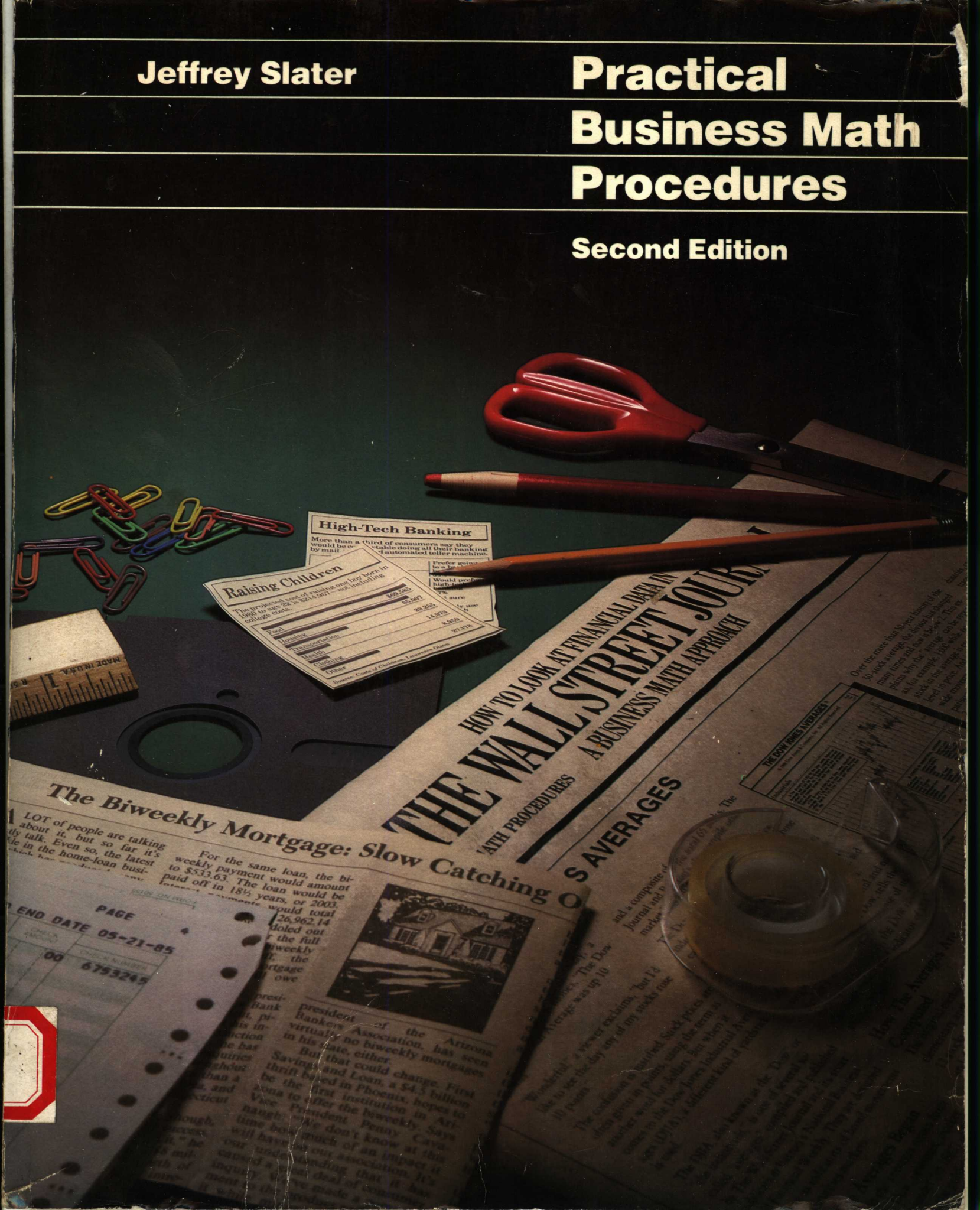
Jeffrey Slater

Practical Business Math Procedures

Second Edition



Practical Business Math Procedures

Jeffrey Slater
North Shore Community College
Beverly, Massachusetts

Second Edition

1987

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Practical Business Math Procedures

Dedicated to my family
Shelley, Rusty, Abby, and Scupper
With love

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Acknowledgments

People told me revisions are easy and quick. *NOT THIS ONE.* The Second Edition of *Practical Business Math Procedures* is not a cosmetic revision. It reflects feedback from over 60,000 students who used the First Edition. The process of revision has in fact taken as long as the preparation of the First Edition.

I am truly proud of the finished package. I would like to thank the following for their help in making *Practical Business Math Procedures* a true learning system for students.

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Security National Bank
Lynn, Massachusetts

The Company Store
La Crosse, Wisconsin

The Wall Street Journal

Special thanks to Cheryl Bogart and Eva Haight in the typing of the manuscript.

Note to Students

Special Feature	
Inside front cover	Fold-out newspaper that teaches you how to read selected financial data in *The Wall Street Journal.* Page references are also included relating business math theory in newspaper to content found within text.

Structure of *Practical Business Math Procedures,* Second Edition:
The student support system

Chapters	
21 chapters, broken up into learning units	Objectives are presented at the beginning of each chapter. Page references are provided.

Mini-Quizzes	
Self-quizzes at the end of each unit, with solutions at the end of each chapter	Provides instant feedback. Solutions to mini-quizzes are at the ends of chapters with page references.

Problems	
Complete sets of both drill (Level 1) and word problems (Level 2) at the end of each chapter	Check figures for odd-numbered problems are found in Appendix 4.

Extra Problems	
One more time: 210 additional word problems to review chapters	Appendix 1 has 10 word problems per chapter as an additional set of supplementary homework word problems. Your professor has solutions to these.

Vocabulary	
Vocabulary review with page references	At the end of each chapter is a list of key terms along with specific page references.

Chapter Organizer: A Reference Guide	
Outline of chapter at end of chapter that presents key points, formulas, procedures, etc., along with worked-out problems	Includes page references. The organizer provides you with a complete set of "Student Notes" chapter by chapter.

Summary Practice Test

Sample test that reviews the chapter

Take a test before the actual one. Your professor has solutions.

Audio Cassette Tapes

Chapter mini-quizzes are reviewed on audio tapes

Your lab or professor will have access to these tapes. The tape reviews key concepts in the chapter along with a discussion of the mini-quizzes.

New to this edition. Computer software is available. Check with your professor for specifics.

In the Appendixes, be sure to look at:

Appendix 1

One more time: 210 additional word problems

Metric System

A simple introduction to understanding the metric system

Basic Business Statistics with Computer Applications

Basic calculations of mean, median, mode, etc., plus examples of graphs illustrated on computer screens

Check Figures for Odd-Numbered Problems

Answers to drill and word problems

Glossary

All terms simply defined

Note to Professor

The total package of *Practical Business Math Procedures,* Second Edition, includes the following:

1. Student Edition of text.
2. Teacher's Edition of text with worked out solutions.
3. Manual Test Bank (four exams per chapter), including pre- and post-skill tests along with final exam.
4. Instructor's Resource Manual containing lecture outlines, crossword puzzles, and a complete set of reproducible tables that are found in the text.
5. Audio cassette tapes to review chapters and mini-quizzes.
6. Box of overhead *plastic* transparencies for solutions to end of chapter drill and word problems.
7. Set of *colored* plastic teaching transparencies.
8. Computer software.
9. Computerized test bank with over 1,000 true-false and multiple choice questions.
10. Special fold-out newspaper in the inside front cover of the text on how to read selected financial data in *The Wall Street Journal,* along with how to apply your Business Mathematics to it. Page references are provided.
11. Special supplement on how to use the "touch method" with the electronic calculator. Time tests and problem materials will be furnished.

Students need your time and hopefully this "industry-leading package" will provide the needed faculty support system you need.

Contents

Note: Inside front cover has a special supplement on How to Look at Financial Data in *The Wall Street Journal.*

1 Review of Basic Computational Skills, 1

LU 1–1 Applying Business Math in Today's Business World: Writing of Numbers; Rounding Whole Numbers, 2
LU 1–2 Whole Numbers—Addition and Subtraction, 5
LU 1–3 Whole Numbers—Multiplication and Division, 7

2 Fractions, 25

LU 2–1 Types of Fractions and Conversion Procedures, 26
LU 2–2 Addition and Subtraction of Fractions, 29
LU 2–3 Multiplication and Division of Fractions, 33

3 Decimals and Aliquot Parts, 48

LU 3–1 Fraction and Decimal Conversions; Rounding, 49
LU 3–2 Decimal Addition, Subtraction, Multiplication, and Division; Shortcuts, 52
LU 3–3 Aliquot Parts: A Mathematical Shortcut, 54

4 Checking Accounts and Bank Reconciliation, 67

LU 4–1 Checking Account, 67
LU 4–2 Bank Statement and Reconciliation Process; Insight into Current Trends, 71

5 Solving for the Unknown: A How-To Approach for Solving Equations, 87

LU 5–1 Solving for Unknowns from Basic Equations, 88
LU 5–2 Solving for Unknowns from Word Problems, 93

6 Percents and Their Applications, 109

LU 6–1 Conversions, 109
LU 6–2 Application of Percents—Portion Formula, 112

7 Discounts: Trade and Cash, 129

LU 7–1 Trade Discounts—Single and Chain, 129
LU 7–2 Cash Discounts, Credit Terms, and Partial Payments, 133

8 Markups and Markdowns; Insight into Perishables, 149

LU 8–1 Markups Based on Cost (100%), 150
LU 8–2 Markups Based on Selling Price (100%), 152
LU 8–3 Markdowns and Perishables, 155

9 Payroll, 168

LU 9–1 Calculating Employees' Gross Pay, 168
LU 9–2 Computing Payroll Deductions for Employees' Pay, 172
LU 9–3 Payroll Responsibilities of Employer, 178

10 Simple Interest, 191

LU 10–1 Introduction and Calculation of Simple Interest, 191
LU 10–2 Finding Unknown in Simple Interest Formula; Simple Interest Calculated from Table Look-Up, 197
LU 10–3 The U.S. Rule versus the Merchant's Rule in Making Partial Payments on a Note before Its Due Date, 200

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11 Structure of Promissory Notes, Simple Discount Notes, and the Discounting Process, 213

LU 11–1 Structure of Promissory Notes; the Simple Discount Note, 213
LU 11–2 Discounting an Interest-Bearing Note before Maturity, 216

12 Compound Interest and Present Value, 224

LU 12–1 Compound Interest, 224
LU 12–2 Present Value, 229

13 Installment Buying, Rule of 78, and Revolving Charge and Credit Card Accounts, 238

LU 13–1 The Cost of Installment Buying: The Case of Buying a Pickup Truck, 238
LU 13–2 Paying Off Installment Loan before Due Date, 244
LU 13–3 Revolving Charge and Credit Cards, 245

14 How to Read, Analyze, and Interpret Financial Reports, 258

LU 14–1 Balance Sheet: Report as of a Particular Date, 259
LU 14–2 Income Statement: Report for a Specific Period of Time, 264
LU 14–3 Trend and Ratio Analysis, 267

15 Depreciation, 282

LU 15–1 Concepts of Depreciation and the Straight-Line Method, 283
LU 15–2 Units-of-Production Method, 284
LU 15–3 Sum-of-the-Years'-Digits Method, 286
LU 15–4 Declining-Balance Method, 287
LU 15–5 Accelerated Cost Recovery System (ACRS), 288

16 Inventory and Overhead, 301

LU 16–1 Specific Identification Method, 302
LU 16–2 Weighted-Average Method, 304
LU 16–3 FIFO—First-In, First-Out Method, 305
LU 16–4 LIFO—Last-In, First-Out Method, 306
LU 16–5 Retail Method; Insight into Inventory Turnover, 307
LU 16–6 Distribution of Overhead, 310

17 Sales, Excise, and Property Tax, 320

LU 17–1 Sales and Excise Tax, 320
LU 17–2 Property Tax, 323

18 Life, Fire, and Auto Insurance, 333

LU 18–1 Life Insurance, 333
LU 18–2 Fire Insurance, 338
LU 18–3 Auto Insurance, 341

19 Stocks and Bonds, 355

LU 19–1 Stocks, 355
LU 19–2 Bonds, 360

20 The Cost of Home Ownership, 369

LU 20–1 Mortgage You Can Afford Based on Your Annual Income, 369
LU 20–2 Monthly Mortgage Payment, 371
LU 20–3 Amortization Schedule—Breaking Down Monthly Payment, 372

21 Annuities and Sinking Funds, 381

LU 21–1 Annuities: Ordinary Annuity and Annuity Due, 381
LU 21–2 Present Value of an Ordinary Annuity, 385
LU 21–3 Sinking Funds, 386

Appendixes

1 One More Time: 210 Additional Word Problems to Review Text, 393
2 Metric System: An Overview, 409
3 Basic Business Statistics with Computer Applications, 413
4 Check Figures for Odd-Numbered Problems, 419
5 Glossary, 424

Credits and Acknowledgments, 431

Index, 435

The Tax Reform Act Update

1

Review of Basic Computational Skills

On completion of this chapter you should be able to:

The Defense Rests

"The average American male spends 3,350 hours of his life shaving." My love for my beard is suddenly stronger, now that I can sleep 3,000 hours longer.

Arnold J. Zarrett

LU 1–1: Applying Business Math in Today's Business World: Writing of Numbers; Rounding Whole Numbers

1. Explain how business math is used in the decision-making process of today's business world. **[2]**
2. Convert written numbers into verbal form. **[3]**
3. Write numbers from verbal form. **[3]**
4. Identify digits to be rounded. **[4]**
5. Round whole numbers to indicated position (tens, hundreds, thousands, and so on). **[4]**

LU 1–2: Whole Numbers—Addition and Subtraction

1. Develop speed and accuracy. **[5]**
2. Add columns by grouping of tens. **[5]**
3. Prove addition and subtraction computations. **[5,6]**
4. Estimate addition and subtraction computations. **[5,6]**
5. Compare and contrast "common sense" with the process of estimating. **[6]**
6. Complete horizontal and vertical addition and subtraction. **[6]**

LU 1–3: Whole Numbers—Multiplication and Division

1. Explain the relationship of multiplication to addition. **[7]**
2. Estimate and prove multiplication and division calculations. **[7,9]**
3. Complete multiplication and division calculations by shortcut methods (zero, 25, 50). **[8,10]**
4. Complete short division. **[9]**
5. Complete long division. **[10]**

BLOOPERS: About 6.5 million individual income tax returns last year had math errors and other careless mistakes, the IRS says. That's out of a total of more than 96 million individual returns. Many people erred on medical costs or took the wrong amount of tax from the tables.

Learning Unit 1–1: Applying Business Math in Today's Business World: Writing of Numbers; Rounding Whole Numbers

Christmas Shopping at Marshall Field's Flagship Store on State Street

CHICAGO—An emergency shipment of cashmere-lined gloves hasn't arrived. An expensive new display of designer leather-bags isn't ready. Some racks are empty, and the company's chairman suggests a rather discouraging solution: Turn part of the purse boutique into a stall for mints.

The golden Christmas shopping bags the store had planned to use stymie the electronic security system, but new bags aren't available yet. And it takes more than two hours in line if you want to visit Santa.

But the cash registers are crunching out the good news. The crowds, perhaps 70,000 people today, seem to be buying. In offices across the way from Santa's Cozy Cloud Cottage, the store's manager Richard R. Donat, and his merchandise executives sweat out the figures, department by department. They cheer as they discern a trend—and get their Christmas wish: double-digit sales increases.

The six-week Christmas shopping season makes or breaks many retailers. At State Street, about 30% of annual sales and 70% of profit come in November and December. So Field's has been preparing for this Christmas for nearly two years. The 21-store company's investment in Christmas personnel, events, displays, advertising and supplies exceeds $5 million.

The decision-making process of a business is the key to its success in today's business world. In the case of Marshall Field, the problems during the Christmas shopping season were out-of-stock merchandise and wrong shopping bags. Marshall Field attempted to solve its out-of-stock merchandise problem with an alternative strategy and turned part of the purse boutique into a stall for mints. The solution made sense because people kept buying, and the result was a double-digit sales increase. From this example we can list the four steps in the decision-making process of a business:

Steps

1. State the problem(s)—out of stock.
2. Decide the best method to solve it—add candy to empty shelves.
3. Is the solution making sense—people are buying.
4. Evaluate the end result—double-digit sales increase.

Although Marshall Field's alternative business strategy proved to be financially successful, not all strategy solutions to business problems have such a happy ending. The solution to many problems can also be found by using mathematics. As you study *Practical Business Math Procedures,* 2nd edition, you will learn how a business math course is an invaluable tool in the decision-making process. Topics that you will study in this course will include the following types of business problems:

Career Choices

Surveyed college freshmen said their probable career choices will be:

Men		Women	
Engineer	18.5%	Business executive	11.4%
Business executive	12.5	Nurse	7.5
Computer analyst	7.7	Accountant	6.8
Accountant	5.2	Teacher	6.1

Source: Cooperative Institutional Research Program

1. In which selling seasons can we raise or lower our markups or markdowns?
2. Are we allocating enough floor space to winter clothing?
3. Should we keep the store open on Saturday night?
4. Are we taking advantage of all our trade and cash discounts?
5. What is the present value of the money we are borrowing?
6. What is the annual percentage rate we are paying on the company truck?
7. How is our property assessed?
8. Should our business utilize credit cards or only accept cash?
9. Do we need business interruption insurance?
10. Are we complying with the Truth in Lending Act?

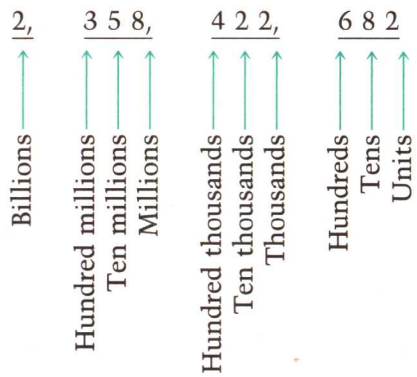
Before presenting advanced business math topics, it is important to review the basic math skills used for speed and accuracy. Too often a calculator, cash register, or computer will break down, and we will have to rely on our "manual" backup system. So let's first look at how whole numbers are written and then learn how to quickly estimate calculations by rounding.

Writing of Numbers

Using our decimal number system, the **whole number** 2,634 is in actuality:

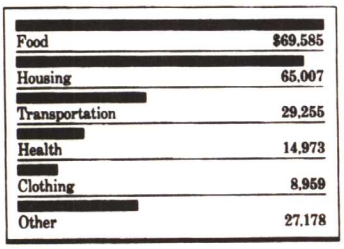
$$2{,}634 = (2 \times 1{,}000) + (6 \times 100) + (3 \times 10) + (4 \times 1)$$

This is true because our number system has positions of units, tens, hundreds, thousands, and so on. Let's look at how the number two billion, three hundred fifty-eight million, four hundred twenty-two thousand, six hundred eighty-two is written.



Raising Children

The projected cost of raising one boy born in 1980 to age 22 is $214,957—not including college costs.



Source: Costs of Children, Lawrence Olson

Note how each number is positioned (the commas help separate from right to left every three digits). When we read (or write in verbal) a whole number, we do not use the word *and*. This is used for the decimal point and discussed later in the course. Also, any numbers written between twenty-one to ninety-nine are hyphenated. For example, the number **4,959** in verbal is written as **four thousand, nine hundred fifty-nine.**

As we work with numbers and try to estimate results, the process of **rounding** can be a great tool to verify actual calculations. Let's look at the rounding-off process, keeping in mind that this process of rounding tries to **approximate** the actual answer.

Rounding Whole Numbers

The three steps used to **round whole numbers** are:

Steps

1. Identify the digit to be rounded.
2. If digit to right of place identified in step 1 is 5 or more, increase identified digit by one (round up). (If not, identified digit is not changed.)
3. Change all of the digits to the right of the identified digit to zeros.

Rounded to nearest thousand, 38,725 rounds to 39,000. Rounded to nearest ten, 38,725 rounds to 38,730. Rounded to nearest hundred, 38,725 rounds to 38,700.

Example. 38,725 rounded to the nearest thousand.

Step 1. 38,725 — Identified digit in thousand position—8.

Step 2. 7 is 5 or more; thus 8, the identified digit (step 1), is now rounded to a 9.

39,725

Step 3. 39,000 — Change the 725 to zeros, since these are the digits to the right of the number rounded off.

Additional Example. 7,458 rounded to nearest thousand.

Step 1. 7,458 — Identified digit in thousand position—7.

Step 2. Digit to right of 7 is not 5 or more; thus identified digit is not changed. We only change if digit to right is 5 or more.

Step 3. 7,000 — Change the 458 to zeros.

Rounding affects accuracy in calculations.

In this case we are rounding **all the way.** This means that after rounding we have **only one nonzero digit remaining.** By rounding all the way our estimate is not as exact. For example, 4,895 rounded all the way is 5,000. Remember, rounding to a specific digit depends on what degree of accuracy you seek in your estimate.

LU 1–1 Mini-Quiz
Applying Business Math in Today's Business World: Writing of Numbers; Rounding Whole Numbers
Solutions to Mini-Quiz on P. 11.

At the end of each unit you will have a chance to check your progress with a mini-quiz. If you are having difficulty, these mini-quizzes will help identify your area of weakness. It is suggested that you work out the problems on scrap paper and check your answers with the solutions given on the page number following the mini-quiz title in the margin. After checking your answers, a page number in the margin of the solutions refers you back to the page you left off.

1. Write in verbal form:

a. 9,258 **b.** 28,758 **c.** 425,416,052 **d.** 6,000,010

2. Round off as indicated:

Nearest Ten	Nearest Hundred	Nearest Thousand	Rounded All the Way
a. 43	**b.** 468	**c.** 7,980	**d.** 120
e. 86	**f.** 541	**g.** 6,105	**h.** 1,650

Learning Unit 1–2: Whole Numbers—Addition and Subtraction

In today's fast-moving business world there is a great need for speed and accuracy in the adding and subtracting of numbers. Too often a calculator or computer is not available, and you must quickly add or subtract manually.

Addition

A quick method to add a large group of numbers is to group them by 10s. This method is used by many accountants. The various combinations of numbers adding to 10 are:

1	2	2	5	3	4	3	2
1	7	3	4	3	4	2	2
8	1	5	1	4	2	5	6

2_8	8_2	3_7	7_3	5_5	4_6	6_4	1_9	9_1

Example.

$$\begin{array}{r} 7 \\ 3 \\ 8 \\ 2 \\ 3 \\ 4 \\ 3 \\ \hline 30 \end{array} \begin{array}{l} \rangle 10 \\ \\ \rangle 10 \\ \\ \rangle 10 \\ \\ \\ \end{array}$$

Example.

$$\begin{array}{r} 7 \\ 1 \\ 8 \\ 2 \\ 9 \\ 5 \\ 6 \\ 4 \\ \hline 42 \end{array} \begin{array}{l} \rangle 8 \\ \\ \rangle 10 \\ \\ \rangle 14 \\ \\ \rangle 10 \\ \\ \end{array} \begin{array}{l} \\ 18 \\ \\ 32 \\ \\ 42 \\ \\ \end{array}$$

Numbers that are added are called **addends.** The total of the numbers added is called the **sum.** Adding is done by adding columns top to bottom, while proving the result can be done by re-adding the columns from bottom to top. Let's look at the following example to show how to add and prove.

The Adding and Proving Process

Insight

Another method to use when adding long columns is to divide the columns into two parts, obtain a subtotal for each part, and add subtotals for the grand total.

Example.

Proving bottom to top ↑

$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 1{,}423 \\ 3{,}891 \\ 2{,}750 \\ 7{,}190 \\ \hline 15{,}254 \end{array}$$

↓ Adding top to bottom

Alternative Proof

Add each column as a separate total and then combine:

$$\begin{array}{r} 1{,}423 \\ 3{,}891 \\ 2{,}750 \\ 7{,}190 \\ \hline 4 \\ 25 \\ 20 \\ 13 \\ \hline 15{,}254 \end{array}$$

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