

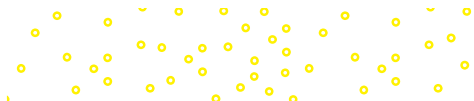
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Jeffrey Slater | Sharon M. Wittry

# PRACTICAL BUSINESS MATH PROCEDURES

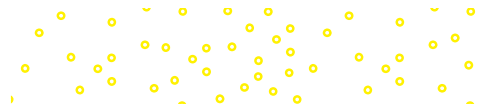


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# Practical Business Math Procedures





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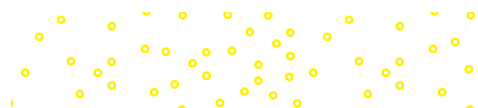
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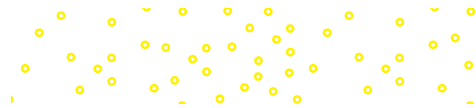
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## PRACTICAL BUSINESS MATH PROCEDURES

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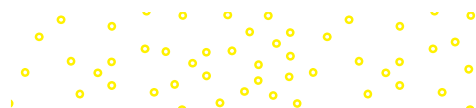
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### **Dedication**

To Shelley . . . My best pal.  
Love, Jeff

To my mom, who did everything for me as a  
child.

To my dad, who paved the way.

Love, Sharon



## ROADMAP TO SUCCESS

How to use this book and the Total Slater/Wittry Learning System.

**Step 1:** Read “Your Guide to Successfully Completing This Chapter” at the beginning of each chapter. Each chapter is broken down into Learning Units. Read and master one Learning Unit at a time.

How do I know whether I understand it?

- Try the Practice Quiz. All the worked-out solutions are provided. If you still have questions, watch the author videos in Connect, or get the information from your instructor and work each problem out.
- Repeat the above until you understand.

Once you feel confident with the subject matter, go on to the next Learning Unit in the chapter.

**Step 2:** Review the Interactive Chapter Organizer at the end of the chapter.

How do I know if I understand it?

- The third column, “You try it,” gives you the chance to do additional practice.

**Step 3:** Do assigned problems at the end of the chapter (or Appendix A). These may include discussion questions, drill, word problems, challenge problems, as well as projects from My Money and Kiplinger’s magazine.

Can I check my homework?

- Appendix B has check figures for all the odd-numbered problems.

**Step 4:** Complete the “Interactive Video Worksheet” near the end of the chapter while completing the Summary Practice Test.

Can I check my progress?

- Complete the Summary Practice Test. Check solutions from videos in Connect.

What do I do if I do not match check figures?

- Review the video tutorial in Connect, or through information from your instructor—the authors work out each problem.

To aid you in studying the book, we have developed the following color code:



**Blue:** Movement, cancellations, steps to solve, arrows, blueprints



**Purple and yellow:** Formulas and steps



**Green:** Tables and forms



**Red:** Key items we are solving for

If you have difficulty with any text examples, pay special attention to the red and the blue. These will help remind you of what you are looking for as well as what the procedures are.

## FEATURES

### Blueprint Aid Boxes

The following are the features students have told us have helped them the most.

For the first eight chapters (not in Chapter 4), blueprint aid boxes are available to help you map out a plan to solve a word problem. We know the hardest part of solving word problems is often figuring out where to start. Use the blueprint as a model to get started.

### Business Math Handbook

This reference guide contains all the tables found in the text. It makes homework, exams, etc., easier to deal with than flipping back and forth through the text.

### Interactive Chapter Organizer

At the end of each chapter is a quick reference guide called the Interactive Chapter Organizer, in which key points, formulas, and examples are provided. A list of vocabulary terms is also included. A column called “You try it” gives you a chance to do additional practice. And solutions are provided in Appendix B. (A complete glossary is found at the end of the text.) Think of the Interactive Chapter Organizer as your set of notes and use it as a reference when doing homework problems and reviewing before exams.



For **extra help** from your authors—Sharon and Jeff—see the videos in Connect.

Additionally, a series of author-created tutorial videos are available in Connect, or you can check with your instructor for more information. The videos cover all of the Learning Unit Practice Quizzes and Summary Practice Tests.

### Your Guide to Successfully Completing This Chapter

Each chapter begins with a plan for you to follow to help you master the content.

### Group Activity: Personal Finance, a Kiplinger Approach

In each chapter you can debate a business math issue based on a *Kiplinger's Personal Finance* magazine article. This is great for critical thinking, as well as improving your writing skills.

### Spreadsheet Templates

Excel® templates are available for selected end-of-chapter problems. You can run these templates as-is or enter your own data. The templates also include an interest table feature that enables you to input any percentage rate and any terms. The program then generates table values for you.

### Cumulative Reviews

At the end of Chapters 3, 8, and 13 are word problems that test your retention of business math concepts and procedures. Check figures for *all* cumulative review problems are in Appendix B.

### Vocabulary

Each chapter includes highlighted words covering the key terms in the chapter. The Interactive Chapter Organizer includes a list of the terms. There's also a glossary at the end of the text.

### Interactive Video Worksheet

At the end of each chapter is an interactive worksheet allowing you to work through the Summary Practice Test to success.

### My Money

Each chapter has a personal finance page applying the concepts from the chapter toward personal finance success.



# Acknowledgments

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## Company/Applications

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Google—*Reading and writing numbers*  
Volkswagen—*Rounding numbers and Adding and subtracting numbers*  
Star Wars—*Multiplying and dividing numbers*

### Chapter 2

Health industry—*Introduction*  
M&M'S/Mars—*Fractions and multiplication*

### Chapter 3

McDonald's; Brexit—*Introduction*  
Apple—*Decimal applications*  
Toyota—*Multiplication and division shortcuts for decimals*

### Chapter 4

ATMs—*Introduction*  
Smartphones—*Checking account*  
Apps—*Bank reconciliation*

### Chapter 5

Big Food—*Unknowns*  
Dunkin' Donuts—*Equations*

### Chapter 6

Tesla, Hershey—*Introduction*  
Procter & Gamble; M&M'S/Mars—*Percent increase and decrease*

### Chapter 7

FedEx; Walmart, Amazon—*Introduction*  
Michael's—*Discounts*  
FedEx United Parcel Service—*Shipping*  
New Hampshire Propane Co.—*Cash discounts*

### Chapter 8

Gap; Amazon; Walmart—*Introduction*  
Gap—*Markup on cost and selling price*

### Chapter 9

Walmart—*Introduction*  
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### Chapter 10

Auto Lenders—*Introduction*  
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### Chapter 11

Treasury Department—*Treasury bills*

### Chapter 12

Investing—*Introduction*

### Chapter 13

Dunkin' Donuts—*Introduction; Compounding*

### Chapter 14

Federal Reserve; Wells Fargo—*Introduction*  
Federal Trade Commission—*Installments*  
Citibank; MasterCard—*Finance charge*

### Chapter 15

Bank of America—*Mortgages*

### Chapter 16

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Apple—*Financial statements*  
Toys "R" Us; McDonald's—*Ratio analysis*

### Chapter 17

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Big Lots—*Depreciation*

### Chapter 18

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Amazon—*Money tip*

### Chapter 20

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### Chapter 21

Disney—*Introduction*  
Amazon, Texaco, GM—*Stocks*  
J. Crew—*Bonds*  
American Funds—*Mutual funds*

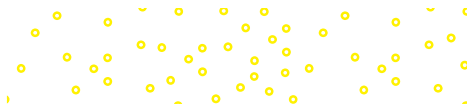
### Chapter 22

Apple—*Introduction*  
U.S. Census Bureau—*Median*

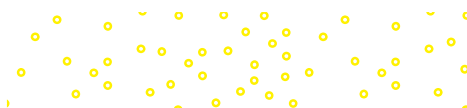
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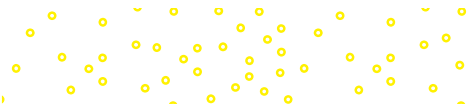
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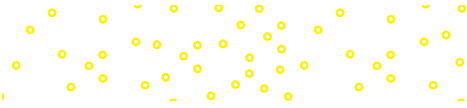


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# Practical Business Math Procedures

# Whole Numbers: How to Dissect and Solve Word Problems

## Visa Offers Merchants Cash to Go Cashless

By ANNAMARIA ANDRIOTIS

**Visa Inc.** has a new offer for small merchants: Take thousands of dollars from the card giant to upgrade your payment technology and in return stop accepting cash from customers.

The company unveiled the initiative on Wednesday as part of a broader effort to steer Americans away from using old-fashioned money. Visa says it plans to give \$10,000 apiece to as many as 50 restaurants and food vendors to cover technology and marketing costs, as long as the businesses pledge to start what Visa executive Jack Forestell calls a “journey to cashless.”

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## LEARNING UNIT OBJECTIVES

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

1. Use place values to read and write numeric and verbal whole numbers.
2. Round whole numbers to the indicated position.
3. Use blueprint aid for dissecting and solving a word problem.

### LU 1–2: Adding and Subtracting Whole Numbers

1. Add whole numbers; check and estimate addition computations.
2. Subtract whole numbers; check and estimate subtraction computations.

### LU 1–3: Multiplying and Dividing Whole Numbers

1. Multiply whole numbers; check and estimate multiplication computations.
2. Divide whole numbers; check and estimate division computations.

## Your Guide to Successfully Completing This Chapter

*Traditional book or ebook*

Check box as you complete each step.

### Steps

- Read learning unit.
  - Complete practice quiz at the end of the learning unit.
- Grade practice quiz using provided solutions. (For more help, watch the learning unit video in Connect and have a Study Session with the authors. Then complete the additional practice quiz in Connect.)
- Repeat above for each of the three learning units in Chapter 1.
  - Review chapter organizer.
  - Complete assigned homework.
    - Finish summary practice test. (Go to Connect via the ebook link and do the interactive video worksheet to grade.)
- Complete instructor's exam.



### GLOBAL



The *Wall Street Journal* clip “McDonald’s Goes Digital” shows how important Tweets can be.

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 McDonald’s and note the importance of numbers in the company’s business decision-making process.

McDonald’s has to use numbers to see

1. The effect of introducing healthy food choices.
2. The promptness of service orders.
3. The expenditures necessary for new-product development.
4. Ways to improve store layouts to achieve lower unit costs and better quality control.

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

Wow! Did you know that back in 2017, \$80 billion in sales resulted from click-on ads on Google? We will see how to read, write, and round whole numbers.

Now let's begin our study of whole numbers.

### Reading and Writing Numeric and Verbal Whole Numbers

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.

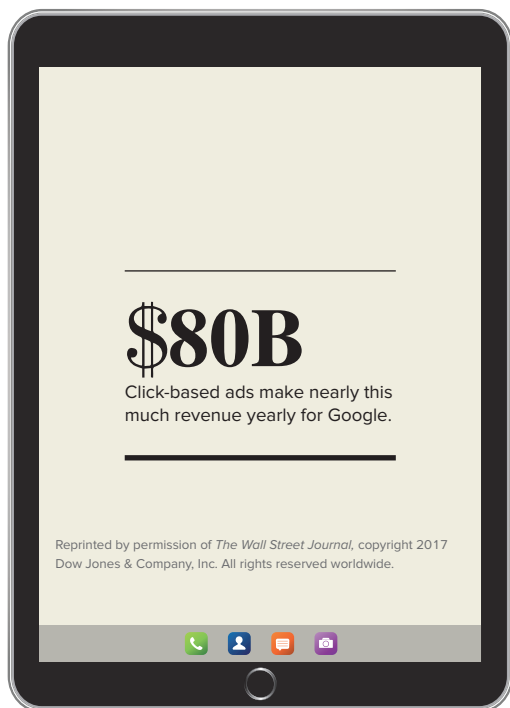
In Figure 1.1, the numeric number 1,605,743,891,412 illustrates place values. When you study the place-value chart, you can see that the value of each place in the chart is 10 times the value of the place to the right. We can illustrate this by analyzing the last four digits in the number **1,605,743,891,412**:

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

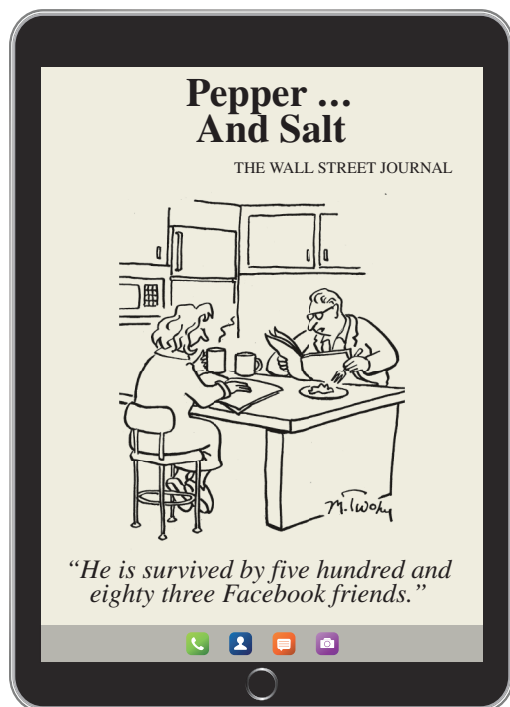
So we can also say, for example, that in the number 745, the “7” means seven hundred (700); in the number 75, the “7” means 7 tens (70).

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 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.



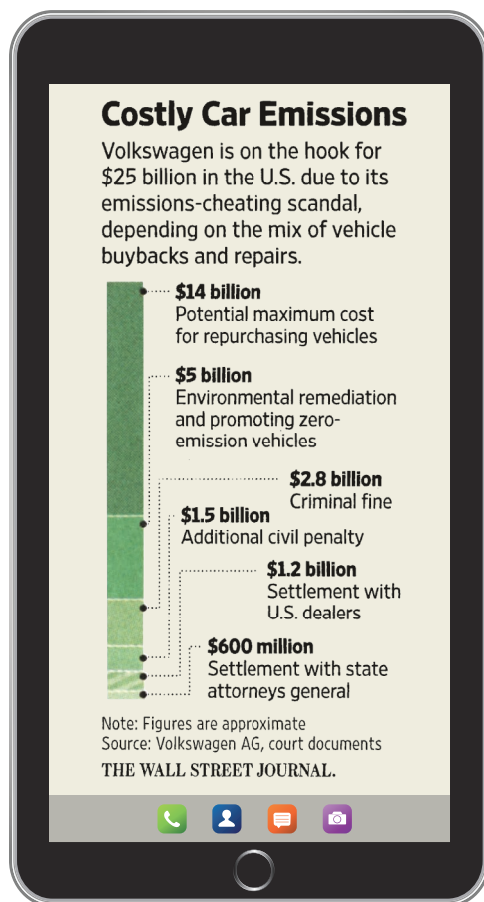
LO 1



**FIGURE 1.1**

Whole number place-value chart

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	.				



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**LO 2**

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 *Wall Street Journal* clip “Costly Car Emissions” as an example. Volkswagen paid a \$1.2 billion settlement with U.S. dealers. This amount is 1 billion plus 200 million of an additional billion. The following steps explain how to convert decimal numbers into whole numbers.

#### 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.

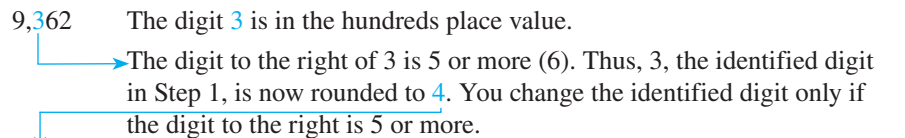
Numbers can be rounded to any identified digit place value, including the first digit of a number (rounding all the way). To round whole numbers, use the following three steps:

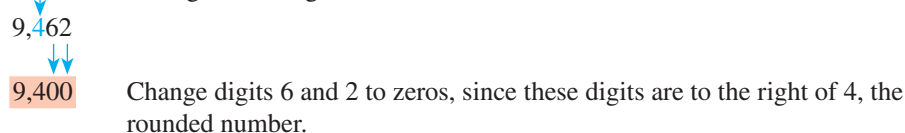
#### ROUNDING WHOLE NUMBERS

- 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.

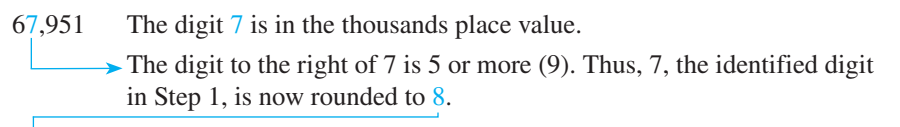
**Step 3.**  9,400 Change digits 6 and 2 to zeros, since these digits are to the right of 4, the rounded number.

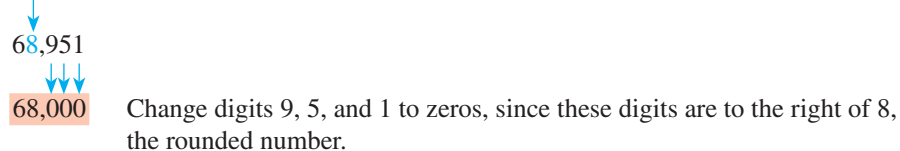
By rounding 9,362 to the nearest hundred, you can see that 9,362 is closer to 9,400 than to 9,300.

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.

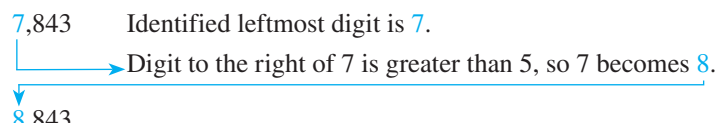
**Step 3.**  68,000 Change digits 9, 5, and 1 to zeros, since these digits are to the right of 8, the rounded number.


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.

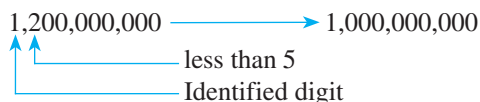
**Step 1.** 7,843 Identified leftmost digit is 7.

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

**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* article “Costly Car Emissions,” 1.2 billion rounded all the way would be 1 billion. Note the digit to the right of the identified digit is less than 5 so the identified digit (1) is kept at 1.



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

### 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**.



Remember to **RTDQ2**: Read the darn question and then read it again before trying to solve it.

**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	<p><i>Sales</i>: One hundred ninety-four million dollars.</p> <p><i>Profit</i>: Twenty-two million, five hundred fifty-six thousand dollars.</p>	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.

**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.

**Steps to solving problem**

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

**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 in Connect 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:
 

<b>Nearest ten</b>	<b>Nearest hundred</b>	<b>Nearest thousand</b>	<b>Rounded all the way</b>
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.*)

**✓ 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:



For *extra help* from your authors—Sharon and Jeff—see the videos in Connect.

Blueprint	The facts	Solving for?	Steps to take	Key points
<b>BLUEPRINT</b>	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 leftmost digit will remain. All other digits become zeros.

**Steps to solving problem**

1. Convert verbal to numeric.
 

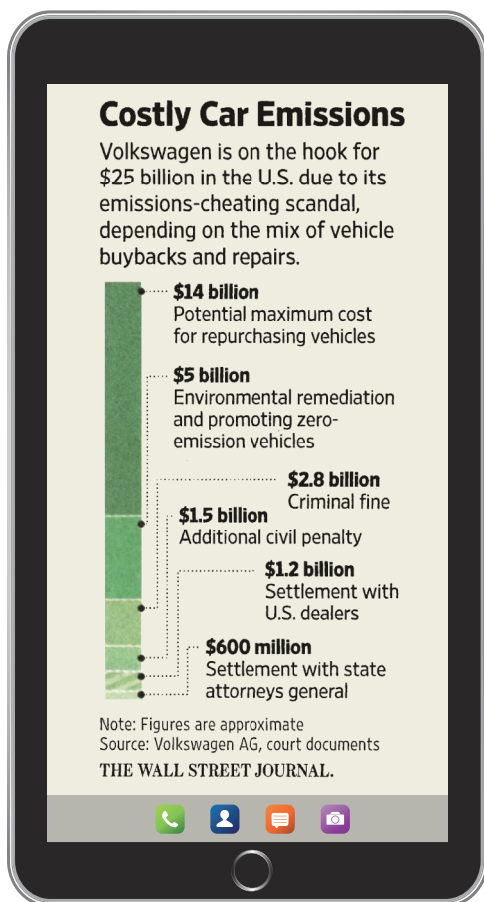
Five million, one hundred eighty-one thousand	→ \$5,181,000
Five hundred two thousand	→ \$ 502,000
2. Identify leftmost digit of each number.
 

\$5,181,000	\$502,000
↓	↓
3. Round.
 

\$5,000,000	\$500,000
-------------	-----------

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

LO 1



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In the *Wall Street Journal* clip “Costly Car Emissions” reprinted from Learning Unit 1–1, note the difference between criminal fine and settlement with U.S. dealers.

Criminal fine	\$2,800,000,000
U.S. dealer settlement	<u>–1,200,000,000</u>
	\$1,600,000,000

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	
Adding	1,362	↑
top to	5,913	
bottom	8,924	
	+ 6,594	
	<u>22,793</u>	

Checking  
bottom  
to top

**Alternate check**  
Add each column as a separate total and then combine. The end result is the same.

1,362
5,913
8,924
+ 6,594
<u>13</u>
18
26
20
<u>22,793</u>

**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 *Wall Street Journal* clip “Major Money” on page 10, 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.