ELEVENTH EDITION

BUSINESS MATH

Cheryl Cleaves • Margie Hobbs • Jeffrey Noble

Pearson

BUSINESS MATH

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BUSINESS MATH

Eleventh Edition

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To Margie

Dr. Margie Johnson Hobbs
June 13, 1943–March 16, 2016

When you work together with a group of people long enough, you become like family. You certainly have your ups and downs and challenges along the way, but eventually you develop a much deeper appreciation for each other and the contributions that each one brings to the whole. For us, Margie Hobbs was family. She had a unique set of qualities that truly set her apart: her attention to detail, her passion and persistence and willingness to see the job through made the people around her better – made us better. Her commitment to her husband and daughter, to the profession of teaching, to her students, to us as her colleagues, and to this project were unquestioned. She was a dedicated professional to the end, but somehow she managed to always put the needs of others first – which is a truly remarkable thing. Her legacy will live on not only in this textbook, but in our hearts. Thank you for everything you did for us, Margie, and for making us part of your family.

Cheryl Cleaves

Jeffrey Noble

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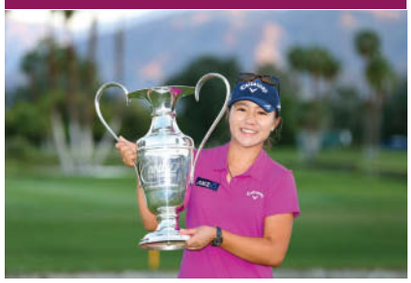

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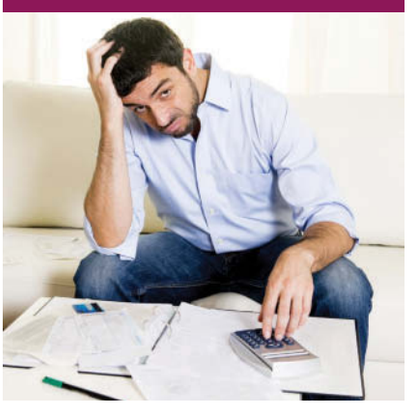

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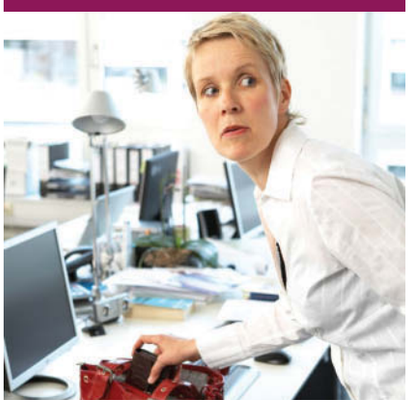

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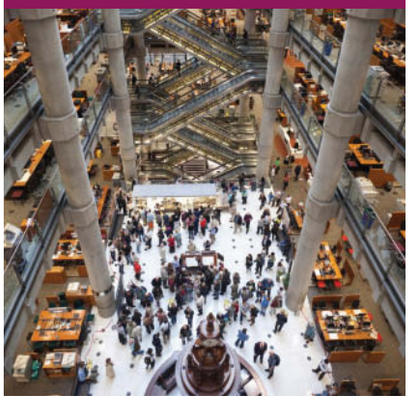

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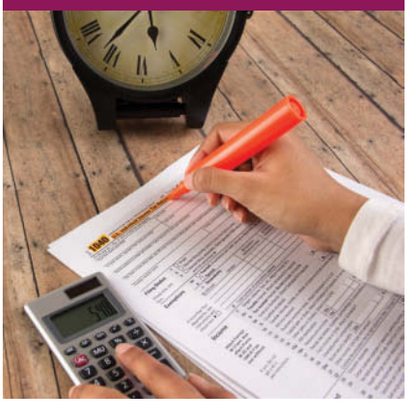

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Preface

From the Authors: About the 11th Edition of Business Math

Does just opening this text increase your stress level? What can be more stressful than managing your own money or the finances of a small business? Well, we hope you will be pleasantly surprised as you work through this text.

This text is designed to empower individuals and small business owners with the skills they need to handle their personal and business finances. For too long, too many of us have avoided the topics presented in this text. We either thought that we couldn't learn them because they involved math or that we didn't need them because we had a good background in more advanced mathematical concepts. *Business Math* deals with money, and everyone needs to understand how to manage money.

In this text you will review some basic math that you may have forgotten; even if you haven't, the basic math will relate to the world in which you live. All the applied problems are designed to simulate instances in real life where you would need these math skills.

You will learn about banking, interest, consumer credit, mortgages, investments, insurance, taxes, and many more topics that you will encounter no matter what career you pursue. You will examine some common business practices such as payroll, markup, markdown, trade discounts, cash discounts, and business statistics that will be beneficial whether you are a consumer, employee, or owner of a small business.

For those more involved with the recordkeeping of a small business, you will find topics such as depreciation, inventory, and financial statements to be very informative, especially if you plan to take some accounting courses. Recordkeeping requirements that we encounter from government agencies, lending agencies, and investors can be overwhelming if we don't have a basic understanding of these concepts.

Why is this text special? We have tried to use a conversational writing style and to incorporate interesting but relevant examples, applications, and case studies. All three of us have families, business interests, educational experiences, and many business contacts that we have drawn on when writing this text. Above all, we care about our students. We want our students to enjoy learning new things while they get beyond some of the anxieties and dislikes that are commonly associated with these topics. While we all take pride in our work, we also make it fun. One of our main objectives is to make it fun for you, too.

We hope you enjoy your journey through the text. If you have questions or suggestions, we would love to hear from you.

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What's New in the 11th Edition

Focus on Facilitating Learning

- Examples have been mapped to Stop and Check Exercises and Section Exercises.
- Learning Catalytics questions have been added at the beginning of every section.
- Excel Templates have been greatly expanded in every chapter, to facilitate technology usage in making calculations.

New Trends and New Laws Incorporated

- Banking chapter reflects new trends in electronic banking.
- Payroll, Consumer Credit, and Taxes chapters reflect new laws and procedures.
- Investment and insurance topics reflect recent changes in the marketplace.
- Global Marketplace notes have been included to increase awareness of the global economy.

Updated to Enhance Real-World Relevancy

- Examples and exercises have been updated to reflect current products and prices.
- Chapter openers and case studies have been added and updated to reflect relevant data.
- IRS and Interest Rate information has been updated to reflect current figures.

Enhanced MyMathLab Resources

- Quality and quantity of MathXL exercises have been refined using analyzed aggregated student usage and performance data.
- Section Lecture Videos have been updated in each chapter.
- Over 1,000 new business concept questions have been added to MathXL homework.

Time-Tested Pedagogy Aids Student Learning

LEARNING OUTCOMES

1-1 Place Value and Our Number System
1. Read whole numbers.
2. Write whole numbers.
3. Round whole numbers.
4. Read and round integers.

1-2 Operations with Whole Numbers and Integers
1. Add and subtract whole numbers.
2. Add and subtract integers.
3. Multiply integers.
4. Divide integers.
5. Apply the standard order of operations to a series of operations.

LEARNING OUTCOMES are outlined at the beginning of each chapter, repeated throughout the chapter, and reviewed in the Summary to keep students focused on important concepts.

HOW TO Add two negative integers

1. Add the numbers without regard to the signs.
2. Assign a negative to the sum.

HOW TO feature takes students through the steps to solve different business applications.

Estimate: to find a reasonable approximate answer for a calculation.
Approximate number: a rounded number.

Businesses normally use a personal calculator, a desktop calculator, or a spreadsheet like Excel® to make calculations. It is a good practice to always **estimate** your sum before making the calculations for the exact sum. The estimated sum is an **approximate number**.

KEY TERMS are highlighted in bold in the text and called out in the margin with their definitions.

STOP & CHECK

Write the number. See Example 2.

1. A Fortune 500 company reported gross sales of eighteen billion, seventy-eight million, three hundred ninety-seven thousand, two hundred three dollars.
2. Jason's annual net salary is thirty-six thousand, seventeen dollars.
3. Krispy Kreme had profits of nine hundred thirty-two thousand, eight hundred six dollars. Write the profit in numbers.
4. Jet Blue, an award-winning airline, sold fifty-two thousand, eight hundred ninety-six tickets. Write the number.

STOP AND CHECK exercises give students practice so they can master every outcome. Exercises are coded to Examples. Solutions are in an appendix at the end of the text.

TIP

Using Guess and Check to Solve Problems

An effective strategy for solving problems involves guessing. Make a guess that you think might be reasonable and check to see if the answer is correct. If your guess is not correct, decide if it is too high or too low. Make another guess based on what you learned from your

TIP AND DID YOU KNOW? boxes give students alternate strategies for solving problems, point out common mistakes to avoid, and give instruction on using calculators.

EXAMPLE 2 In a sales presentation, Marty reported that the gross sales for the month were five hundred forty-two million, six hundred sixty-two thousand, five hundred thirty-eight. The gross sales for the previous year were fifteen billion, five hundred thousand, twenty-nine. Write these numbers in digits.

(a) Five hundred forty-two million, six hundred sixty-two thousand, five hundred thirty-eight
(b) Fifteen billion, five hundred thousand, twenty-nine

EXAMPLES show all the steps and use annotations and color to highlight the concepts.

1-1 SECTION EXERCISES

SKILL BUILDERS

Write the words used to read the number. See Example 1.

1. 22,356,027
2. 106,357,291,582

SKILL BUILDERS AND APPLICATIONS are the two types of section exercises that are included to help students first master basic concepts and then apply them.

What You Know	What You Are Looking For	Solution Plan
Store orders: 45,000 cups Packages of cups on hand: 303 Cups per package: 1 gross, or 144	Total quantity of cups on hand Should more cups be ordered?	Total quantity of cups on hand = packages of cups on hand × cups per package Compare the total quantity of cups on hand with 45,000 cups.

FIVE-STEP PROBLEM-SOLVING STRATEGY gives students an efficient and effective way to approach problem solving and gives them a strategy for good decision making.

Summary CHAPTER 1

Learning Outcomes What to Remember with Examples

SUMMARY at the end of each chapter functions as a mini study-review with learning outcomes and step-by-step instructions and examples.

Exercise Set CHAPTER 1

1. According to a major auto manufacturer, the company invested more than $7 billion in manufacturing, research, and design. Use digits to write this number.
2. An automobile manufacturer claims to create more than twenty thousand direct jobs. Use digits to write this number.

EXERCISE SET has ample space for students to show their work.

Practice Test CHAPTER 1

Write the word name for the number.

1. 503
2. 12,056,039

PRACTICE TEST gives students a chance to gauge their knowledge of the chapter material and see where they need to review.

Critical Thinking CHAPTER 1

1. Addition and subtraction are inverse operations. Write the following addition problem as a subtraction problem and find the
2. Multiplication and division are inverse operations. Write the following multiplication problem as a division problem and

CRITICAL THINKING questions ask the students to apply their knowledge to more complex questions and build their decision-making skills.

Case Studies

2-1 Bitsie's Pastry Sensations

It was the grand opening of Elizabeth's pastry business, and she wanted to make something extra special. As a tribute to

CASE STUDIES promote collaborative and conceptual learning with real-world project problems.

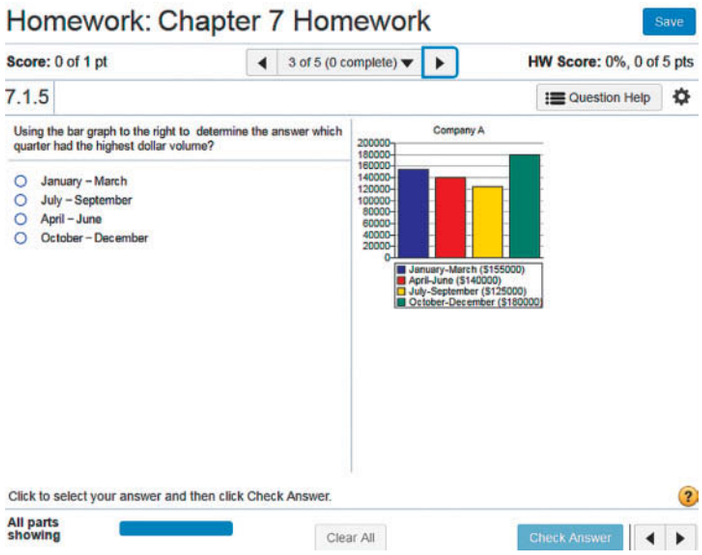
Resources for Success

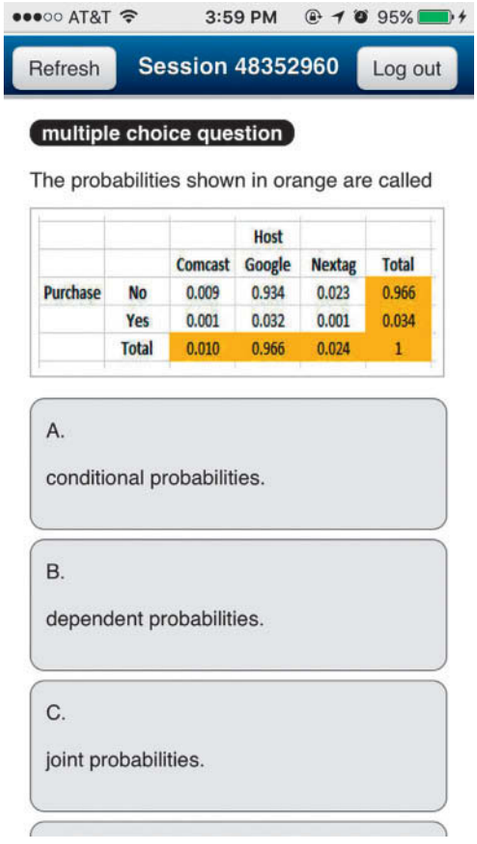
MyMathLab Online Course for Cleaves' *Business Math*, 11th edition

MyMathLab is available to accompany Pearson's market leading text offerings. To give students a consistent tone, voice, and teaching method, each text's flavor and approach is tightly integrated throughout the accompanying MyMathLab course, making learning the material as seamless as possible.

Updated Video Program

An updated video program walks students through the concepts from every section of the text in a fresh, modern presentation format, to give students support when they need it - at home, in the lab, or on the go.





Interactive Exercises

MyMathLab's interactive exercises are programmed to allow students unlimited practice and include learning aids that offer helpful feedback to help students master the material. In this revision, exercises have been expanded and refined using analyzed aggregated student usage and performance data.

Learning Catalytics

Learning Catalytics is an interactive student response tool that uses students' own devices to engage them in the learning process. Learning Catalytics is accessible through MyMathLab, where instructors can generate class discussion, promote peer-to-peer learning, and use real-time data to adjust instructional strategy. Questions for classroom use have been added to the beginning of every section.

Instructor Resources

The resources below can be downloaded from Pearson's Instructor's Resource Center, or are available in MyMathLab.

Instructor's Resource Manual

Includes additional teaching tips, class presentation outlines, and reproducible activities.

PowerPoints

The PowerPoint presentation package has been revised and augmented to include coverage of chapter concepts with additional new problems not found in the text and with step-by-step screens for each of the even-numbered questions in the exercise sets and practice test.

TestGen

TestGen® (www.pearsoned.com/testgen) enables instructors to build, edit, print, and administer tests using a computerized bank of questions developed to cover all the objectives of the text.

To access our Instructor Resource Center (IRC), please go to http://www.pearsonhighered.com/pearsonhigheredus/educator/catalog/index.page?null and follow the prompts. Once approved for online access, you will receive an email containing instructions on how to redeem your code and create your login name and password.

Student Resources

Quick Reference Tables

ISBN 10: 0134570243
ISBN 13: 9780134570242
Include annual percentage rate, compound interest, present value, future value, payroll tax, and income tax tables, which are available for use in the classroom or with testing.

Study Guide

ISBN 10: 0134506251
ISBN 13: 9780134506258
Contains the popular *How to Study Business Math* section and additional sets of vocabulary, drill, and application problems with solutions for each chapter in the text.

Student Solutions Manual

ISBN 10: 0134506316
ISBN 13: 9780134506319
Includes worked-out solutions to odd-numbered problems in Section Exercises and Exercise Sets, and to all Practice Test, Critical Thinking, Challenge, and Case Study questions.

Excel Templates

Excel templates for selected problems in the text (marked with an Excel icon in the margin) are available with MyMathLab.

Acknowledgments

We especially thank the students and faculty who used the previous editions for their thoughtful suggestions for improving this book. We also appreciate and thank the long list of reviewers who have contributed their ideas for improving the text. Colleagues who reviewed the previous editions and provided ideas and suggestions for improving this edition are:

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our project manager, made sure the production process was accomplished in a timely manner and that a quality product was generated. We thank Deana Richmond for accuracy checking the manuscript, working the examples and exercises, and providing outstanding suggestions.

We also thank Beverly Vance for preparing the Excel Templates and Quick Reference Tables, and Shirley Riddle for preparing the glossary and index.

As the manuscript for this edition was developed, we consulted with numerous business professionals so that we could reflect current business practices in the examples and exercises. We thank all of our consultants for so graciously sharing their expertise.

All of us want to thank our families for their continued support. Without them we couldn't get this done, and it wouldn't be nearly as much fun.

CHERYL CLEAVES, MARGIE HOBBS, AND JEFFREY NOBLE

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BUSINESS MATH

CHAPTER 1

Review of Whole Numbers and Integers

VIRTUAL GAMING IN A VIRTUAL WORLD, OR HOW MUCH IS YOUR DEGREE WORTH?

With revenues approaching $30 billion annually, online gaming has become more popular than ever. In fact, today worldwide estimates report that over one billion people play simple online games, such as checkers, bridge, or mahjong. The incredible numbers of online gamers have led to soaring revenues, making online advertising one of the fastest growing business sectors in the world today. Google, for example, has seen annual revenues skyrocket to over $65,000,000,000 ($65 billion)—that number has nine 0's in it!

China has nearly 700 million Internet users, and is the leader of the global online game market in terms of user penetration with over 400 million gamers. The United States also has a thriving gaming community, with almost 130 million people playing online games. The most avid online gamers are 25- to 34-year-olds but all ages are fairly well represented, including those over 55. In terms of gender, males and females are almost equally represented.

One of the increasingly popular genres of online games is a Massively Multiplayer Online Game, also known as MMO or MMOG, capable of supporting large numbers of players from all over the world at the same time. Whether users pay for the game or not, they engage with other players either working together or against one another, forming teams, creating strategies and many times creating real relationships through the virtual medium. According to a recent study, the number of monthly active MMO subscribers worldwide was an estimated 23 million. Some of the most popular MMO games in the world with huge worldwide followings are League of Legends, Crossfire, or World of Warcraft—but one of the longest running is EverQuest. EverQuest represents an entire world with its own diverse species, economic systems, alliances, and politics.

But what does playing EverQuest have to do with whole numbers or with studying math in general? Research by U.S. economist Edward Castronova showed that EverQuest players earned an average of more than $3 for every hour spent playing the game, by trading skills and possessions with other players. But does doing math homework (or any other subject) have an economic value as well? The answer, of course, is yes. The average college student will spend approximately 150 hours per course, while studying or attending class, or 3,000 hours total for an associate's degree (AD). Increased earnings for AD graduates will total nearly $300,000 more over a career, when compared to high school graduates' earnings. For every hour you spend studying or attending class, you will get $100 back! So before you get started gaming, make sure your business math homework is finished!

LEARNING OUTCOMES

1-1 Place Value and Our Number System

1. Read whole numbers.
2. Write whole numbers.
3. Round whole numbers.
4. Read and round integers.

1-2 Operations with Whole Numbers and Integers

1. Add and subtract whole numbers.
2. Add and subtract integers.
3. Multiply integers.
4. Divide integers.
5. Apply the standard order of operations to a series of operations.

This text will prepare you to enter the business world with mathematical tools for a variety of career paths. The chapters on business topics build on your knowledge of mathematics, so it is important to begin the course with a review of the mathematics and problem-solving skills you will need in the chapters to come.

In most businesses, arithmetic computations are done on a calculator or computer. Even so, every businessperson needs a thorough understanding of mathematical concepts and a basic number sense to make the best use of a calculator. A machine will do only what you tell it to do. Pressing a wrong key or performing the wrong operations on a calculator will result in a rapid but incorrect answer. If you understand the mathematics and know how to make reasonable estimates, you can catch and correct many errors.

1-1 PLACE VALUE AND OUR NUMBER SYSTEM

LEARNING OUTCOMES

1 Read whole numbers.
2 Write whole numbers.
3 Round whole numbers.
4 Read and round integers.

Digit: one of the ten symbols used in the decimal-number system: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Whole number: a number from the set of numbers including zero and the counting or natural numbers: 0, 1, 2, 3, 4, ...

Mathematical operations: calculations with numbers. The four operations that are often called basic operations are addition, subtraction, multiplication, and division.

Our system of numbers, the decimal-number system, uses ten symbols called **digits:** 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Numbers in the decimal system can have one or more digits. Each digit in a number that contains two or more digits must be arranged in a specific order to have the value we intend for the number to have. One set of numbers in the decimal system is the set of **whole numbers:** 0, 1, 2, 3, 4, ...

Most business calculations involving whole numbers include one or more of four basic **mathematical operations:** addition, subtraction, multiplication, and division.

1 Read whole numbers.

What business situations require that we read and write whole numbers? Communication is one of the most important skills of successful businesspersons. Both the giver and the receiver of communications must have the same interpretation for the communication to be effective. That is why understanding terminology and the meanings of symbolic representations is an important skill.

Period: a group of three place values in the decimal-number system.

Place-value system: a number system that determines the value of a digit by its position in a number.

Beginning with the ones place on the right, the place values are grouped in groups of three places. Each group of three place values is called a **period**. Each period has a name and a ones place, a tens place, and a hundreds place. In a number, the first period from the left may have less than three digits. In many cultures the periods are separated with commas.

Reading numbers is based on an understanding of the **place-value system** that is part of our decimal-number system. The chart in Figure 1-1 shows that system applied to the number 381,345,287,369,021.

To apply the place-value chart to any number, follow the steps given in the HOW TO feature. You'll find this feature, and examples illustrating its use, throughout this text.

Trillions			Billions			Millions			Thousands			Units		
Hundred trillions (100,000,000,000,000)	Ten trillions (10,000,000,000,000)	Trillions (1,000,000,000,000)	Hundred billions (100,000,000,000)	Ten billions (10,000,000,000)	Billions (1,000,000,000)	Hundred millions (100,000,000)	Ten millions (10,000,000)	Millions (1,000,000)	Hundred thousands (100,000)	Ten thousands (10,000)	Thousands (1,000)	Hundreds (100)	Tens (10)	Ones (1)
3	8	1	3	4	5	2	8	7	3	6	9	0	2	1
381 trillion,			345 billion,			287 million,			369 thousand,			21		

FIGURE 1-1
Place-Value Chart for Whole Numbers

HOW TO Read a whole number

	Read the number 4,693,107.
1. Separate the number into periods beginning with the rightmost digit and moving to the left.	
2. Identify the period name of the leftmost period.	million
3. For each period, beginning with the leftmost period:	
(a) Read the three-digit number from left to right.	four *million,* six hundred ninety-three *thousand,* one hundred seven
(b) Name the period.	
4. Note these exceptions:	
(a) Do not read or name a period that is all zeros.	
(b) Do not name the units period.	

DID YOU KNOW?

When writing numbers from 21–99 in words, a hyphen is included between the words when two words are necessary. For example, 21 is written as twenty-one.

TIP

Reference to Exercises

At the end of each example will be a reference to one or more exercises in the Stop and Check exercises for that Learning Outcome that will be similar to this example. For example, the reference for Example 1 is "Try Stop & Check 1–4."

EXAMPLE 1

The annual operating budget for a major corporation is $3,007,047,203. Show how you would read this number.

3 007 047 203	Identify each period name.
3 billion, 007 million, 047 thousand, 203	Read the words for the numbers in each period. Name each period except the units period.

Three billion, seven million, forty-seven thousand, two hundred three. *Try Stop & Check 1–4.*

GLOBAL MARKETPLACE

Not all cultures use commas as period separators. Some use a period instead. The number in Example 1 would look like this: 3.007.047.203.

Most calculators don't separate periods at all. In a calculator, the number would look like this: 3007047203. It's hard to read, isn't it?

TIP

Points to Remember in Reading Whole Numbers

1. Commas separating periods are inserted from right to left between groups of three numbers. The leftmost period may have fewer than three digits.
2. The period name will be read at each comma.
3. Period names are read in the singular: *million* instead of *millions,* for example.
4. Because no comma follows the units period, that will serve as your reminder that the period name *units* is not read.
5. *Hundreds* is NOT a period name.
6. Every period has a ones, tens, and hundreds *place.*
7. The word *and* is NOT used when reading whole numbers.
8. Commas ordinarily do not appear in calculator displays.
9. If a number has more than four digits, but no commas, such as you see on a calculator display, insert commas when you write the number. The comma is optional in numbers with four digits. In this text we choose to include a comma in four-digit numbers.

STOP & CHECK

Write the words used to read the number. See Example 1.

1. New Balance Shoes has sold 7,352,496 pairs of running shoes.

2. An investor has net assets of $4,023,508.

3. A large international corporation has an annual operating budget of $62,805,000,927.

4. At one time the U.S. national debt was $587,000,000,912.

2 Write whole numbers.

Suppose you are in a sales meeting and the marketing manager presents a report of the sales for the previous quarter, the projected sales for the current quarter, and the projected sales for the entire year. How would you record these figures in the notes you are taking for the meeting? You will need to have a mental picture of the place-value structure of our numbering system.

HOW TO Write a whole number

1. Begin recording digits from left to right.
2. Insert a comma at each period name.
3. Every period after the first period must have three digits. Insert zeros as necessary.

EXAMPLE 2

In a sales presentation, Marty reported that the gross sales for the month were five hundred forty-two million, six hundred sixty-two thousand, five hundred thirty-eight. The gross sales for the previous year were fifteen billion, five hundred thousand, twenty-nine. Write these numbers in digits.

(a) Five hundred forty-two million, six hundred sixty-two thousand, five hundred thirty-eight
(b) Fifteen billion, five hundred thousand, twenty-nine

(a) 542, ___ ___ ___, ___ ___ ___
million, thousand, unit

542,662,538

Record the first digits followed by a comma when the period name *million* is heard (or read). Then anticipate the periods to follow (thousand and unit).

Fill in each remaining period as the digits and period names are heard (or read).

The number is 542,662,538.

(b) 15, ___ ___ ___, ___ ___ ___, ___ ___ ___
billion, million, thousand, unit

Record the first period and anticipate the periods to follow (million, thousand, and unit).

15, ___ ___ ___, 500, ___ ___ ___

The next period name you hear (or read) is *thousand*, so you place the 500 in the thousand period, leaving space to place three zeros in the million period.

15,000,500,029

Place three zeros in the *million* period and listen for (read) the last three digits. You hear (read) *twenty-nine*, which is a two-digit number. Thus, a 0 is placed in the hundreds place.

The number is 15,000,500,029.

Try Stop & Check 1–4.

STOP & CHECK

Write the number. See Example 2.

1. A Fortune 500 company reported gross sales of eighteen billion, seventy-eight million, three hundred ninety-seven thousand, two hundred three dollars.

2. Jason's annual net salary is thirty-six thousand, seventeen dollars.

3. Krispy Kreme had profits of nine hundred thirty-two thousand, eight hundred six dollars. Write the profit in numbers.

4. Jet Blue, an award-winning airline, sold fifty-two thousand, eight hundred ninety-six tickets. Write the number.

3 Round whole numbers.

Rounded number: an approximate number that is obtained from rounding an exact amount.

Approximate number: a rounded amount.

Exact numbers are not always necessary or desirable. For example, the board of directors does not want to know to the penny how much was spent on office supplies (although the accounting staff should know). Approximate or rounded numbers are often used. A **rounded number** does not represent an exact amount. It is instead an **approximate number**. You round a number to a specified place.

HOW TO Round a whole number to a specified place

1. Find the digit in the specified place.
2. Look at the next digit to the right.
   (a) If this digit is less than 5, replace it and all digits to its right with zeros.
   (b) If this digit is 5 or more, add 1 to the digit in the specified place, and replace all digits to the right of the specified place with zeros.

Round 2,748 to the nearest hundred.
2,748
2,748
2,700

EXAMPLE 3

After the sales presentation, Marty's supervisor suggested that in future presentations, Marty use approximate numbers to illustrate the company's progress. Look at the two sales amounts in Example 2 on page 6. What are appropriate place values for rounding these numbers? Round each number to an appropriate place value.

Appropriate Rounding Places:

Large numbers are often rounded to a period place like nearest million, nearest billion, and so on.
Round the monthly sales amount to the nearest million.
Round the annual sales amount to the nearest billion.

(a) Round 542,662,538 to the nearest million.
542,662,538
543,000,000

2 is in the millions place.
The digit to the right is 6.
6 is 5 or more, so step 2b applies. Add 1 to 2 to get 3 and replace all digits to the right with zeros.

(b) Round 15,000,500,029 to the nearest billion.
15,000,500,029
15,000,000,000

5 is in the billions place.
The digit to the right is 0.
0 is less than 5, so step 2a applies. Leave 5 and replace all digits to the right with zeros.

Try Stop & Check 1–4.

EXAMPLE 4

In making estimations it is common to round a number to the first digit from the left. Round 27,389,092 to the first digit.

27,389,092
27,389,092
30,000,000

The first digit on the left is 2.
The next digit to the right is 7.
7 is 5 or more, so step 2b applies. Increase 2 by 1 to get 3 and replace all digits to the right of 3 with zeros.

Try Stop & Check 5–6.

STOP & CHECK

See Example 3.

1. Round 3,784,921 to the nearest thousand.

2. Round 6,098 to the nearest ten.

3. Round 52,973 to the nearest hundred.

4. The two-year-average median household income for Maryland in a recent year was $57,265. Round to the nearest thousand dollars.

See Example 4.

5. Round 17,439 to the first digit.

6. Southwest Airlines, one of the largest in the United States, sold 584,917 tickets. Write this as a number rounded to the first digit.

4 Read and round integers.

Negative number: a number that is less than zero.

In the business world and in real-life situations we sometimes want to express numbers that are smaller than 0. These numbers are **negative numbers**. If the temperature is lower than 0, the temperature is a negative amount. If you write a check for more than the amount of money in your bank account, your balance will be a negative number. Some business terms that often imply negative amounts are *loss* and *debt*.

Integers: the set of numbers that includes the positive whole numbers, the negatives of whole numbers, and zero.

The set of whole numbers is expanded by including negatives of whole numbers. This new set of numbers that includes whole numbers and negatives of whole numbers is called the set of **integers**. Figure 1-2 shows how the set of whole numbers is extended to include all integers. Numbers get larger as you move to the right and smaller as you move to the left. The arrows at the ends of the number line indicate that the numbers continue indefinitely in *both* directions.

FIGURE 1-2
Integers

Negative sign, −: a symbol that is written before a number to show that it is a negative number. In business applications negative numbers are sometimes enclosed in parentheses, as (5) for −5.

In reading and rounding negative numbers, the same rules apply. The negative number is preceded by a **negative sign**, −, or enclosed in parentheses. In business reports negative five may be written as −5 or (5).

DID YOU KNOW?

The symbol ≈ is often used to indicate a rounded value.

HOW TO Read and round integers

1. For reading integers, the rules are the same as for reading whole numbers. State the word *negative* or *minus* as you begin to read a number that is less than zero. Other words such as *loss* or *debt* may be used to indicate a negative amount.
2. For rounding integers, the rules are the same as for rounding whole numbers.

EXAMPLE 5

The U.S. national debt is estimated on many different web sites. On a recent electronic counter, the national debt was given as −$18,936,042,802,503. Show how you would read this number.

−$18,936,042,802,503	Identify each period name.
Negative 18 trillion, 936 billion, 42 million, 802 thousand, 503	Read the words for the numbers in each period. Name each period except the units period.

Negative eighteen trillion, nine hundred thirty-six billion, forty-two million, eight hundred two thousand, five hundred three dollars. *Try Stop & Check 1–2.*

EXAMPLE 6

Round the U.S. national debt given in Example 5 to the nearest trillion.

−$18,936,042,802,503	The trillions digit is 8.
−$18,936,042,802,503	The digit to the right of the trillions digit is 9.
−$19,000,000,000,000	9 is more than 5, so increase 8 by 1 to get 9 and replace all digits to the right of 9 with zeros.
−$19 trillion	Sometimes the period name is used instead of showing all the zeros.

−$18,936,042,802,503 rounded to the nearest trillion is −$19,000,000,000,000 or −$19 trillion. *Try Stop & Check 3–4.*

STOP & CHECK

See Example 5.

1. The public debt for the state of California was recently given as −$94,002,052,157. Show how you would read this number.

2. Recently the U.S. paid −$19,812,486,187 in interest on its public debt. Show how you would read this number to indicate it is being *paid out* of the national treasury.

See Example 6.

3. A recent study showed that citizens of New Hampshire had the highest overall debt in the nation, with an average per person debt of −$16,845. Round the average per person debt to the nearest ten thousand.

4. Citizens in Oklahoma had the lowest average debt in the country, −$8,823 per person. Round the average debt to the nearest thousand.

1-1 SECTION EXERCISES

SKILL BUILDERS

Write the words used to read the number. See Example 1.

1. 22,356,027

2. 106,357,291,582

3. 730,531,968

4. 21,000,017

5. 523,800,007,190

6. 713,205,538

Write as numbers. See Example 2.

7. Fourteen thousand, nine hundred eighty-five

8. Thirty-two million, nine hundred forty-three thousand, six hundred eight

9. Seventeen billion, eight hundred three thousand, seventy-five

10. Fifty million, six hundred twelve thousand, seventy-eight

11. Three hundred six thousand, five hundred forty-one

12. Three hundred million, seven hundred sixty thousand, five hundred twelve

See Examples 3–4.

13. Round 483 to tens.

14. Round 3,762 to hundreds.

15. Round 298,596 to ten-thousands.

16. Round 57,802 to the first digit.

APPLICATIONS

See Examples 3–4.

17. Cisco, one of the world's largest Internet equipment makers, recorded earnings of about $3,585,000,000. Round Cisco's earnings to the first digit.

18. Net income at Levi Strauss, one of the world's largest branded apparel companies, was expected to be twenty-five million, nine hundred seventy-two thousand, eight hundred dollars. Write as a number.