**MASON - LANGE - ROUSOS** 

# MATHEMATICS FOR BUSINESS AND CONSUMERS

# Mathematics for Business and Consumers (ご成)

ROBERT D. MASON
WALTER H. LANGE
TEMOLEON G. ROUSOS
All of the University of Toledo



1984 · Third Edition
BUSINESS PUBLICATIONS, INC.
Plano, Texas 75075

© BUSINESS PUBLICATIONS, INC., 1976, 1980, and 1984

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

ISBN 0-256-03071-5

Printed in the United States of America

1 2 3 4 5 6 7 8 9 0 ML 1 0 9 8 7 6 5 4

# **Mathematics for Business and Consumers**

To our wives: Dorothy, Donna, and Irene

## **Preface**

Mathematics for Business and Consumers is a text-workbook designed primarily for a one-semester course in business mathematics offered in community colleges, technical colleges, junior colleges, and four-year colleges. It can be used in courses stressing both business and consumer mathematics or only consumer mathematics.

As in the first two editions, to exemplify the broad applications of mathematics in business, a large number of actual illustrations have been drawn from wholesale and retail establishments, banks, consumer finance companies, insurance firms, and manufacturers. The purpose of the textbook is to actively involve the student in the learning process.

Consumer mathematics is introduced early because in class-testing the book the authors discovered that students were highly motivated by such topics as consumer spending and income and deductions. There is no reason, however, why the chapters cannot be covered in any other sequence.

#### HIGHLIGHTS OF THIS EDITION

Behavioral Objectives. Each section has an objective indicating what the student will be able to do after completing the section.

Clear Explanations. Each section begins with a clear explanation of the topic. The topic is approached from a "real-world" point of view. This makes the material relevant for the student.

**Problem-Solution.** Each section has one or more sample problems followed by detailed solutions.

Calculators. The student is shown how to solve many of the sample problems using a calculator. These calculator solutions appear in the margin adjacent to the solutions given in the text.

Self-Review Problems. At various points in each section there are self-review problems which are designed to give students an opportunity to work problems similar to the sample problems. They serve to reinforce the student's understanding of the preceding material. Answers and methods of solution are given in the margin adjacent to the self-review problems.

Section Assignments. To further reinforce comprehension, there is an assignment set after each section. The answers and methods of solution for the odd-numbered problems are given in Appendix A. There is a large number of problems to allow the instructor a wide latitude when assigning them. Space is provided to show the method of solution. These sections are perforated and can be assigned by the instructor to be completed outside of class.

Chapter Review Assignment. There is a chapter review assignment at the end of each chapter. A wide assortment of problems covers all of the material in the chapter. These sections are also perforated but no answers are given.

Chapter Self-Review Test. A self-review test for every chapter is provided following the chapter review assignment. These allow students to evaluate their overall comprehension of the subject matter. Answers and methods of solution are given for all problems in Appendix A.

#### **NEW FEATURES**

Chapters have been rearranged at the suggestion of several adopters.

The chapter on banking services has been expanded and divided into two chapters: "Simple Interest" and "Banking Services."

The chapter self-review tests have been moved from the appendix to the end of

each chapter, thus making the material very accessible to the students. All an swers are placed in Appendix A.

A number of computer programs in BASIC are presented to show how the computer can aid in routine calculations.

The insurance chapter has been expanded to include mobile home insurance.

The chapter on depreciation has been expanded to include the accelerated cosrecovery system.

Problems have been updated in all sections to reflect current prices.

All tables, charts, graphs, and similar data have been updated.

#### **ACKNOWLEDGMENTS**

We are indebted to the reviewers for their helpful comments and suggestions. For the first edition these include Professors Robert J. Bishop, Macomb County Community College; John S. Campbell, San Jose City College; Robert Ochs, Miami Dade Community College, South Campus; Richard D. Godfrey, Grand Rapids Junior College; Steven C. Lawlor, Foothill College; Esther H. Highland, Queensborough Community College; Vik Shah, Lansing Community College; Charles Nichols, University of Toledo; and Dr. Murray P. Leavitt, De Anza College.

Many of the changes in the revised edition resulted from suggestions by students and professors too numerous to mention. However, we would particularly like to thank Paul Londrigan and the staff at C. S. Mott Community College, Arthur DeManty at Fresno City College, and Helen G. Scoon at Madison Area Tech College for their helpful suggestions based on their experience with the first edition. Special thanks to Alec Beaudoin (Triton College), John S. Campbell (San Jose City College), Frederick H. Janke (Tompkins-Cortland Community College), and Charles Nichols who read the entire manuscript and whose invaluable critique was reflected in that edition.

Many of the changes in the third edition resulted from suggestions from Kent R. Brigham, Madison Area Technical College, and Sue Dolan, Elizabeth Town College, as well as extensive, excellent, and much appreciated reviews by Dr. Louise Spivey, Golden West College, Virginia Brannan, Spokane Falls Community College, and Ira Wilsker, Lamar University. In addition, we wish to thank Donald Greco and Carla Christy for their assistance in writing solutions. We are also grateful to many insurance underwriters, bankers, retailers, and colleagues for their assistance in preparing specific portions of the manuscript. Finally, our appreciation to Donna T. Lange for her assistance.

Robert D. Mason Walter H. Lange Temoleon G. Rousos

## A Note to the Student

This is not an ordinary textbook. It is constructed to aid you in your study by presenting the subject matter in small, easy-to-take steps with frequent checks to determine whether you fully understood the preceding material.

As you progress through each chapter you will be asked to fill in blanks or solve a problem. The answer to each self-review is always given. Following is an example.

#### Self-Review

Cover the answers in the left margin.

Susan and Kevin Carr are sales representatives. They receive a commission of \$0.55 for each box of greeting cards sold, \$1.15 for each set of memo pads, and \$0.85 for each child's deluxe coloring book. Complete the following:

- Commission for 32 boxes of cards is:
- 32 × \$\_\_\_\_ = \$
- Commission for 50 sets of memo pads is: \_\_\_\_\_ × \$\_\_\_ = \$\_\_\_
- Commission for 564 coloring books is: \_\_\_\_\_ × \$\_\_\_\_ = \$\_\_\_\_
  - \$\_\_\_\_

Total = \$554.50Total commission is:

 $32 \times \$0.55 = \$17.60$ 

 $50 \times \$1.15 = \$57.50$ 

 $564 \times \$0.85 = \$479.40$ 

Now verify your answers against those given in the margin.

There are section assignments after each section, if you need additional practice. The answers to odd-numbered problems, and the method of solution, are given in Appendix A.

Another distinctive feature of this text is the Chapter Self-Review Test with answers and method of solution. By completing this test you can better evaluate your comprehension of all of the material in the chapter.

Your instructor will probably assign the review assignment at the end of each chapter. The combination of (1) the many self-reviews in the chapter, (2) the section assignments, (3) the Chapter Self-Review Test, and (4) the chapter review assignments should aid you in mastering the subject matter.

> R. D. M. W. H. L. T. G. R.

### **Contents**

#### 1. A Brief Review of Basic Computations 1

1–1 Computations with Whole Numbers and Decimals, 1

> Addition, 1 Subtraction, 2 Multiplication, 3 Division, 4 Rounding, 6 Assignment 1–1, 7

1-2 Computations with Fractions, 9

Adding Fractions, 9
Subtracting Fractions, 10
Reducing Fractions, 10
More on Adding and Subtracting
Fractions, 11
Multiplying Fractions, 12
Dividing Fractions, 12
More on Multiplication and Division of
Fractions, 13
Assignment 1–2, 15

Review Assignment for Chapter 1, 17 Self-Review Test, 19

#### 2. Percents 21

2-1 Converting a Percent to a Fraction or a Decimal, 21

Converting a Percent to a Fraction, 21 Converting a Percent to a Decimal, 22 Assignment 2–1, 23

2-2 Converting Decimals and Fractions to Percents, 25

> Converting a Decimal to a Percent, 25 Converting a Fraction to a Percent, 25 Fractional Percents, 26 Assignment 2–2, 27

Review Assignment for Chapter 2, 29 Self-Review Test, 31

#### 3. Percentages 33

3-1 Percentage, Rate, and Base, 33
 Base, Rate, and Percentage, 33
 Calculating the Percentage, 33
 Calculating the Rate, 34
 Calculating the Base, 35
 Assignment 3-1, 37

3-2 Rate of Increase or Decrease, 39

Rate of Increase, 39 Rate of Decrease, 40 Assignment 3-2, 41

Review Assignment for Chapter 3, 43 Self-Review Test, 45

#### 4. Income and Deductions 47

4-1 Income, 47

Gross Pay: Hourly Wages, 47 Gross Pay: Salary, 48 Gross Pay: Commission, 49 Incentive Pay, 51 Assignment 4–1, 53

4-2 Deductions, 57

or Social Security, 57
Federal Income Tax (FIT), 59
Percentage Method of Calculating Federal Income Tax, 60
Wage-Bracket Table Method of Calculating Federal Income Tax, 63

Federal Insurance Contributions Act (FICA)

Review Assignment for Chapter 4, 67 Self-Review Test, 69

Assignment 4-2, 65

#### 5. Taxes 71

5-1 Sales Taxes, 71
Straight Sales Tax, 71
Solving for the Selling Price, 73
Assignment 5-1, 75

5-2 Property Taxes, 77

Assessed Value, 77
Tax Rate, 78
Determining the Property Tax, 79
Computing the Tax Rate, 80
Assignment 5–2, 83

5-3 Other Taxes, 85

Highway Use Tax, 85 State and Federal Gasoline Taxes, 85 Federal Tax on Tires, Tubes, and Tread Rubber, 86 Cigarette Tax, 87 Assignment 5–3, 89

Review Assignment for Chapter 5, 91

Self-Review Test, 93

#### 6. Consumer Spending 95

6-1 Unit Pricing—Comparison Shopping, 95
Introduction, 95
Unit Pricing, 95
Universal Product Code, 98
Assignment 6-1, 101

6-2 Cost of Transportation, 103

Cost of Operating an Automobile, 103
Renting an Automobile (Mileage
Charge), 104
Renting an Automobile (Unlimited
Mileage), 105
Traveling by Taxicab, 106
Traveling by Air and by Railroad, 108
Assignment 6–2, 111

6-3 Budgeting, 113

Allocations, 113 Budget Analysis, 114 Assignment 6–3, 115

Review Assignment for Chapter 6, 117

Self-Review Test, 119

#### 7. Simple Interest 121

7-1 Simple Interest, 121

Determining Interest, 121
30-Day-Month Time and Exact Time, 122
Exact Time Using a Table, 123
Due Date of a Loan when Time Is in Months and in Days, 125
Computing the Amount of Interest on a Loan, 126
Assignment 7–1, 131

7-2 Determining Principal, Rate, and Time, 133
 Determining the Principal, 133
 Determining the Rate of Interest, 134
 Determining the Time, 135

Memory Aid, 136 Assignment 7-2, 137

Review Assignment for Chapter 7, 139

Self-Review Test, 141

#### 8. Banking Services 143

8-1 Checking Accounts, 143

Writing and Recording Checks, 143

Making a Deposit, 144

Reconciling the Bank Statement, 144

Special Checking Accounts, 146

Cash Management Accounts, 146

Share Drafts, 146

NOW Accounts, 146

Assignment 8-1, 149

8-2 Compound Interest, 151

Computing Compound Interest, 151
Conversion Periods, 152
Compound Interest Using Tables, 153
Daily Compounding, 155
Optional: The Compound Interest
Formula, 158
Assignment 8-2, 161

Review Assignment for Chapter 8, 163 Self-Review Test, 165

## 9. Promissory Notes, Discounting, and Partial Payment 167

9-1 Promissory Notes and Discounting, 167
 Promissory Notes, 167
 Discounting a Noninterest-Bearing Note, 168
 Assignment 9-1, 171

 9-2 Discounting an Interest-Bearing Note and Establishing a Line of Credit, 173
 Line of Credit, 174
 Assignment 9-2, 175

9-3 Partial Payment, 177

The United States Rule, 177 The Merchants' Rule, 178 Assignment 9-3, 181

Review Assignment for Chapter 9, 185 Self-Review Test, 187

#### 10. Consumer Credit—Charge Accounts 189

10-1 The Previous-Balance and the Adjusted-Balance Methods of Determining the Finance Charge, 189
Introduction, 189
Previous-Balance Method of Computing Finance Charges, 190
Adjusted-Balance Method of Computing Finance Charges, 192
Assignment 10-1, 195

10-2 Average Daily Balance Method—No New Monthly Purchases Included, 197
 Assignment 10-2, 201

10-3 Average Daily Balance Method—New Monthly Purchases Included, 203
Optional, 205
Optional, 206
Average Daily Balance Method—New Purchases Included and Previous Finance Charges Excluded, 206
Assignment 10-3, 209

Review Assignment for Chapter 10, 211 Self-Review Test, 213

#### 11. Consumer Credit—Installment Credit 215

11-1 Installment Credit, 215
 Determining the Amount of Each Payment on Installment Accounts, 215
 Technical Note on Annual Percentage Rate, 217
 Assignment 11-1, 219

11-2 Annual Percentage Rate (APR) on Installment Accounts, 221Assignment 11-2, 223

11-3 Refund of Finance Charge—The Rule of 78, 225

Determining the Amount of the Refund (Unearned Finance Charge), 226 Assignment 11–3, 229

Review Assignment for Chapter 11, 231 Self-Review Test, 233

#### 12. Home Mortgage Loans 235

12-1 Financing the Purchase of a Home, 235
 Introduction, 235
 Determining the Monthly Payment, 235

Payment for Interest, Principal, and New Balance, 236 Creative Financing, 238 Assignment 12–1, 243

12-2 More on Financing the Purchase of a Home, 245

Escrow Accounts, 245
The Importance of the Interest Rate, 246
The Importance of the Length of Time of the Loan, 247
The Importance of the Monthly
Payment, 248
Closing Costs or Settlement Costs, 248
Assignment 12–2, 249

12-3 Cost of Owning or Renting a Home, 253
Buying a Home, 254
Assignment 12-3, 255

Review Assignment for Chapter 12, 257 Self-Review Test, 259

#### 13. Insurance 263

13-1 Home and Mobile Home Insurance, 263
Introduction, 263
Coinsurance, 263
Policy Exclusions, 267
Factors Determining the Premium, 268
Mobile Homeowner's Insurance, 269
Homeowner's Policy—Related
Insurance, 271
Assignment 13-1, 273

13-2 Life Insurance, 275

Types of Life Insurance, 275
Term Insurance, 275
Straight Life Insurance, 276
Limited-Payment Life, 276
Endowment Insurance, 277
Life Insurance Premiums, 278
Semiannual, Quarterly, and Monthly
Premiums, 279
Assignment 13–2, 281

13-3 Automobile Insurance, 283

Basic Coverages, 283
Optional Coverages, 284
Automobile Insurance Premiums, 284
Rating Factors, 284
Semiannual Premium, 285
No-Fault Auto Insurance, 288
Assignment 13–3, 289

Review Assignment for Chapter 13, 291 Self-Review Test, 293

#### 14. Opening a Business 295

14-1 Assets, Liabilities, and Owner Equity, 295
Introduction, 295
Assets, 295
Liabilities, 295
Owner Equity, 295
Assignment 14-1, 297

14-2 The Balance Sheet, 299
Assignment 14-2, 303

14-3 Income Statements, 307Assignment 14-3, 311

14-4 Vertical and Horizontal Analysis, 313
 Vertical Analysis, 313
 Horizontal Analysis, 313
 Assignment 14-4, 315

14-5 Ratio Analysis, 317 Assignment 14-5, 321

Review Assignment for Chapter 14, 323 Self-Review Test. 327

#### 15. Business Expenses 329

15-1 Payroll Register, 329
Introduction, 329
Optional—The Tax Dollar, 332
Assignment 15-1, 333

15-2 Advertising Expenses, 335

Newspaper Advertising, 335

Television Advertising, 336

Assignment 15-2, 339

15–3 Business Insurance, 341
Factors Affecting the Premium, 341
Assignment 15–3, 347

15-4 Other Business Expenses, 349
Workers' Compensation Insurance, 349
Unemployment Insurance, 350
Freight Costs, 351
Assignment 15-4, 353

Review Assignment for Chapter 15, 355 Self-Review Test, 357

#### 16. Depreciation 359

16-1 Accelerated Cost Recovery System (ACRS), 359
Introduction, 359

Accelerated Cost Recovery System (ACRS), 359
Assignment 16–1, 363

16-2 Straight-Line Method, 365 Straight-Line Method, 365 Assignment 16-2, 371

16-3 Sum-of-the-Years'-Digits Method, 373Sum-of-the-Years'-Digits Method, 373Assignment 16-3, 375

16-4 The Declining-Balance Method, 377Declining-Balance Method, 377Assignment 16-4, 381

Review Assignment for Chapter 16, 383 Self-Review Test, 385

#### 17. Trade and Cash Discounts 387

17-1 Trade Discounts, 387

Trade Discount, 387

Net Price, 387

Complement Method for Computing Net
Price, 388

Assignment 17-1, 391

17-2 Chain Discounts, 393
Chain Discounts, 393
Complement Method for Computing Net
Price, 394
Assignment 17-2, 395

17–3 Cash Discounts, 397
Cash Discounts, 397
Ordinary Dating, 397
End-of-Month Dating, 398
Receipt-of-Goods Dating, 399
Invoices, 399
Assignment 17–3, 401

Review Assignment for Chapter 17, 403 Self-Review Test, 405

#### 18. Markup and Markdown 407

18-1 Markup, 407

The Basic Retailing Equation, 407
The Basic Retailing Equation Expressed as
Percents of the Selling Price, 409
The Basic Retailing Equation Expressed as
Percents of the Cost, 410
Determining the Selling Price Given
Markup Based on Selling Price, 411

Determining the Selling Price Given Markup Based on the Cost, 411 Assignment 18–1, 413

18-2 Markdown, 415

Markdown, 415 Percent Markdown, 415 Sale Price, 416 Assignment 18–2, 419

Review Assignment for Chapter 18, 421

Self-Review Test, 423

#### 19. Valuing an Inventory and Inventory Turnover 425

19-1 Valuing an Inventory Using the Average-Cost Method, 425
 Introduction, 425
 Average-Cost Method, 426
 Assignment 19-1, 429

19-2 Valuing an Inventory Using the First-In, First-Out (FIFO) Method, 431 FIFO Method, 431 Assignment 19-2, 433

 19-3 Valuing an Inventory Using the Last-In, First-Out (LIFO) Method, 435
 LIFO Method, 435
 Which Method Should Be Used? 435
 Assignment 19-3, 437

19-4 Inventory Turnover, 439
 Inventory Turnover Based on Cost, 439
 Inventory Turnover Based on Retail
 Sales, 440

Assignment, 19-4, 441

Review Assignment for Chapter 19, 443 Self-Review Test, 445

#### 20. The Use of Statistical Techniques in Business 447

20-1 Graphic Presentation, 447 Introduction, 447

Line Charts, 447
Bar Charts, 449
Two-Directional Bar Chart, 450
Pie Chart, 451
Assignment 20-1, 453

20-2 Frequency Distributions, 455
Frequency Distribution, 455
Graphic Portrayal of a Frequency
Distribution, 456
A Computer Application, 457
Assignment 20-2, 459

20-3 Averages, 461

Arithmetic Mean, 461 Median, 462 Mode, 463 Misuses of Statistics, 463 Assignment 20-3, 465

Review Assignment for Chapter 20, 467 Self-Review Test, 469

#### 21. The Metric System 471

A Brief History of Measurement, 471
Metric Distances (Lengths), 471
Volume, 474
Weight and Mass, 474
Temperature, 476
Conversions: Metric to U.S. Customary and U.S.
Customary to Metric, 476
Review Assignment for Chapter 21, 479
Self-Review Test, 481

#### Appendix A Answers to Odd-Numbered Problems 483

Index 513

# A Brief Review of Basic Computations

#### SECTION 1-1 Computations with Whole Numbers and Decimals

When you have completed this section, you will be able to:

Add whole numbers and decimal numbers.

Subtract whole numbers and decimal numbers.

Multiply whole numbers and decimal numbers.

Divide whole numbers and decimal numbers.

Round whole numbers and decimal numbers.

#### ADDITION

The operation of combining two or more numbers to give one number is called **addition.** The usual practice when adding is to align the numbers vertically.

**Problem** 

Several deposits to a checking account at the First National Bank were: \$242.39, \$3.08, \$94.98, and \$1,357.00. What is the total amount deposited?

Solution

Write the numbers vertically; note that the decimal points must be aligned.

Using a cal	culator:	
Enter	Press	Display
242.39	+	242.39
3.08	+	245.47
94.98	+	340.45
1357	=	1697.45

Deposit Date	Amount Deposited
January 3	\$ 242.39 3.08 94.98 1,357.00
Total	\$1,697.45

The numbers in the extreme right column are summed first: That is, 9 + 8 + 8 + 0 = 25.

The 5 is entered in the total, and the 2 is carried over to the column to the left. The sum of that column, 2 + 3 + 0 + 9 + 0, is 14.

The 4 is entered in the total, and the 1 is carried over to the next column to the left.

This process is continued until all the columns have been totaled. The sum of the deposits is \$1,697.45.

"Albert Einstein didn't do too badly, and he never had a pocket calculator!"

A NOTE TO THE STUDENT: As you progress through each chapter, there are self-review problems for you to solve. By actually doing each problem, you can determine *immediately* whether you have understood the preceding material. The answers to the problems are in the left margin. Cover them before solving the problems.

A. 18,000 42,000 386,000 365,000 811,000 1 Self-Review

A. There were 18,000 murders, 42,000 forcible rapes, 386,000 robberies, and 365,000 aggravated assaults committed in the United States during one year, according to the Federal Bureau of Investigation. The total number of these violent crimes is \_\_\_\_\_\_.

B. The Department of Interior, Bureau of Indian Affairs, reported on the number of persons living on Indian reservations in Oklahoma.

Reservation	Numbe
Creek	. 28,224
Cherokee	. 25,300
Choctaw	. 18,171
Osage	. 10,144
Chickasaw	. 7,700

What is the total number of persons living on Indian reservations in Oklahoma?

B. 89,539

Now uncover the answers in the left margin and check your answers.

#### SUBTRACTION

The procedure for determining the difference between two amounts is called **subtraction**. The difference can be positive or negative.

#### **Problems**

Using a calculator:

Enter	Press	Display
8.28		8.28
5.99		2.29

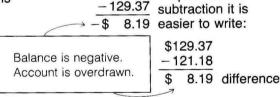
A. To introduce its Doubleheader, Ponderosa reduced two big chopped steak dinners, including an all-youcan-eat salad bar, baked potato, warm roll with butter, and a cold drink, from \$8.28 (for two persons) down to \$5.99 with coupon. What is the total savings?

Note alignment

of decimal points.

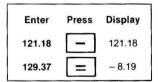
B. The balance in a checking account is \$121.18. A check for \$129.37 is written. What is the new balance?

To perform the



\$121.18

**Solutions** 



2 Self-Review

\$2.29 difference

\$8.28 - 5.99

Cover the answers in the left margin before solving the following problems.

A. \$53,091,000 -20,643,000 \$32,448,000 earnings after taxes A. Merrill Lynch & Co. Inc., had earnings of \$53,091,000 before income taxes for the third quarter. Income taxes were \$20,643,000. The earnings after paying the income taxes were \$\_\_\_\_\_\_.

B. \$329.88 -268.00 \$ 61.88 Now uncover the answers in the left margin and check your answers.

Certain problems require that some numbers be added and others be subtracted to arrive at the total. To determine the total, the numbers to be added and subtracted are separated. Then:

- Step 1. Find the total of the numbers to be added.
- Step 2. Find the total of the numbers to be subtracted.
- Step 3. Subtract the two totals. The answer can be positive or negative.

#### **Problem**

Deposits and withdrawals in a new checking account at the City National Bank were: July 6, deposit \$500.00; July 11, withdrawal \$241.72; July 18, withdrawal \$80.16; July 27, deposit \$291.86; July 31, withdrawal \$42.75. What is the total (called the *balance*) in the account at the end of July?

#### Solution

Deposits	Withdrawals	End-of-Month Balance
\$500.00	\$241.72	\$791.86 deposits
291.86	80.16	-364.63 withdrawals
\$791.86 total	42.75	\$427.23 balance at end of July
	\$364.63 total	

#### Using a calculator:

Enter	Press	Display
500	_	500
241.72	_	258.28
80.16	+	178.12
291.86	_	469.98
42.75	=	427.23

#### 3 Self-Review

Northside Ford had 243 automobiles on the sales lot March 1. During March, 18 autos were received from the factory, and 52 were sold. In April, no cars were received from the factory, and 60 were sold. In May, 43 were received from the factory; 65 were sold. In June, 121 were received from the factory; 103 were sold. What was the total number of automobiles on the sales lot on June 30?

Separating the number received from the factory from the number sold to customers:

	On Hand	Sold
March 1	243	
March	18	52
April	0	60
May	43	65
June	121	103
Total	425	280

End-of-month balance: 425 - 280 = 145

On Hand and Received from the Factory	Number Sold		
On hand March 1 Received in March Received in April Received in May Received in June Total	March April May June Total	Total on hand and received from factory Total sold to customers End-of-month balance	

#### MULTIPLICATION

**Multiplication** can be viewed as repeated addition. For example,  $3 \times 7$  is the same as 7 + 7 + 7 = 21. And  $6 \times 8$  is the same as 8 + 8 + 8 + 8 + 8 + 8 = 48. The answer to the multiplication of two numbers is called the **product.** 

$$\begin{array}{c} 7 \leftarrow \text{multiplicand} \\ \text{multiply sign} \rightarrow \underline{\frac{\times 3}{21}} \leftarrow \text{multiplier} \\ \hline 21 \leftarrow \text{product} \end{array}$$

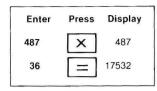
Obviously, if the problem involved multiplying  $36 \times 487$ , adding 487 + 487 + 487. . . a total of 36 times would be very time-consuming. The alternative is to multiply the two numbers. (The smaller of the two numbers is usually placed underneath.)

#### Problem

Find the product of 487 and 36.

#### Solution

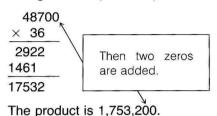
Using a calculator:

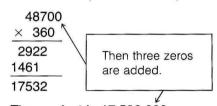


It should be noted that in multiplying 487 by 30, the 0 is usually omitted:

$$\begin{array}{r}
487 \\
\times 36 \\
\hline
2922 \\
1461 \\
\hline
17532
\end{array}$$
 \Leftarrow 0 was omitted

If the multiplicand or multiplier (or both) *end* in zeros, the zeros may be ignored during the multiplication process. Then they are added on to the product. Examples:





The product is 17,532,000.

2.013

 $\times 6.7$ 

In multiplying two numbers containing decimals, the product must have as many decimal places as found in the numbers being multiplied.

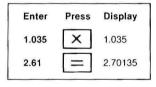
#### **Problems**

A. Determine the product of 1.035 and 2.61.

B. Determine the product of 2.013 and 6.7.

#### Solutions

Using a calculator:



A. Multiplicand

Multiplier

× 2.61

1035

6210

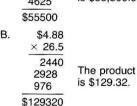
2070

Product

1.035

← has three decimal places B.
← has two decimal places
counting from the right

Has four decimal places counting from the right



4 Self-Review

A. Standard Oil of California common stock is selling on the New York Stock Exchange at \$46.25 a share. An investor purchases 1,200 shares. Disregarding the commission paid, what is the total amount paid for the shares?

\$ \_\_\_\_\_

B. Dacron voile is priced at \$4.88 a yard. The total cost of 26.5 yards is:

\$ \_\_\_\_\_

#### DIVISION

In a sense, **division** is the opposite of multiplication. Since  $3 \times 7 = 21$ , then  $21 \div 7 = 3$ , or  $21 \div 3 = 7$ . The answer to a division problem is called the **quotient**. Division can be shown several ways:

$$\frac{48}{6}$$
 or  $48 \div 6$  or  $6)\overline{48}$