. Align the minuend and subtrahend according to their place values.
Step 2. Begin the subtraction with the units digits. Write the difference below the column. If the units digit in the minuend is smaller than the units digit in the subtrahend, borrow 1 from the tens digit in the minuend. One tens digit is 10 units.
Step 3. Moving to the left, repeat Step 2 until all place values in the subtrahend are subtracted.

© AP Photo/Matt York

EXAMPLE   The *Wall Street Journal* clipping "International Ambitions" illustrates the subtraction of whole numbers:

What is the difference in the number of Walmart stores in Japan and the UK? As shown below you can use subtraction to arrive at the 35 difference.

$$
\begin{array}{r}
\overset{3\,10\,14}{\cancel{4}\,\cancel{1}\,\cancel{4}} \leftarrow \text{Minuend (larger number)} \\
-379 \leftarrow \text{Subtrahend} \\
\hline
35 \leftarrow \text{Difference}
\end{array}
$$

Check
$$
\begin{array}{r}
35 \\
+379 \\
\hline
414
\end{array}
$$

In subtraction, borrowing from the column at the left is often necessary. Remember that 1 ten = 10 units, 1 hundred = 10 tens, and 1 thousand = 10 hundreds.

In the units column in the example above, 9 cannot be subtracted from 4 so we borrow from the tens column, resulting in 14 less 9 equals 5. In the tens column, we cannot subtract 7 from 0 so we borrow 10 tens from the hundreds column, leaving 3 hundreds. Ten less 7 equals 3.

Checking subtraction requires adding the difference (35) to the subtrahend (379) to arrive at the minuend (414).

How to Dissect and Solve a Word Problem

Accurate subtraction is important in many business operations. In Chapter 4 we discuss the importance of keeping accurate subtraction in your checkbook balance. Now let's check your progress by dissecting and solving a word problem.

The Word Problem   Hershey's produced 25 million Kisses in one day. The same day, the company shipped 4 million to Japan, 3 million to France, and 6 million throughout the United States. At the end of that day, what is the company's total inventory of Kisses? What is the inventory balance if you round the number all the way?

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	*Produced:* 25 million. *Shipped:* Japan, 4 million; France, 3 million; United States, 6 million.	Total Kisses left in inventory. Inventory balance rounded all the way.	Total Kisses produced − Total Kisses shipped = Total Kisses left in inventory.	Minuend − Subtrahend = Difference. Rounding all the way means rounding to last digit on the left.

Steps to solving problem

1. Calculate the total Kisses shipped.

$$
\begin{array}{r}
4,000,000 \\
3,000,000 \\
+\ 6,000,000 \\
\hline
13,000,000
\end{array}
$$

2. Calculate the total Kisses left in inventory.

$$
\begin{array}{r}
25,000,000 \\
-13,000,000 \\
\hline
12,000,000
\end{array}
$$

3. Rounding all the way.

Identified digit is 1. Digit to right of 1 is 2, which is less than 5. *Answer:* 10,000,000 .

The Practice Quiz that follows will tell you how you are progressing in your study of Chapter 1.

LU 1–2   PRACTICE QUIZ

Complete this **Practice Quiz** to see how you are doing.

1. Add by totaling each separate column:

   8,974
   6,439
   + 6,941

2. Estimate by rounding all the way (do not round the total of estimate) and then do the actual computation:

   4,241
   8,794
   + 3,872

3. Subtract and check your answer:

   9,876
   − 4,967

4. Jackson Manufacturing Company projected its year 2013 furniture sales at $900,000. During 2013, Jackson earned $510,000 in sales from major clients and $369,100 in sales from the remainder of its clients. What is the amount by which Jackson over- or underestimated its sales? Use the blueprint aid, since the answer will show the completed blueprint aid.

*For **extra help** from your authors–Sharon and Jeff–see the student DVD*

You Tube

✓ Solutions

1.		2. **Estimate**	**Actual**	3.	8 18 6 16	**Check**
	14					
	14	4,000	4,241		9,876	4,909
	2 2	9,000	8,794		− 4,967	+ 4,967
	20	+ 4,000	+ 3,872		4,909	9,876
	22,354	17,000	16,907			

4. Jackson Manufacturing Company over- or underestimated sales:

	The facts	**Solving for?**	**Steps to take**	**Key points**
BLUEPRINT	*Projected 2013 sales: $900,000.* *Major clients: $510,000.* *Other clients: $369,100.*	How much were sales over- or underestimated?	Total projected sales − Total actual sales = Over- or underestimated sales.	Projected sales (minuend) − Actual sales (subtrahend) = Difference.

Steps to solving problem

1. Calculate total actual sales.

   $510,000
   + 369,100
   $879,100

2. Calculate overestimated or underestimated sales.

   $900,000
   − 879,100
   $ 20,900 (overestimated)

LU 1–2a   EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer, p. 21). Worked-out Solutions can be found in Appendix B at end of text.

1. Add by totaling each separate column:

   9,853
   7,394
   + 8,843

2. Estimate by rounding all the way (do not round the total of estimate) and then do the actual computation:

   3,482
   6,981
   + 5,490

3. Subtract and check your answer:

9,787
−5,968

4. Jackson Manufacturing Company projected its year 2013 furniture sales at $878,000. During 2013, Jackson earned $492,900 in sales from major clients and $342,000 in sales from the remainder of its clients. What is the amount by which Jackson over- or under-estimated its sales?

Learning Unit 1–3: Multiplying and Dividing Whole Numbers

LO 1

The *Wall Street Journal* clip in the margin shows that Facebook agreed to a 20-year privacy settlement with the government. If Facebook violates the settlement, it can be fined $16,000 per day. What would it cost if Facebook violated the settlement for 4 days?

4 days × $16,000 = $64,000

If you divide $64,000 by $16,000 per day you get 4 days.

This unit will sharpen your skills in two important arithmetic operations—multiplication and division. These two operations frequently result in knowledgeable business decisions.

Multiplication of Whole Numbers—Shortcut to Addition

From calculating the cost of Facebook's settlement you know that multiplication is a *shortcut to addition:*

$16,000 × 4 = $64,000   or $16,000 + $16,000 + $16,000 + $16,000 = $64,000

Before learning the steps used to multiply whole numbers with two or more digits, you must learn some multiplication terminology.

Note in the following example that the top number (number we want to multiply) is the **multiplicand.** The bottom number (number doing the multiplying) is the **multiplier.** The final number (answer) is the **product.** The numbers between the multiplier and the product are **partial products.** Also note how we positioned the partial product 2090. This number is the result of multiplying 418 by 50 (the 5 is in the tens position). On each line in the partial products, we placed the first digit directly below the digit we used in the multiplication process.

EXAMPLE

```
                    418   ←————    Top number (multiplicand)
Partial        ×     52   ←————    Bottom number (multiplier)
products           836                                    2 × 418 =        836
                  20 90                                   50 × 418 = +  20,900
                 ─────                                                 ───────
                 21,736   ←————  Product answer  ————→     21,736
```

Facebook Inc. agreed to a 20-year privacy settlement with the U.S. government that would re-quire the company to ask users for permission before changing the way their personal informa-tion is released.

The settlement, the strongest government rebuke yet to the social network, stems from changes Facebook made to its privacy settings in December 2009 to make aspects of users' profiles—such as name, picture, gender and friends list—public by default.

In an aggressive complaint, the Federal Trade Commission charged that Facebook's changes threatened the "health and safety" of users, in part, by ex-posing "potentially sensitive af-filiations" such as political views, sexual orientation or business relationships.

As part of the settlement, Facebook agreed to submit to in-dependent privacy audits every two years. If it violates the set-tlement, it can be fined $16,000 per day per violation.
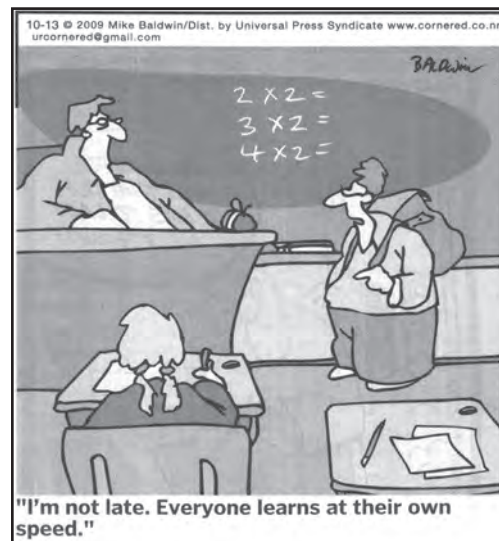
"I'm not late. Everyone learns at their own speed."

We can now give the following steps for multiplying whole numbers with two or more digits:

MULTIPLYING WHOLE NUMBERS WITH TWO OR MORE DIGITS
Step 1. Align the multiplicand (top number) and multiplier (bottom number) at the right. Usually, you should make the smaller number the multiplier.
Step 2. Begin by multiplying the right digit of the multiplier with the right digit of the multiplicand. Keep multiplying as you move left through the multiplicand. Your first partial product aligns at the right with the multiplicand and multiplier.
Step 3. Move left through the multiplier and continue multiplying the multiplicand. Your partial product right digit or first digit is placed directly below the digit in the multiplier that you used to multiply.
Step 4. Continue Steps 2 and 3 until you have completed your multiplication process. Then add the partial products to get the final product.

Checking and Estimating Multiplication   We can check the multiplication process by reversing the multiplicand and multiplier and then multiplying. Let's first estimate 52×418 by rounding all the way.

$$
\begin{array}{r}
\textbf{EXAMPLE} \qquad 50 \leftarrow \qquad 52 \\
\underline{\times\ 400} \leftarrow \underline{\times\ 418} \\
20{,}000 \qquad 416 \\
52 \\
\underline{20\ 8} \\
\boxed{21{,}736}
\end{array}
$$

By estimating before actually working the problem, we know our answer should be about 20,000. When we multiply 52 by 418, we get the same answer as when we multiply 418×52—and the answer is about 20,000. Remember, if we had not rounded all the way, our estimate would have been closer. If we had used a calculator, the rounded estimate would have helped us check the calculator's answer. Our commonsense estimate tells us our answer is near 20,000—not 200,000.

Before you study the division of whole numbers, you should know (1) the multiplication shortcut with numbers ending in zeros and (2) how to multiply a whole number by a power of 10.

MULTIPLICATION SHORTCUT WITH NUMBERS ENDING IN ZEROS
Step 1. When zeros are at the end of the multiplicand or the multiplier, or both, disregard the zeros and multiply.
Step 2. Count the number of zeros in the multiplicand and multiplier.
Step 3. Attach the number of zeros counted in Step 2 to your answer.

EXAMPLE

$$
\begin{array}{r}
65{,}000 \\
\underline{\times\ 420}
\end{array}
\qquad
\begin{array}{r}
65 \\
\underline{\times\ 42} \\
1\ 30 \\
\underline{26\ 0} \\
27{,}300{,}000
\end{array}
\qquad
\begin{array}{r}
3 \text{ zeros} \\
\underline{+\ 1 \text{ zero}} \\
4 \text{ zeros}
\end{array}
$$

No need to multiply rows of zeros

$$
\begin{array}{r}
65{,}000 \\
\underline{\times\ \quad 420} \\
00\ 000 \\
1\ 300\ 00 \\
\underline{26\ 000\ 0} \\
\boxed{27{,}300{,}000}
\end{array}
$$

MULTIPLYING A WHOLE NUMBER BY A POWER OF 10

Step 1. Count the number of zeros in the power of 10 (a whole number that begins with 1 and ends in one or more zeros such as 10, 100, 1,000, and so on).

Step 2. Attach that number of zeros to the right side of the other whole number to obtain the answer. Insert comma(s) as needed every three digits, moving from right to left.

EXAMPLE $99 \times 10 \quad = 990 \quad = \boxed{990} \quad \leftarrow$ Add 1 zero
$99 \times 100 \quad = 9,900 \quad = \boxed{9,900} \quad \leftarrow$ Add 2 zeros
$99 \times 1,000 = 99,000 = \boxed{99,000} \quad \leftarrow$ Add 3 zeros

When a zero is in the center of the multiplier, you can do the following:

EXAMPLE
$$\begin{array}{r} 658 \\ \times\ \ 403 \\ \hline 1\ 974 \\ 263\ 2\square \\ \hline \boxed{265,174} \end{array}$$
$$\begin{array}{r} 3 \times 658 = \quad\ \ 1,974 \\ 400 \times 658 = +\ 263,200 \\ \hline \boxed{265,174} \end{array}$$

Division of Whole Numbers

Division is the reverse of multiplication and a time-saving shortcut related to subtraction. For example, in the introduction of this learning unit you determined that Facebook would pay $64,000 for a 4-day settlement penalty. You multiplied $16,000 × 4 to get $64,000. Since division is the reverse of multiplication you can also say that $64,000 ÷ 4 = $16,000.

Division can be indicated by the common symbols ÷ and $\overline{)}$, or by the bar — in a fraction and the forward slant / between two numbers, which means the first number is divided by the second number. Division asks how many times one number **(divisor)** is contained in another number **(dividend).** The answer, or result, is the **quotient.** When the divisor (number used to divide) doesn't divide evenly into the dividend (number we are dividing), the result is a **partial quotient,** with the leftover amount the **remainder** (expressed as fractions in later chapters). The following example illustrates *even division* (this is also an example of *long division* because the divisor has more than one digit).

EXAMPLE
$$\begin{array}{r} \boxed{18} \leftarrow \text{Quotient} \\ \text{Divisor} \longrightarrow 15\overline{)270} \leftarrow \text{Dividend} \\ \underline{15} \\ 120 \\ \underline{120} \end{array}$$

This example divides 15 into 27 once with 12 remaining. The 0 in the dividend is brought down to 12. Dividing 120 by 15 equals 8 with no remainder; that is, even division. The following example illustrates *uneven division with a remainder* (this is also an example of *short division* because the divisor has only one digit).

EXAMPLE
$$\begin{array}{r} \boxed{24\ R1} \leftarrow \text{Remainder} \\ 7\overline{)169} \\ \underline{14} \\ 29 \\ \underline{28} \\ 1 \end{array}$$

Check
(7 × 24) + 1 = 169
Divisor × Quotient + Remainder = Dividend

Note how doing the check gives you assurance that your calculation is correct. When the divisor has one digit (short division) as in this example, you can often calculate the division mentally as illustrated in the following examples:

EXAMPLES
$$\begin{array}{r} \boxed{108} \\ 8\overline{)864} \end{array} \qquad \begin{array}{r} \boxed{16\ R6} \\ 7\overline{)118} \end{array}$$

Next, let's look at the value of estimating division.

Estimating Division   Before actually working a division problem, estimate the quotient by rounding. This estimate helps you check the answer. The example that follows is rounded all the way. After you make an estimate, work the problem and check your answer by multiplication.

EXAMPLE

$$36 \text{ R}111$$

	Estimate	**Check**
138)5,079	50	138
4 14	100)5,000	× 36
939		828
828		4 14
111		4,968
		+ 111 ← Add remainder
		5,079

Now let's turn our attention to division shortcuts with zeros.

Division Shortcuts with Zeros   The steps that follow show a shortcut that you can use when you divide numbers with zeros.

DIVISION SHORTCUT WITH NUMBERS ENDING IN ZEROS
Step 1. When the dividend and divisor have ending zeros, count the number of ending zeros in the divisor.
Step 2. Drop the same number of zeros in the dividend as in the divisor, counting from right to left.

Note the following examples of division shortcuts with numbers ending in zeros. Since two of the symbols used for division are ÷ and)‾ , our first examples show the zero shortcut method with the ÷ symbol.

EXAMPLES

One ending zero

Dividend   Divisor

Drop 1 zero in dividend

$$95{,}000 \div 10 \longrightarrow 95{,}000 = \boxed{9{,}500}$$
$$95{,}000 \div 100 \longrightarrow 95{,}000 = \boxed{950} \quad \text{Drop 2 zeros}$$
$$95{,}000 \div 1{,}000 \longrightarrow 95{,}000 = \boxed{95} \quad \text{Drop 3 zeros}$$

In a long division problem with the)‾ symbol, you again count the number of ending zeros in the divisor. Then drop the same number of ending zeros in the dividend and divide as usual.

EXAMPLE   6,500)88,000 ← Drop 2 zeros

$$13 \text{ R}35$$

65)880
65
230
195
35

65)880

You are now ready to practice what you learned by dissecting and solving a word problem.

How to Dissect and Solve a Word Problem

The blueprint aid on page 18 will be your guide to dissecting and solving the following word problem.

The Word Problem Dunkin' Donuts sells to four different companies a total of $3,500 worth of doughnuts per week. What is the total annual sales to these companies? What is the yearly sales per company? (Assume each company buys the same amount.) Check your answer to show how multiplication and division are related.

MONEY tips

College *is* worth it! College graduates earn substantially more money each year than high school graduates *and* that wage premium is increasing steadily—almost twice as much. Stay in school.

BLUEPRINT

The facts	Solving for?	Steps to take	Key points
Sales per week: $3,500. Companies: 4.	Total annual sales to all four companies. Yearly sales per company.	Sales per week × Weeks in year (52) = Total annual sales. Total annual sales ÷ Total companies = Yearly sales per company.	Division is the reverse of multiplication.

Steps to solving problem

1. Calculate total annual sales. $3,500 × 52 weeks = $182,000

2. Calculate yearly sales per company, $182,000 ÷ 4 = $45,500

Check

$45,500 × 4 = $182,000

It's time again to check your progress with a Practice Quiz.

LU 1–3 **PRACTICE QUIZ**

Complete this **Practice Quiz** to see how you are doing.

1. Estimate the actual problem by rounding all the way, work the actual problem, and check:

   Actual   **Estimate**   **Check**
   3,894
   × 18

2. Multiply by shortcut method:
   77,000
   × 1,800

3. Multiply by shortcut method:
   95 × 10,000

4. Divide by rounding all the way, complete the actual calculation, and check, showing remainder as a whole number.
   26)5,325

5. Divide by shortcut method:
   4,000)96,000

6. Assume General Motors produces 960 Chevrolets each workday (Monday through Friday). If the cost to produce each car is $6,500, what is General Motors' total cost for the year? Check your answer.

*For **extra help** from your authors–Sharon and Jeff–see the student DVD*

✓ Solutions

1. **Estimate**   **Actual**   **Check**
   4,000   3,894   8 × 3,894 =   31,152
   × 20   × 18   10 × 3,894 = + 38,940
   80,000   31 152   70,092
                     38 94
                     70,092

2. 77 × 18 = 1,386 + 5 zeros = 138,600,000   3. 95 + 4 zeros = 950,000

4. **Rounding**   **Actual**   **Check**
       166 R20   204 R21   26 × 204 = 5,304
   30)5,000   26)5,325   +   21
      3 0   5 2   5,325
      2 00   125
      1 80   104
       200   21
       180
        20

5. Drop 3 zeros = $\dfrac{24}{4\overline{)96}}$

6. General Motors' total cost per year:

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	*Cars produced each workday: 960.* *Workweek: 5 days.* *Cost per car: $6,500.*	Total cost per year.	Cars produced per week × 52 = Total cars produced per year. Total cars produced per year × Total cost per car = Total cost per year.	Whenever possible, use multiplication and division shortcuts with zeros. Multiplication can be checked by division.

Steps to solving problem

1. Calculate total cars produced per week.   5 × 960 = 4,800 cars produced per week

2. Calculate total cars produced per year.   4,800 cars × 52 weeks = 249,600 total cars produced per year

3. Calculate total cost per year.   249,600 cars × $6,500 = $1,622,400,000
(multiply 2,496 × 65 and add zeros)

Check

$1,622,400,000 ÷ 249,600 = $6,500 (drop 2 zeros before dividing)

LU 1–3a   **EXTRA PRACTICE QUIZ WITH WORKED-OUT SOLUTIONS**

Need more practice? Try this **Extra Practice Quiz** (check figures in the Interactive Chapter Organizer, p. 21). Worked-out Solutions can be found in Appendix B at end of text.

1. Estimate the actual problem by rounding all the way, work the actual problem, and check:

Actual   **Estimate**   **Check**

   4,938
×   19

2. Multiply by shortcut method:

   86,000
× 1,900

3. Multiply by shortcut method:

86 × 10,000

4. Divide by rounding all the way, complete the actual calculation, and check, showing remainder as a whole number.
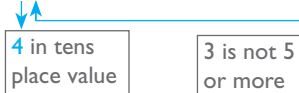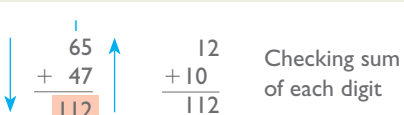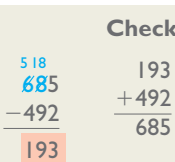
$26\overline{)6,394}$

5. Divide by the shortcut method:

$3,000\overline{)99,000}$

6. Assume General Motors produces 850 Chevrolets each workday (Monday through Friday). If the cost to produce each car is $7,000, what is General Motors' total cost for the year? Check your answer.

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Reading and writing numeric and verbal whole numbers, p. 4 Placement of digits in a number gives the value of the digits (Figure 1.1). Commas separate every three digits, moving from right to left. Begin at left to read and write number in verbal form. Do not read zeros or use *and*. Hyphenate numbers twenty-one to ninety-nine. Reverse procedure to change verbal number to numeric.	462 → Four hundred sixty-two 6,741 → Six thousand, seven hundred forty-one	**Write in verbal form** 571 → 7,943 →
Rounding whole numbers, p. 6 1. Identify place value of the digit to be rounded. 2. If digit to the right is 5 or more, round up; if less than 5, do not change. 3. Change all digits to the right of rounded identified digit to zeros.	643 to nearest ten 4 in tens place value 3 is not 5 or more Thus, 643 rounds to 640.	**Round to nearest ten** 691
Rounding all the way, p. 6 Round to first digit of number. One nonzero digit remains. In estimating, you round each number of the problem to one nonzero digit. The final answer is not rounded.	468,451 → 500,000 The 5 is the only nonzero digit remaining.	**Round all the way** 429,685 →
Adding whole numbers, p. 10 1. Align numbers at the right. 2. Add units column. If sum is more than 9, carry tens digit. 3. Moving left, repeat Step 2 until all place values are added. Add from top to bottom. Check by adding bottom to top or adding each column separately and combining.	65 12 Checking sum + 47 +10 of each digit 112 112	**Add** 76 +38
Subtracting whole numbers, p. 11 1. Align minuend and subtrahend at the right. 2. Subtract units digits. If necessary, borrow 1 from tens digit in minuend. 3. Moving left, repeat Step 2 until all place values are subtracted. Minuend less subtrahend equals difference.	**Check** 5 18 193 685 +492 −492 685 193	**Subtract** 692 −134
Multiplying whole numbers, p. 14 1. Align multiplicand and multiplier at the right. 2. Begin at the right and keep multiplying as you move to the left. First partial product aligns at the right with multiplicand and multiplier. 3. Move left through multiplier and continue multiplying multiplicand. Partial product right digit or first digit is placed directly below digit in multiplier. 4. Continue Steps 2 and 3 until multiplication is complete. Add partial products to get final product.	223 × 32 446 6 69 7,136	**Multiply** 491 × 28

Shortcuts: (a) When multiplicand or multiplier, or both, end in zeros, disregard zeros and multiply; attach same number of zeros to answer. If zero is in center of multiplier, no need to show row of zeros. (b) If multiplying by power of 10, attach same number of zeros to whole number multiplied.	a. 48,000 48 3 zeros 524
	    × 40 4 +1 zero × 206
	    1,920,000 ← 4 zeros 3 144
	                    104 8
	                   107,944
	 b. 14 × 10 = 140 (attach 1 zero)
	 14 × 1,000 = 14,000 (attach 3 zeros)
		Multiply by shortcut
		 13 × 10 =
		 13 × 1,000 =

(continues)

INTERACTIVE CHAPTER ORGANIZER

Topic/procedure/formula	Examples	You try it*
Dividing whole numbers, p. 16 1. When divisor is divided into the dividend, the remainder is less than divisor. 2. Drop zeros from dividend right to left by number of zeros found in the divisor. Even division has no remainder; uneven division has a remainder; divisor with one digit is short division; and divisor with more than one digit is long division.	1. 5 R6 14)76 70 6 2. $5,000 \div 100 = 50 \div 1 = 50$ $5,000 \div 1,000 = 5 \div 1 = 5$	**Divide** 1. 16)92 **Divide by shortcut** 2. $4,000 \div 100$ $4,000 \div 1,000$
KEY TERMS	Addends, *p. 10* Decimal point, *p. 4* Decimal system, *p. 4* Difference, *p. 11* Dividend, *p. 16* Divisor, *p. 16* Minuend, *p. 11* Multiplicand, *p. 14* Multiplier, *p. 14* Partial products, *p. 14* Partial quotient, *p. 16* Product, *p. 14*	Quotient, *p. 16* Remainder, *p. 16* Rounding all the way, *p. 6* Subtrahend, *p. 11* Sum, *p. 10* Whole number, *p. 4*
Check Figures for Extra Practice Quizzes with Page References. (Worked-out Solutions in Appendix B.)	LU 1–1a (p. 9) 1. A. Eight thousand, six hundred eighty-two; B. Fifty-six thousand, two hundred ninety-five; C. Seven hundred thirty-two billion, three hundred ten million, four hundred forty-four thousand, eight hundred eighty-eight 2. A. 40; B. 700; C. 7,000; D. 6,000 3. $3,000,000; $400,000 LU 1–2a (p. 13) 1. 26,090 2. 15,000; 15,953 3. 3,819 4. $43,100 (over)	LU 1–3a (p. 19) 1. 100,000; 93,822 2. 163,400,000 3. 860,000 4. 245 R24 5. 33 6. $1,547,000,000

*Worked-out solutions are in Appendix B.

Critical Thinking Discussion Questions with Chapter Concept Check

1. List the four steps of the decision-making process. Do you think all companies should be required to follow these steps? Give an example.

2. Explain the three steps used to round whole numbers. Pick a whole number and explain why it should not be rounded.

3. How do you check subtraction? If you were to attend a movie, explain how you might use the subtraction check method.

4. Explain how you can check multiplication. If you visit a local supermarket, how could you show multiplication as a shortcut to addition?

5. Explain how division is the reverse of multiplication. Using the supermarket example, explain how division is a time-saving shortcut related to subtraction.

6. **Chapter Concept Check.** Using all the math you learned in Chapter 1, go to the chapter opener and plan out a dinner for a family of four. You need to calculate the difference in cost and calories from dining at Subway versus McDonald's. Go online or visit these stores in your area to find current food prices.

Classroom Notes

END-OF-CHAPTER PROBLEMS Mc Graw Hill connect™ plus+ www.mhhe.com/slater11e

Check figures for odd-numbered problems in Appendix C.   Name _____   Date _____

DRILL PROBLEMS

Add the following: *LU 1-2(1)*

1–1. 75 + 19 94	**1–2.** 850 + 670 1,520	**1–3.** 88 + 88 176	**1–4.** 88 + 75 163

1–5. 6,251 + 7,329 13,580	**1–6.** 59,481 51,411 + 70,821 181,713	**1–7.** 78,159 15,850 + 19,681 113,690

Subtract the following: *LU 1-2(2)*

1–8. 68   5 18
       6̷8̷
−19   −19
      49

1–9. 80   7 10
       8̷0̷
−42   −42
      38

1–10. 287   1 17 17
        2̷8̷ 7̷
−199   −199
        88

1–11. 9,000   8 10
         9̷,0̷̷00
−5,400   −5,400
         3,600

1–12. 9,800
−8,900
900

1–13. 1,622
− 548
1,074

Multiply the following: *LU 1-3(1)*

1–14. 60
× 7
420

1–15. 510
× 61
510
30 60
31,110

1–16. 800
× 200
160,000

1–17. 677
× 503
2 031
338 5□
340,531

1–18. 309
× 850
15 450
247 2
262,650

1–19. 450
× 280
36 000
90 0
126,000

Divide the following by short division: *LU 1-3(2)*

1–20. 4)1,600   → 400

1–21. 9)810   → 90

1–22. 4)164   → 41

Divide the following by long division. Show work and remainder.   *LU 1-3(2)*

1–23. 86 R4
6)520
48
40
36
4

1–24. 143 R49
62)8,915
6 2
2 71
2 48
235
186
49

Add the following without rearranging: *LU 1-2(1)*

1–25. 95 + 310 = 405

1–26. 1,055 + 88 = 1,143

1–27. 666 + 950 = 1,616

1–28. 1,011 + 17 = 1,028

1–29. Add the following and check by totaling each column individually without carrying numbers: *LU 1-2(1)*

		Check
	8,539	16
	6,842	16
	+ 9,495	17
	24,876	23
		24,876

Estimate the following by rounding all the way and then do actual addition: *LU 1-1(2), LU 1-2(1)*

	Actual	**Estimate**		**Actual**	**Estimate**
1–30.	7,700	8,000	**1–31.**	6,980	7,000
	9,286	9,000		3,190	3,000
	+ 3,900	+ 4,000		+ 7,819	+ 8,000
	20,886	21,000		17,989	18,000

Subtract the following without rearranging: *LU 1-2(2)*

1–32. $190 - 66 = 124$ **1–33.** $950 - 870 = 80$

1–34. Subtract the following and check answer: *LU 1-2(2)*

$$591,001 \\ - 375,956$$

```
        8 10 9 9 11
        591,001  ⟵   215,045
      − 375,956     + 375,956
        215,045     − 591,001
```

Multiply the following horizontally: *LU 1-3(1)*

1–35. $19 \times 7 = 133$ **1–36.** $84 \times 8 = 672$ **1–37.** $27 \times 8 = 216$ **1–38.** $19 \times 5 = 95$

Divide the following and check by multiplication: *LU 1-2(2)*

1–39. 45)876 = 19 R21

```
        45
       426
       405
        21
```
Check
$45 \times 19 = 855$
$+ 21$ (R)
876

1–40. 46)1,950 = 42 R18

```
      1 84
       110
        92
        18
```
Check
$46 \times 42 = 1,932$
$+ 18$ (R)
$1,950$

Complete the following: *LU 1-2(2)*

1–41.	9,200	**1–42.**	3,000,000
	− 1,510		− 769,459
	7,690		2,230,541
	− 700		− 68,541
	6,990		2,162,000

1–43. Estimate the following problem by rounding all the way and then do the actual multiplication: *LU 1-1(2), LU 1-3(1)*

Actual	**Estimate**
870	900
× 81	× 80
870	72,000
69 60	
70,470	

Divide the following by the shortcut method: *LU 1-3(2)*

1–44. 1,000)950,000   1)950   = 950
Drop 3 zeros

1–45. 100)70,000   1)700   = 700
Drop 2 zeros.

1–46. Estimate actual problem by rounding all the way and do actual division: *LU 1-1(2), LU 1-3(2)*

Actual	**Estimate**
695)8,950 = 12 R610	700)9,000 = 12 R600
6 95	7 00
2 000	2 000
1 390	1 400
610	600

WORD PROBLEMS

1–47. The *Wall Street Journal* reported that the cost for lightbulbs over a 10-year period at a local Walmart parking lot in Kansas would be $248,134 if standard lightbulbs were used. If LED lightbulbs were used over the same period, the total cost would be $220,396. What would Walmart save by using LED bulbs? *LU 1-2(2)*

$248,134
−220,396
$ 27,738

1–48. An education can be the key to higher earnings. In a U.S. Census Bureau study, high school graduates earned $30,400 per year. Associate's degree graduates averaged $38,200 per year. Bachelor's degree graduates averaged $52,200 per year. Assuming a 50-year work-life, calculate the lifetime earnings for a high school graduate, associate's degree graduate, and bachelor's degree graduate. What's the lifetime income difference between a high school and associate's degree? What about the lifetime difference between a high school and bachelor's degree? *LU 1-3(1), LU 1-2(2)*

High school: $30,400 × 50 = $1,520,000
Associate's degree: $38,200 × 50 = $1,910,000
Bachelor's degree: $52,200 × 50 = $2,610,000

Difference between high school and associate's degree:
$1,910,000 − 1,520,000 = $390,000

Difference between high school and bachelor's degree:
$2,610,000 − 1,520,000 = $1,090,000

1–49. Assume season-ticket prices in the lower bowl for the Buffalo Bills will rise from $480 for a 10-game package to $600. Fans sitting in the best seats in the upper deck will pay an increase from $440 to $540. Don Manning plans to purchase two season tickets for either lower bowl or upper deck. **(a)** How much more will two tickets cost for lower bowl? **(b)** How much more will two tickets cost for upper deck? **(c)** What will be his total cost for a 10-game package for lower bowl? **(d)** What will be his total cost for a 10-game package for upper deck? *LU 1-2(2), LU 1-3(1)*

a. $600
−480
$120 per ticket
× 2
$240 for 2 tickets

b. $540
−440
$100 per ticket
× 2
$200 for 2 tickets

c. $ 600
×   2
$1,200

d. $ 540
×   2
$1,080

1–50. Some ticket prices for *Lion King* on Broadway were $70, $95, $200, and $250. For a family of four, estimate the cost of the $95 tickets by rounding all the way and then do the actual multiplication: *LU 1-1(2), LU 1-3(1)*

Estimate	Actual
$100	$ 95
× 4	× 4
$400	$380

1–51. Walt Disney World Resort and United Vacations got together to create a special deal. The air-inclusive package features accommodations for three nights at Disney's All-Star Resort, hotel taxes, and a four-day unlimited Magic Pass. Prices are $609 per person traveling from Washington, DC, and $764 per person traveling from Los Angeles. **(a)** What would be the cost for a family of four leaving from Washington, DC? **(b)** What would be the cost for a family of four leaving from Los Angeles? **(c)** How much more will it cost the family from Los Angeles? *LU 1-3(1)*

a. $ 609
×   4
$2,436 cost

b. $ 764
×   4
$3,056 cost

c. $3,056
− 2,436
$ 620 more

1–52. NTB Tires bought 910 tires from its manufacturer for $36 per tire. What is the total cost of NTB's purchase? If the store can sell all the tires at $65 each, what will be the store's gross profit, or the difference between its sales and costs (Sales − Costs = Gross profit)? *LU 1-3(1), LU 1-2(2)*

Cost = 910 × $36 = $32,760   Sales = 910 × $65 = $59,150
$59,150 sales
− 32,760 cost
$26,390 gross profit

1–53. What was the total average number of visits for these websites?   *LU 1-2(1), LU 1-3(2)*

Website	Average daily unique visitors
1. Orbitz.com	1,527,000
2. Mypoints.com	1,356,000
3. Americangreetings.com	745,000
4. Bizrate.com	503,000
5. Half.com	397,000

$$\begin{array}{r} 1,527,000 \\ 1,356,000 \\ 745,000 \\ 503,000 \\ +\ 397,000 \\ \hline 4,528,000 \text{ visitors} \end{array}$$

$$\begin{array}{r} 905,600 \text{ average} \\ 5\overline{)4,528,000} \\ \underline{4\ 5} \\ 28 \\ \underline{25} \\ 30 \\ \underline{30} \end{array}$$

1–54. As the Boston MarketWatch for January 2012 states, "The Approved Card" from Suze Orman provides a pretty fair deal. This prepaid debit card costs $3 to purchase and there is a $3 monthly account maintenance fee (the first month's charge is waived). Withdrawals at ATMs cost $2. If Hanna Lind used this card for 8 months and had nine ATM withdrawals, what would her charge be?   *LU 1-3(1)*

Purchase price	$ 3
7 months (first month free) × $3 =	21
$2 ATM charges × 9 =	18
Total:	$42

1–55. A report from the Center for Science in the Public Interest—a consumer group based in Washington, DC—released a study listing calories of various ice cream treats sold by six of the largest ice cream companies. The worst treat tested by the group was 1,270 total calories. People need roughly 2,200 to 2,500 calories per day. Using a daily average, how many additional calories should a person consume after eating ice cream?   *LU 1-2(1), LU 1-3(2)*

$$\begin{array}{r} 2,200 \\ +2,500 \\ \hline 4,700 \end{array}$$

$$\begin{array}{r} 2,350 \text{ average} \\ 2\overline{)4,700} \\ \underline{4} \\ 7 \\ \underline{6} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

$$\begin{array}{r} {}^{2\ 15} \\ 2,\cancel{3}\cancel{5}0 \\ -\ 1,270 \\ \hline 1,080 \end{array}$$

1–56. At Rose State College, Alison Wells received the following grades in her online accounting class: 90, 65, 85, 80, 75, and 90. Alison's instructor, Professor Clark, said he would drop the lowest grade. What is Alison's average?   *LU 1-2(1)*

90 + 85 + 80 + 75 + 90 = 420 ÷ 5 = 84 average

1–57. The Bureau of Transportation's list of the 10 most expensive U.S. airports and their average fares is given below. Please use this list to answer the questions that follow.   *LU 1-2(1, 2)*

1. Houston, TX	$477
2. Huntsville, AL	473
3. Newark, NJ	470
4. Cincinnati, OH	466
5. Washington, DC	465
6. Charleston, SC	460
7. Memphis, TN	449
8. Knoxville, TN	449
9. Dallas–Fort Worth, TX	431
10. Madison, WI	429

  a. What is the total of all the fares?
  b. What would the total be if all the fares were rounded all the way?
  c. How much does the actual number differ from the rounded estimate?
  a. Total: $4,569
  b. Round all the way
     $500 + 500 + 500 + 500 + 500 + 500 + 400 + 400 + 400 = $4,200
  c. $ 4,569
     − 4,200
     $ 369 Difference

1–58. Ron Alf, owner of Alf's Moving Company, bought a new truck. On Ron's first trip, he drove 1,200 miles and used 80 gallons of gas. How many miles per gallon did Ron get from his new truck? On Ron's second trip, he drove 840 miles and used 60 gallons. What is the difference in miles per gallon between Ron's first trip and his second trip?   *LU 1-3(2)*

1,200 ÷ 80 = 15 miles per gallon
840 ÷ 60 = 14 miles per gallon   Difference = 1 mile per gallon

1–59. In Bankrate.com's Smart Spending column for early 2012, Jan Fandrich of Billings, Montana, explains how she saves money, stays healthy, and helps the environment by using baking soda and vinegar instead of toxic commercial cleaners. She puts a little bit of vinegar in the rinse cycle instead of fabric softener, and mops the floors and cleans the showers with a mix of baking soda and vinegar in water. If a box of baking soda costs $1 and a bottle of vinegar is $2, how much will her cleaning supplies cost if she uses five boxes of baking soda and 10 bottles of vinegar in 1 year?   *LU 1-3(1)*

5 boxes of baking soda × $1 = $ 5
10 bottles of vinegar × $2 = $20
Total: $25

1–60. Assume BarnesandNoble.com has 289 business math texts in inventory. During one month, the online bookstore ordered and received 1,855 texts; it also sold 1,222 on the web. What is the bookstore's inventory at the end of the month? If each text costs $59, what is the end-of-month inventory cost?   *LU 1-2(1), LU 1-2(2)*

289 + 1,855 = 2,144   2,144
                             −1,222
922 × $59 = $54,398   922 end-of-month inventory

1–61. Assume Cabot Company produced 2,115,000 cans of paint in August. Cabot sold 2,011,000 of these cans. If each can cost $18, what were Cabot's ending inventory of paint cans and its total ending inventory cost?   *LU 1-2(2), LU 1-3(1)*

   2,115,000
 −2,011,000
     104,000 paint cans × $18 = $1,872,000

1–62. A local community college has 20 faculty members in the business department, 40 in psychology, 26 in English, and 140 in all other departments. What is the total number of faculty at this college? If each faculty member advises 25 students, how many students attend the local college?   *LU 1-2(1), LU 1-3(1)*

20 + 40 + 26 + 140 = 226 faculty
226 × 25 = 5,650 students

1–63. Hometown Buffet had 90 customers on Sunday, 70 on Monday, 65 on Tuesday, and a total of 310 on Wednesday to Saturday. How many customers did Hometown Buffet serve during the week? If each customer spends $9, what were the total sales for the week?   *LU 1-2(1), LU 1-3(1)*

90 + 70 + 65 + 310 =   535 customers
                       × $9
                       $4,815

If Hometown Buffet had the same sales each week, what were the sales for the year?
$4,815 × 52 = $250,380

1–64. A local travel agency projected its year 2013 sales at $880,000. During 2013, the agency earned $482,900 sales from its major clients and $116,500 sales from the remainder of its clients. How much did the agency overestimate its sales?   *LU 1-2(2)*

   $880,000
 − 599,400 ($482,900 + $116,500)
   $280,600

1–65. Ryan Seary works at US Airways and earned $71,000 last year before tax deductions. From Ryan's total earnings, his company subtracted $1,388 for federal income taxes, $4,402 for Social Security, and $1,030 for Medicare taxes. What was Ryan's actual, or net, pay for the year?   *LU 1-2(1, 2)*

   $71,000
 −   6,820 ($1,388 + $4,402 + $1,030)
   $64,180

1–66. An article in *The New York Times* on January 5, 2012, discussed how individuals with little or no prior credit sources may benefit from a new tracking procedure. Experian, one of the three leading credit reporting companies, is now tracking on-time rent payments, thereby raising the credit scores of many people. Experian uses FICO scores, a three-digit rating system ranging generally from 300–850, to rate how risky a borrower is. If you currently have a FICO score of 550 and on-time rent payments increase your FICO score by 80, what is your new FICO score?   *LU 1-2(1)*

550 + 80 = 630

1–67. Roger Company produces beach balls and operates three shifts. Roger produces 5,000 balls per shift on shifts 1 and 2. On shift 3, the company can produce 6 times as many balls as on shift 1. Assume a 5-day workweek. How many beach balls does Roger produce per week and per year? *LU 1-2(1), LU 1-3(1)*

    10,000 balls (shifts 1 and 2)   200,000
+ 30,000 balls (shift 3)   ×   52
  40,000 balls per day   10,400,000 balls per year
×   5
 200,000 balls per week

1–68. Assume 6,000 children go to Disneyland today. How much additional revenue will Disneyland receive if it raises the cost of admission from $31 to $41 and lowers the age limit for adults from 12 years old to 10 years old? *LU 1-2(1), LU 1-3(1)*

 $41   6,000 children
− 31   × $10
 $10 more per child $60,000 additional revenue per day

1–69. Moe Brink has a $900 balance in his checkbook. During the week, Moe wrote the following checks: rent, $350; telephone, $44; food, $160; and entertaining, $60. Moe also made a $1,200 deposit. What is Moe's new checkbook balance? *LU 1-2(1, 2)*

 $ 900
+ 1,200
 $2,100
−   614 ($350 + $44 + $160 + $60)
  $1,486

1–70. A local Sports Authority store, an athletic sports shop, bought and sold the following merchandise: *LU 1-2(1, 2)*

	Cost	Selling price
Tennis rackets	$ 2,900	$ 3,999
Tennis balls	70	210
Bowling balls	1,050	2,950
Sneakers	+ 8,105	+ 14,888
	$12,125	$22,047

What was the total cost of the merchandise bought by Sports Authority? If the shop sold all its merchandise, what were the sales and the resulting gross profit (Sales − Costs = Gross profit)?

Sales $22,047
− Costs   − 12,125
= Gross profit $ 9,922

1–71. Rich Engel, the bookkeeper for Engel's Real Estate, and his manager are concerned about the company's telephone bills. *eXcel* Last year the company's average monthly phone bill was $32. Rich's manager asked him for an average of this year's phone bills. Rich's records show the following: *LU 1-2(1), LU 1-3(2)*

January	$ 34	July	$ 28
February	60	August	23
March	20	September	29
April	25	October	25
May	30	November	22
June	59	December	41
	$228		$168

What is the average of this year's phone bills? Did Rich and his manager have a justifiable concern?
$228 + $168 = $396 ÷ 12 = $33
No justifiable concern.

1–72. On Monday, a local True Value Hardware sold 15 paint brushes at $3 each, six wrenches at $5 each, seven bags of grass
eXcel seed at $3 each, four lawn mowers at $119 each, and 28 cans of paint at $8 each. What were True Value's total dollar sales
on Monday? *LU 1-2(1), LU 1-3(1)*

$$\underbrace{\$45}_{(15 \times \$3)} + \underbrace{\$30}_{(6 \times \$5)} + \underbrace{\$21}_{(7 \times \$3)} + \underbrace{\$476}_{(4 \times \$119)} + \underbrace{\$224}_{(28 \times \$8)} = \$796$$

1–73. While redecorating, Lee Owens went to Carpet World and bought 150 square yards of commercial carpet. The total cost of
the carpet was $6,000. How much did Lee pay per square yard? *LU 1-3(2)*
$6,000 ÷ 150 = $40 per square yard

1–74. Washington Construction built 12 ranch houses for $115,000 each. From the sale of these houses, Washington received
eXcel $1,980,000. How much gross profit (Sales − Costs = Gross profit) did Washington make on the houses? *LU 1-2(2),*
LU 1-3(1, 2)

$$\begin{array}{r} \$1,980,000 \\ -\ \underline{1,380,000}\ (\$115,000 \times 12) \\ \$\ \ \ 600,000 \end{array}$$

The four partners of Washington Construction split all profits equally. How much will each partner receive?
$600,000 ÷ 4 = $150,000

CHALLENGE PROBLEMS

1–75. A mall in Lexington has 18 stores. The following is a breakdown of what each store pays for rent per month. The rent is
based on square footage.

5 department/computer stores	$1,250	2 bakeries	$ 500
5 restaurants	860	2 drugstores	820
3 bookstores	750	1 supermarket	1,450

Calculate the total rent that these stores pay annually. What would the answer be if it were rounded all the way? How much
more each year do the drugstores pay in rent compared to the bakeries? *LU 1-2(2), LU 1-3(1)*

$$\begin{array}{ll}
5 \times \$1,250 = \$\ \ 6,250 & \text{Drugstores: } \$1,640 \times 12 = \ \ \$19,680 \\
5 \times \ \ \ \ 860 = \ \ \ \ 4,300 & \text{Bakeries: } \ \ \ 1,000 \times 12 = \underline{-12,000} \\
3 \times \ \ \ \ 750 = \ \ \ \ 2,250 & \$\ \ 7,680 \\
2 \times \ \ \ \ 500 = \ \ \ \ 1,000 & \\
2 \times \ \ \ \ 820 = \ \ \ \ 1,640 & \\
1 \times \ \ 1,450 = \underline{\ \ \ \ 1,450} & \\
\ \ \ \ \ \ \ \ \ \ \ \$16,890 \times 12 = \$202,680 & \ \ \ \ \ \$200,000
\end{array}$$

1–76. Paula Sanchez is trying to determine her 2014 finances. Paula's actual 2013 finances were as follows: *LU 1-1, LU 1-2, LU 1-3*

Income:		Assets:	
Gross income	$69,000	Checking account	$ 1,950
Interest income	450	Savings account	8,950
Total	$69,450	Automobile	1,800
Expenses:		Personal property	14,000
Living	$24,500	Total	$26,700
Insurance premium	350	Liabilities:	
Taxes	14,800	Note to bank	4,500
Medical	585	Net worth	$22,200 ($26,700 − $4,500)
Investment	4,000		
Total	$44,235		

Net worth = Assets − Liabilities
(own)   (owe)

Paula believes her gross income will double in 2014 but her interest income will decrease $150. She plans to reduce her 2014 living expenses by one-half. Paula's insurance company wrote a letter announcing that her insurance premiums would triple in 2014. Her accountant estimates her taxes will decrease $250 and her medical costs will increase $410. Paula also hopes to cut her investments expenses by one-fourth. Paula's accountant projects that her savings and checking accounts will each double in value. On January 2, 2014, Paula sold her automobile and began to use public transportation. Paula forecasts that her personal property will decrease by one-seventh. She has sent her bank a $375 check to reduce her bank note. Could you give Paula an updated list of her 2014 finances? If you round all the way each 2013 and 2014 asset and liability, what will be the difference in Paula's net worth?

Income:

Gross income	$138,000	($69,000 × 2)
Interest income	300	($450 − $150)
Total	$138,300	

Expenses:

Living	$ 12,250	($24,500 ÷ 2)
Insurance premium	1,050	($350 × 3)
Taxes	14,550	($14,800 − $250)
Medical	995	($585 + $410)
Investment	3,000	($4,000 − $\frac{1}{4}$ of $4,000)
Total	$ 31,845	

Assets:

Checking account	$ 3,900	($1,950 × 2)
Savings account	17,900	($8,950 × 2)
Personal property	12,000	($14,000 − $\frac{1}{7}$ of $14,000)
Total	$33,800	

Liabilities:

Note to bank	4,125	($4,500 − $375)
Net worth	$29,675	

	2013	2014	
Checking account	$ 2,000	$ 4,000	
Savings account	9,000	20,000	
Automobile	2,000	0	
Personal property	10,000	10,000	
Total	$ 23,000	$34,000	$30,000 = 2014
Liabilities	5,000	4,000	− 18,000 = 2013
Net worth	$ 18,000	$30,000	$12,000

Total estimated difference is $12,000 in favor of 2014.

SUMMARY PRACTICE TEST   You Tube™

Do you need help? The DVD has step-by-step worked-out solutions.

1. Translate the following verbal forms to numbers and add. *(p. 4)   LU 1-1(1), LU 1-2(1)*

   a. Four thousand, eight hundred thirty-nine
   b. Seven million, twelve
   c. Twelve thousand, three hundred ninety-two

   $$\begin{array}{r} 4,839 \\ 7,000,012 \\ \underline{12,392} \\ 7,017,243 \end{array}$$

2. Express the following number in verbal form. *(p. 4)   LU 1-1(1)*

   9,622,364 Nine million, six hundred twenty-two thousand, three hundred sixty-four

3. Round the following numbers. *(p. 6)   LU 1-1(2)*

Nearest ten	Nearest hundred	Nearest thousand	Round all the way
a. 68 70	b. 888 900	c. 8,325 8,000	d. 14,821 10,000

4. Estimate the following actual problem by rounding all the way, work the actual problem, and check by adding each column of digits separately. *(pp. 6, 10) LU 1-1(2), LU 1-2(1)*

Actual	Estimate	Check
1,886	2,000	12
9,411	9,000	18
+ 6,395	+6,000	15
17,692	17,000	16
		17,692

5. Estimate the following actual problem by rounding all the way and then do the actual multiplication. *(pp. 6, 14) LU 1-1(2), LU 1-3(1)*

Actual	Estimate
8,843	9,000
✕ 906	✕ 900
53 058	8,100,000
79 58 70	
8,011,758	

6. Multiply the following by the shortcut method. *(p. 14) LU 1-3(1)*

$829,412 \times 1,000 = 829,412,000$

7. Divide the following and check the answer by multiplication. *(pp. 14, 16) LU 1-3(1, 2)*

	Check
379 R19	379
39)14,800	✕ 39
11 7	3411
3 10	1137
2 73	14,781
370	19
351	14,800
19	

8. Divide the following by the shortcut method. *(p. 16) LU 1-3(2)*

$6,000 \div 60 = 600 \div 6 = 100$

9. Ling Wong bought a $299 iPod that was reduced to $205. Ling gave the clerk three $100 bills. What change will Ling receive? *(p. 11) LU 1-2(2)*
$300 − $205 = $95

10. Sam Song plans to buy a $16,000 Ford Focus with an interest charge of $4,000. Sam figures he can afford a monthly payment of $400. If Sam must pay 40 equal monthly payments, can he afford the Ford Focus? *(pp. 10, 16) LU 1-2(1), LU 1-3(2)*
$16,000 + $4,000 = $20,000 ÷ 40 = $500   No.

11. Lester Hal has the oil tank at his business filled 20 times per year. The tank has a capacity of 200 gallons. Assume **(a)** the price of oil fuel is $3 per gallon and **(b)** the tank is completely empty each time Lester has it filled. What is Lester's average monthly oil bill? Complete the following blueprint aid for dissecting and solving the word problem. *(pp. 14, 16) LU 1-3(1, 2)*

	The facts	Solving for?	Steps to take	Key points
BLUEPRINT	Tank filled 20 times per year. Tank holds 200 gallons. Cost is $3 per gallon.	Average monthly oil bill.	Total gallons used ✕ Price per gallon = Total cost of oil.	Average cost is total cost divided by 12 months in a year.

Steps to solving problem

1. Calculate the total number of gallons.   200 gallons ✕ 20 = 4,000 gallons

2. Calculate total cost of oil.   4,000 gallons ✕ $3 = $12,000

3. Calculate the average monthly bill. $12,000 ÷ 12 = $1,000

PROBLEM 1
Budget your laptop purchase

Imagine you have a budget of $2,500 to purchase 5 identical laptops for your family. Go to http://www.officemax.com, select a laptop to meet your needs, and then calculate how much 5 of those laptops would cost. Round prices to the nearest dollar and ignore sales tax and delivery charges. Is $2,500 enough? If so, how much money do you have left? If not, how much more money do you need?

Discussion Questions

1. What is the importance of having a budget?
2. Should college students, who are traditionally low wage earners, still utilize a budget? Why?

PROBLEM 2
Budget expenses for a trip

Imagine you are planning a 4-night stay, Monday through Thursday, in New York City. Go to http://www.hertz.com to find the daily rate for the car you'd like. Then, go to http://www2.choicehotels.com to choose a hotel and determine the nightly room rate. Calculate your total cost for the car and lodging, ignoring taxes and rounding rates to the nearest dollar.

Discussion Questions

1. Using your existing salary, how would you budget for this trip to insure you have the appropriate funds? Be specific.
2. What types of expenses might you incur once you are on this trip?

PROBLEM 3
Determine wage breakdowns

Go to http://www.nascar.com. Choose the Standings, Spring Cup Series link. Look at the Top 5 money earners for any 3-year period. Based on total winnings, how much money did each earn per month, per week, per day, and per hour, assuming a 40-hour workweek? What is the difference in each of these earning amounts across the 3 years you selected?

Discussion Questions

1. How much do you expect to earn after graduating from college?
2. What is your expected salary breakdown by month, week, day, and hour?

PROBLEM 4
How much reading can you afford?

Go to http://www.amazon.com. Search for the list of "Top 100 books." If you have $100 to spend, how many of the Top 100 books could you buy if you started with the number one book and worked your way down the list? Ignore shipping and handling and taxes.

Discussion Questions

1. If you owned an e-reader, how many more e-books could you purchase with the same $100?
2. Based on your current salary, how many hours must you work to afford spending this $100 on books?

Answers can be found in Appendix C.

MOBILE APPS ✕

MathPad 4 (Clay Cat Designs) Focuses on solving word problems through addition, subtraction, division, and multiplication.

Basic Math (Explorer Technologies) Uses repetition of problems to build up basic math skills.

INTERNET PROJECTS ✕

See text website
www.mhhe.com/slater11e_sse_ch01

PAID FOR
COLLEGE
ON HIS OWN

David Leestma, 21, is a junior at Ferris State University, in Big Rapids, Mich. He will graduate in 2012 with a bachelor's degree in heating, ventilating and air conditioning, and with zero debt.

YOU TOOK A YEAR OFF BETWEEN HIGH SCHOOL AND COLLEGE. HOW COME? I wasn't sure what I wanted to do for a career, and I didn't want to go to school unless I knew. So I got a job at Sam's Club working at the café for $9 an hour. Over the year, it became clear what I *didn't* want to do— I didn't want to work in retail the rest of my life. I went on a couple of job shadows with friends of my family. On one, I spent time with a mechanical engineer. He designed HVAC systems and got me interested in that.

WHY DID YOU START AT A COMMUNITY COLLEGE RATHER THAN A FOUR-YEAR COLLEGE? Grand Rapids Community College was cheaper, and it gave me the option to live at home. The plan when I started was to transfer to Ferris. As far as I know, it is one of only a few colleges in the country

that offer a bachelor's degree in HVAC. The community college had a program with Ferris, so I had a guarantee that I wouldn't have a problem transferring my credits.

YOU HAVE FOUR YOUNGER SIBLINGS. WERE YOUR PARENTS ABLE TO HELP WITH THE COLLEGE COSTS? They said that I could live at home free and eat all I wanted. But I haven't gotten any money from them for college.

WHAT WERE SOME OF THE WAYS IN WHICH YOU PAID FOR COLLEGE? I had a paper route from ages 12 to 18, and I saved all my money from that—about $6,000. I saved most of my money while I worked at Sam's Club. At the community college, I had a Pell grant [a need-based federal grant, up to $5,550 this year] that covered most of my college costs. I still get a Pell grant, and I also have a scholarship—$4,000 a year, which covers over half of my tuition. I pay a couple of thousand dollars a year more for tuition and fees, plus $3,000 a year for room and board. I have enough money to cover this year's costs, and I should have enough to cover my last year.

WHAT HAS BEEN YOUR BIGGEST CHALLENGE SO FAR? At Grand Rapids, I did two summer, two fall and two winter semesters in one year, and I worked part-time at Sam's Club. I went to school and worked pretty much round the clock, except for Sundays. I did homework on lunch breaks. It was crazy.

DO YOU HAVE ADVICE FOR OTHER STUDENTS? From the start, I've always looked at what job I'm going to get when I finish. That's the whole goal of going to college for me. So take your time to choose what you want to do. You can change your mind after you start college, but taking more classes costs money and extra time.

ANY REGRETS ABOUT THE WAY YOU'VE DONE IT? No. A lot of the other students I talk to are $10,000 or more in debt. I like where I'm sitting financially right now. It's a blessing. ◾

Interview by
JANE
BENNETT
CLARK

BUSINESS MATH ISSUE

Going into debt in order to attend college will always pay off.

1. List the key points of the article and information to support your position.
2. Write a group defense of your position using math calculations to support your view.