FIRST EDITION

MODERN BUSINESS MATH

JEFFREY SLATER • SHARON M. WITTRY

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Modern Business Math

1st edition

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Company/*Applications*

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Modern Business Math

Chapter 1

Whole Numbers: How to Dissect and Solve Word Problems

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.

Pacheco, Inti. "Staying Open." *The Wall Street Journal* (June 24, 2020).

Essential Question

How can I use whole numbers to understand the business world and make my life easier?

Math Around the World

The Wall Street Journal chapter opener discusses how expensive Covid-19 has been for retailers. WalMart and three other large retail chains have spent $3 billion so far because of it. The *Wall Street Journal* clip below shows how the pandemic has affected Disney.

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 Disney and note the importance of numbers in the company's business decision-making process.

Disney has to use numbers to see

1. The effect of closing parks.
2. Profits and losses.
3. The expenditures necessary for new-product development.
4. Ways to improve customer satisfaction.

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

Let's begin our study of whole numbers.

Learn: 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), and the "5" means 5 ones (5).

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.

FIGURE 1.1 Whole number place-value chart

Whole Number Groups

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

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

Before we look at how to round whole numbers, we should look at how to convert a number indicating parts of a whole number to a whole number. We will use the *Wall Street Journal* clip "'Avengers' Posts Record $1.2 Billion Opening" as an example. This amount is 1 billion plus 200 million of an additional billion. The following steps explain how to convert decimal numbers into whole numbers.

Schwartzel, Erich. "'Avengers' Posts Record $1.2 Billion Opening." *The Wall Street Journal* (April 29, 2020).

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 1.2 million to a regular whole number.

Step 1 1.2 million

1,2 Change the decimal point to a comma.

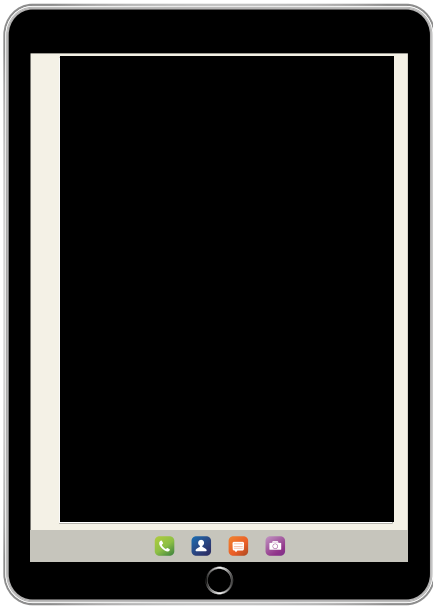
Step 2 1,200,000 Add zeros and commas so the whole number indicates million.

Learn: 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:



Cartoon Collections

Rounding Whole Numbers

Step 1 Identify the place value of the digit you want to round.

Step 2 If the digit to the right of the identified digit in Step 1 is 5 or more, increase the identified digit by 1 (round up). If the digit to the right is less than 5, do not change the identified digit.

Step 3 Change all digits to the right of the rounded identified digit to zeros.

Example 1: Round 9,362 to the nearest hundred.

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

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

9,462

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

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

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

Example 2: Round 67,951 to the nearest thousand.

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

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

68,951

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

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

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

Example 3: Round 7,843 all the way.

Step 1 7,843 Identified leftmost digit is 7.

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

8,843

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

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

Remember that rounding a digit to a specific place value depends on the degree of accuracy you want in your estimate. For example, in the *Wall Street Journal* article "'Avengers' Posts Record $1.2 Billion Opening," 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.

1,200,000,000 → 1,000,000,000

less than 5

Identified digit

Learn: How to Dissect and Solve a Word Problem

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

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

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

Blueprint Aid for Dissecting and Solving a Word Problem

	The facts	Solving for?	Steps to take	Key points
Blueprint				

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.

Money Tip 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.

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

Steps to solving problem

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

2. Identify leftmost digit of each number.

3. Round.

$194,000,000 → $200,000,000

$22,556,000 → $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.

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:

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

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

✓ 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:

Blueprint	The facts	Solving for?	Steps to take	Key points
	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.	Express each verbal form in numeric form. Identify leftmost digit in each number.

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

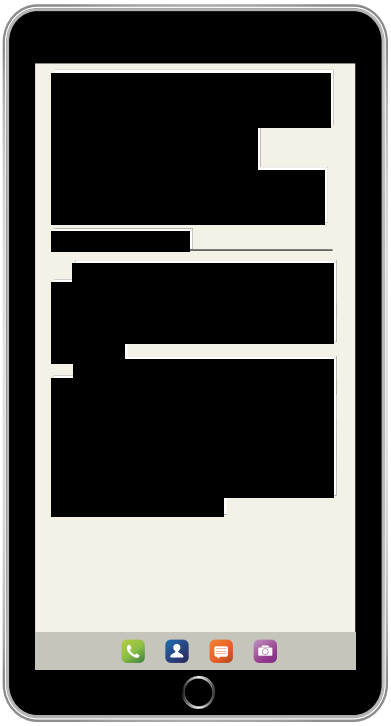
Learning Unit 1–2:

Adding and Subtracting Whole Numbers

In the *Wall Street Journal* clip "'Avengers' Posts Record $1.2 Billion Opening" on the following page reprinted from Learning Unit 1–1, note 'Avengers' was the first movie to gross over $1 billion in its debut. The amount of gross sales outside the U.S. and Canada was:

5-day sales	$1,200,000,000
U.S. and Canada	−350,000,000
	$850,000,000

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.



Schwartzel, Erich. "'Avengers' Posts Record $1.2 Billion Opening." *The Wall Street Journal* (April 29, 2020).

Learn: 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:

Adding top to bottom ↓

```
  2 11
  1,362
  5,913
  8,924
+ 6,594
 22,793
```

↑ 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
     13
     18
     26
     20
 22,793
```

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 "Coronavirus Daily Update" shown on the left, note how you can round each number all the way and the total will

Rounded all the way

1,000,000 ← Rounding all the way means each number has only one nonzero digit.
4,000,000
80,000
300,000
200,000
+2,000,000
7,580,000 ← *Note:* The final answer could have more than one nonzero digit since the total is not rounded all the way.

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.

Learn: Subtraction of Whole Numbers

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

Subtracting Whole Numbers

Step 1 Align the minuend and subtrahend according to their place values.

Step 2 Begin the subtraction with the units digits. Write the difference below the column. If the units digit in the minuend is smaller than the units digit in the subtrahend, borrow 1 from the tens digit in the minuend. One tens digit is 10 units.

Step 3 Moving to the left, repeat Step 2 until all place values in the subtrahend are subtracted.

Example: The previous *Wall Street Journal* "Coronavirus Daily Update" clip illustrates the subtraction of whole numbers:

What is the difference between worldwide cases and U.S. cases? As shown below you can use subtraction to arrive at the 2,955,285 difference.

4,345,646 ← Minuend (larger number)
−1,390,361 ← Subtrahend
2,955,285 ← Difference

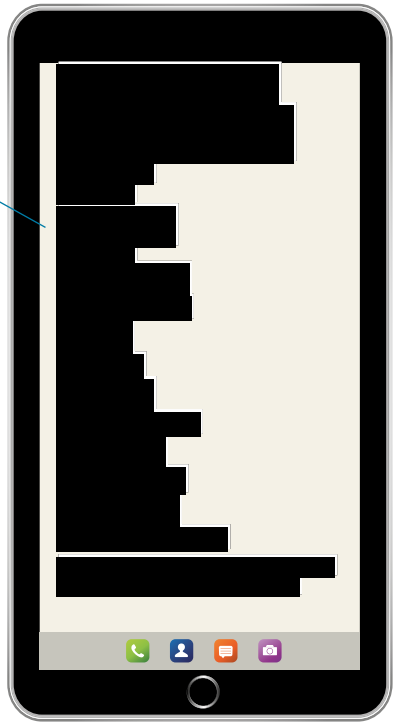
Check

2,955,285
+1,390,361
4,345,646

Checking subtraction requires adding the difference (2,955,285) to the subtrahend (1,390,361) to arrive at the minuend (4,345,646).

Learn: How to Dissect and Solve a Word Problem

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



"Coronavirus Daily Update." *The Wall Street Journal* (May 14, 2020).

At time of writing, deaths from covid have reached nearly 700,000.54% of population has been vaccinated by the delta variant has cause a spike in new cases.

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

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

Steps to solving problem

1. Calculate the total Kisses shipped.

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

2. Calculate the total Kisses left in inventory.

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

3. Rounding all the way.

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

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

Practice Quiz

Complete this Practice Quiz to see how you are doing.

1. Add by totaling each separate column:

$$\begin{array}{r} 8{,}974 \\ 6{,}439 \\ +6{,}941 \\ \hline \end{array}$$

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

$$\begin{array}{r} 4{,}241 \\ 8{,}794 \\ +\ 3{,}872 \\ \hline \end{array}$$

3. Subtract and check your answer:

$$\begin{array}{r} 9{,}876 \\ -\ 4{,}967 \\ \hline \end{array}$$

4. Jackson Manufacturing Company projected its year 2022 furniture sales at $900,000. During 2022, Jackson earned $510,000 in sales from major clients and $369,100 in sales from the remainder of its clients. What is the amount by which Jackson over- or underestimated its sales? Use the blueprint aid, since the answer will show the completed blueprint aid.

✓ Solutions

1.

$$\begin{array}{r} 14 \\ 14 \\ 22 \\ 20 \\ \hline 22{,}354 \end{array}$$

2.

Estimate	Actual
4,000	4,241
9,000	8,794
+ 4,000	+ 3,872
17,000	16,907

3.

$$\begin{array}{r} {\scriptstyle 8\ 18\,6\,16} \\ 9{,}876 \\ -4{,}967 \\ \hline 4{,}909 \end{array}$$

Check

$$\begin{array}{r} 4{,}909 \\ +\ 4{,}967 \\ \hline 9{,}876 \end{array}$$

4. Jackson Manufacturing Company over- or underestimated sales:

Blueprint	The facts	Solving for?	Steps to take	Key points
	Projected 2022 sales: $900,000. *Major clients:* $510,000. *Other clients:* $369,100.	How much were sales over- or underestimated?	Total projected sales − Total actual sales = Over- or underestimated sales.	Projected sales (minuend) − Actual sales (subtrahend) = Difference.

Steps to solving problem

1. Calculate total actual sales.

$$\begin{array}{r} \$\ 510{,}000 \\ +\ 369{,}100 \\ \hline \$\ 879{,}100 \end{array}$$

2. Calculate overestimated or underestimated sales.

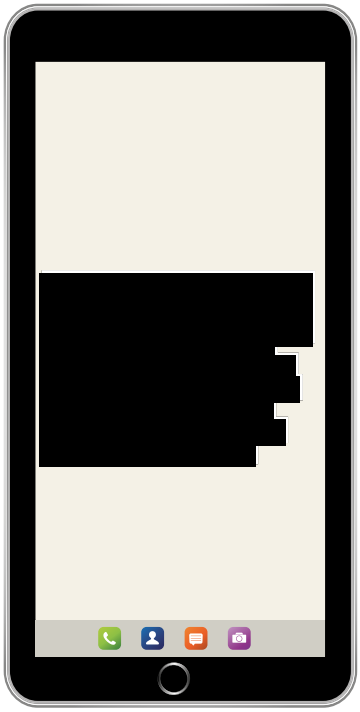
$$\begin{array}{r} \$\ 900{,}000 \\ -\ 879{,}100 \\ \hline \$\ \ 20{,}900 \text{ (overestimated)} \end{array}$$

Learning Unit 1–3:

Multiplying and Dividing Whole Numbers

The *Wall Street Journal* clip on the following page reveals that Disney could lose $175 million if their parks remain closed for two more months. The $175 million figure divided by 2 averages an $87,500,000 loss per month.

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



"'$175 Million' infographic." *The Wall Street Journal* (March 1, 2020).

Learn: Multiplication of Whole Numbers—Shortcut to Addition

From calculating the sales for 2 months you know that multiplication is a *shortcut to addition:*

$87,500,000 \times 2 = \$175,000,000$

or

$87,500,000 + \$87,500,000 = \$175,000,000$

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

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

Example:

$$\begin{array}{rl} & 418 \quad \longleftarrow \text{Top number (multiplicand)} \\ \times & 52 \quad \longleftarrow \text{Bottom number (multiplier)} \\ \hline & 836 \\ & 2090 \\ \hline & 21{,}736 \quad \longleftarrow \text{Product answer} \end{array}$$

Partial products

$$\begin{array}{rr} 2 \times 418 = & 836 \\ 50 \times 418 = & +\ 20{,}900 \\ \hline & 21{,}736 \end{array}$$

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

Multiplying Whole Numbers With Two Or More Digits

Step 1 Align the multiplicand (top number) and multiplier (bottom number) at the right. Usually, you should make the smaller number the multiplier.

Step 2 Begin by multiplying the right digit of the multiplier with the right digit of the multiplicand. Keep multiplying as you move left through the multiplicand. Your first partial product aligns at the right with the multiplicand and multiplier.

Step 3 Move left through the multiplier and continue multiplying the multiplicand. Your partial product right digit or first digit is placed directly below the digit in the multiplier that you used to multiply.

Step 4 Continue Steps 2 and 3 until you have completed your multiplication process. Then add the partial products to get the final product.

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

Example:

$$\begin{array}{r} 50 \leftarrow \quad 52 \\ \times\ 400 \leftarrow \times\ 418 \\ \hline 20{,}000 \qquad 416 \\ \qquad\qquad\ 52 \\ \qquad\quad 20\ 8 \\ \hline \qquad 21{,}736 \end{array}$$

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

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

Multiplication Shortcut With Numbers Ending In Zeros

Step 1 When zeros are at the end of the multiplicand or the multiplier, or both, disregard the zeros and multiply.

Step 2 Count the number of zeros in the multiplicand and multiplier.

Step 3 Attach the number of zeros counted in Step 2 to your answer.

Example:

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

No need to multiply rows of zeros

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

Multiplying A Whole Number By A Power Of 10

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

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

Example:

$99 \times 10 = 990 = 900$ ← Add 1 zero

$99 \times 100 = 9{,}900 = 9{,}900$ ← Add 2 zeros

$99 \times 1{,}000 = 99{,}000 = 99{,}000$ ← Add 3 zeros

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

Example:

$$\begin{array}{r} 658 \\ \times\ 403 \\ \hline 1\ 974 \\ 263\ 2 \\ \hline 265{,}174 \end{array} \qquad \begin{array}{rr} 3 \times 658 = & 1{,}974 \\ 400 \times 658 = & +\ 263{,}200 \\ \hline & 265{,}174 \end{array}$$

Learn: Division of Whole Numbers

Division is the reverse of multiplication and a time-saving shortcut related to subtraction. For example, in the introduction of this learning unit you determined in the Disney example that lost sales for 2 months resulted in $175,000,000. You multiplied $87,500,000 × 2 to get $175,000,000. Since division is the reverse of multiplication you can also say that $175,000,000 ÷ 2 = $87,500,000.

Division can be indicated by the common symbols ÷ and)‾, or by the bar — in a fraction and the forward slant / between two numbers, which means the first number is divided by the second number. Division asks how many times one number **(divisor)** is contained in another number **(dividend).** The answer, or result, is the **quotient.** When the divisor (number used to divide) doesn't divide evenly into the dividend (number we are dividing), the result is a **partial quotient,** with the leftover amount the **remainder** (expressed as fractions in later chapters). The following example reflecting how much is spent on coffee for 15 weeks illustrates *even division* (this is also an example of *long division* because the divisor has more than one digit).

Example:

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

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

Example:

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

Check

$(7 \times 24) + 1 = 169$

Divisor × Quotient + Remainder = Dividend

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

Example:

$$8\overline{)864}\ \ 108 \qquad 7\overline{)118}\ \ 16\ R6$$

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

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

Example:

$$138\overline{)5{,}079}\ \ 36\ R111$$

$$\begin{array}{r} 4\ 14 \\ \hline 939 \\ 828 \\ \hline 1\ 1\ 1 \end{array}$$

Estimate

$$100\overline{)5{,}000}\ \ 50$$

Check

$$\begin{array}{r} 138 \\ \times\ 36 \\ \hline 828 \\ 4\ 14\ \ \\ \hline 4{,}968 \\ +\ 111 \\ \hline 5{,}079 \end{array}$$

← Add remainder

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

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

Division Shortcut With Numbers Ending In Zeros

Step 1 When the dividend and divisor have ending zeros, count the number of ending zeros in the divisor.

Step 2 Drop the same number of zeros in the dividend as in the divisor, counting from right to left.

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

Examples:

One ending zero

Dividend	Divisor			
			Drop 1 zero in dividend	
95,000	÷ 10	→	95,000 =	9,500
95,000	÷ 100	→	95,000 =	950 Drop 2 zeros
95,000	÷ 1,000	→	95,000 =	95 Drop 3 zeros

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

Example:

$$6{,}500\overline{)88{,}000}$$ ← Drop 2 zeros

$$65\overline{)880}\ \ 13\ R35$$

$$\begin{array}{r} 65 \\ \hline 230 \\ 195 \\ \hline 35 \end{array}$$

$$65\overline{)880}$$

Learn: How to Dissect and Solve a Word Problem

The blueprint aid presented in LU 1–1(3) will be your guide to dissecting and solving the following word problem.

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

Money Tip
Be vigilant about sharing personal information. Change passwords often and do not share them.

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

Steps to solving problem

1. Calculate total annual sales. $3,500 × 52 weeks = $182,000
2. Calculate yearly sales per company. $182,000 ÷ 4 = $45,500

Check

$45,500 × 4 = $182,000

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

Practice Quiz

Complete this Practice Quiz to see how you are doing.

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

Actual	Estimate	Check
3,894		
× 18		

2. Multiply by shortcut method:

77,000
× 1,800

3. Multiply by shortcut method:

95 × 10,000

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

$26\overline{)5{,}325}$

5. Divide by shortcut method:

$4{,}000\overline{)96{,}000}$

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

✓ Solutions

1.

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

2. 77 × 18 = 1,386 + 5 zeros = 138,600,000

3. 95 + 4 zeros = 950,000

4.

Rounding	Actual	Check
166 R20	204 R21	26 × 204 = 5,304
$30\overline{)5{,}000}$	$26\overline{)5{,}325}$	+ 21
3 0	5 2	5,325
200	125	
1 80	104	
200	21	
180		
20		

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

Practice Quiz *Continued*

6. General Motors' total cost per year:

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

Steps to solving problem

1. Calculate total cars produced per week. $5 \times 960 = 4{,}800$ cars produced per week

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

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

Check

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

Chapter 1 Review

Topic/Procedure/Formula	Example	You try it*
Reading and writing numeric and verbal whole numbers Placement of digits in a number gives the value of the digits (Figure 1.1). Commas separate every three digits, moving from right to left. Begin at left to read and write number in verbal form. Do not read zeros or use *and*. Hyphenate numbers twenty-one to ninety-nine. Reverse procedure to change verbal number to numeric.	462 → Four hundred sixty-two 6,741 → Six thousand, seven hundred forty-one	**Write in verbal form** 571 → 7,943 →
Rounding whole numbers **1.** Identify place value of the digit to be rounded. **2.** If digit to the right is 5 or more, round up; if less than 5, do not change. **3.** Change all digits to the right of rounded identified digit to zeros.	643 to nearest ten 4 in tens place value; 3 is not 5 or more Thus, 643 rounds to 640.	**Round to nearest ten** 691
Rounding all the way Round to first digit of number. One nonzero digit remains. In estimating, you round each number of the problem to one nonzero digit. The final answer is not rounded.	468,451 → 500,000 The 5 is the only nonzero digit remaining.	**Round all the way** 429,685 →
Adding whole numbers **1.** Align numbers at the right. **2.** Add units column. If sum is more than 9, carry tens digit. **3.** Moving left, repeat Step 2 until all place values are added. Add from top to bottom. Check by adding bottom to top or adding each column separately and combining.	$\begin{array}{r} {\scriptstyle 1} \\ 65 \\ +\,47 \\ \hline 112 \end{array}$ $\begin{array}{r} 12 \\ +10 \\ \hline 112 \end{array}$ Checking sum of each digit	**Add** $\begin{array}{r} 76 \\ +38 \\ \hline \end{array}$

Chapter 1 Review (*Continued*)

Topic/Procedure/Formula	Example	You try it*
Subtracting whole numbers **1.** Align minuend and subtrahend at the right. **2.** Subtract units digits. If necessary, borrow 1 from tens digit in minuend. **3.** Moving left, repeat Step 2 until all place values are subtracted. Minuend less subtrahend equals difference.	$\overset{5\,18}{\not{6}\not{8}5} - 492 = 193$ $193 + 492 = 685$	**Subtract** $629 - 134$
Multiplying whole numbers **1.** Align multiplicand and multiplier at the right. **2.** Begin at the right and keep multiplying as you move to the left. First partial product aligns at the right with multiplicand and multiplier. **3.** Move left through multiplier and continue multiplying multiplicand. Partial product right digit or first digit is placed directly below digit in multiplier. **4.** Continue Steps 2 and 3 until multiplication is complete. Add partial products to get final product.	$223 \times 32 = 446 + 669 = 7{,}136$	**Multiply** 491×28
Shortcuts: (a) When multiplicand or multiplier, or both, end in zeros, disregard zeros and multiply; attach same number of zeros to answer. If zero is in center of multiplier, no need to show row of zeros. (b) If multiplying by power of 10, attach same number of zeros to whole number multiplied.	a. $48{,}000 \times 40 = 1{,}920{,}000$ (48×4; 3 zeros $+ 1$ zero $= 4$ zeros) $524 \times 206 = 107{,}944$ ($3144 + 1048$) b. $14 \times 10 = 140$ (attach 1 zero) $14 \times 1{,}000 = 14{,}000$ (attach 3 zeros)	**Multiply by shortcut** $13 \times 10 =$ $13 \times 1{,}000 =$

Chapter 1 Review *(Continued)*

Topic/Procedure/Formula	Example	You try it*
Dividing whole numbers **1.** When divisor is divided into the dividend, the remainder is less than divisor. **2.** Drop zeros from dividend right to left by number of zeros found in the divisor. Even division has no remainder; uneven division has a remainder; divisor with one digit is short division; and divisor with more than one digit is long division.	**1.** $14\overline{)76}$ = 5 R6, 70, 6 **2.** $5{,}000 \div 100 = 50 \div 1 = 50$ $5{,}000 \div 1{,}000 = 5 \div 1 = 5$	**Divide** **1.** $16\overline{)95}$ **Divide by shortcut** **2.** $4{,}000 \div 100$ $4{,}000 \div 1{,}000$

Key Terms

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

* Worked-out solutions are in Appendix A.

Critical Thinking Discussion Questions with Chapter Concept Check

1. List the four steps of the decision-making process. Do you think all companies should be required to follow these steps? Give an example.
2. Explain the three steps used to round whole numbers. Pick a whole number and explain why it should not be rounded.
3. How do you check subtraction? If you were to attend a movie, explain how you might use the subtraction check method.
4. Explain how you can check multiplication. If you visit a local supermarket, how could you show multiplication as a shortcut to addition?
5. Explain how division is the reverse of multiplication. Using the supermarket example in question 4, explain how division is a timesaving shortcut related to subtraction.
6. **Chapter Concept Check.** Using all the math you learned in Chapter 1, compare the number of COVID-19 cases in your state to the entire country.

End-of-Chapter Problems

Name _____ Date _____

Check figures for odd-numbered problems in Appendix A.

Drill Problems

Add the following: *LU 1–2(1)*

1–1. 90 + 15

1–2. 900 + 250

1–3. 77 + 77

1–4. 88 + 75

1–5. 6,251 + 7,329

1–6. 59,481 + 51,411 + 70,821

1–7. 78,159 + 15,850 + 19,681

Subtract the following: *LU 1–2(2)*

1–8. 68 − 19

1–9. 80 − 42

1–10. 287 − 199

1–11. 9,000 − 5,400

1–12. 9,800 − 8,900

1–13. 1,622 − 548

Multiply the following: *LU 1–3(1)*

1–14. 50 × 6

1–15. 510 × 61

1–16. 800 × 200

1–17. 677 × 503

1–18. 309 × 850

1–19. 450 × 280

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

1–20. $4\overline{)1{,}600}$

1–21. $9\overline{)810}$

1–22. $4\overline{)164}$

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

1–23. $6\overline{)520}$

1–24. $62\overline{)8{,}915}$

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

1–25. 95 + 310

1–26. 1,055 + 88

1–27. 666 + 950

1–28. 1,011 + 17

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

Check

8,539
6,842
+ 9,495

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

	Actual	**Estimate**		**Actual**	**Estimate**
1–30.	7,700		**1–31.**	6,980	
	9,286			3,190	
	+ 3,900			+ 7,819	

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

1–32. 190 − 66

1–33. 950 − 870

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

591,001
−375,956

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

1–35. 19 × 7

1–36. 84 × 8

1–37. 27 × 8

1–38. 19 × 5 =

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

1–39. $45\overline{)876}$

Check

1–40. $46\overline{)1{,}950}$

Check

Complete the following: *LU 1–2(2)*

1–41.

9,200
− 1,510

− 700

1–42.

3,000,000
− 769,459

− 68,541

End-of-Chapter Problems (*Continued*)

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

Actual	**Estimate**
870	
× 81	

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

1–44. $1{,}000\overline{)950{,}000}$

1–45. $100\overline{)70{,}000}$

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

Actual	**Estimate**
$695\overline{)8{,}950}$	

Word Problems

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

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

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

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

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

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

End-of-Chapter Problems (*Continued*)

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

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

1–54. As of mid-September 2021, 229,552,716 worldwide cases of coronavirus were reported by www.worldometers.info. It was also reported 206,248,522 have recovered and 4,709,175 have died. How many cases are unaccounted for to date?

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

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

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

1. Houston, TX	$477
2. Huntsville, AL	473
3. Newark, NJ	470
4. Cincinnati, OH	466

5.	Washington, DC	465
6.	Charleston, SC	460
7.	Memphis, TN	449
8.	Knoxville, TN	449
9.	Dallas–Fort Worth, TX	431
10.	Madison, WI	429

a. What is the total of all the fares?

b. What would the total be if all the fares were rounded all the way?

c. How much does the actual number differ from the rounded estimate?

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

1–59. For the first time in eight years, monthly credit card debt in the United States has dropped an average of 14% despite COVID-19, as reported by Experian. In 2019 the average individual's monthly credit card balance was $6,194. In 2020, this fell to $5,315. How much did the average monthly credit card balance decrease?

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

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

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

End-of-Chapter Problems (*Continued*)

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

If Hometown Buffet had the same sales each week, what were the sales for the year?

1–64. A good credit utilization ratio, measuring your credit card debt divided by your credit card limits, is 30% or less, according to Forbes.com. Surprisingly, the credit utilization ratio fell from 29% in 2019 to 25% in 2020 despite the coronavirus pandemic, as stated by one of the credit agencies, Experian. How many percentage points did the credit utilization ratio fall?

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

1–66. CompareCards.com lists credit card offers by such categories as low interest, no annual fee, cash back, and so on. A top card offers no interest payments for 18 months. If 11 credit card companies make this offer and 25,652 people are approved, on average how many new customers does each credit card company gain? *LU 1–3(2)*

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

1–68. Assume 6,000 children go to Disneyland today. How much additional revenue will Disneyland receive if it raises the cost of admission from $31 to $41? *LU 1–2(1), LU 1–3(1)*

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

1–70. A local Dick's Sporting Store, an athletic sports shop, bought and sold the following merchandise: *LU 1–2(1, 2)*

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

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

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

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

What is the average of this year's phone bills? Did Rich and his manager have a justifiable concern?

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

End-of-Chapter Problems *(Continued)*

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

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

The four partners of Washington Construction split all profits equally. How much will each partner receive?

Challenge Problems

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

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

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

1–76. Paula Sanchez is trying to determine her 2022 finances. Paula's actual 2021 finances were as follows: *LU 1–1, LU 1–2, LU 1–3*

2021			
Income:		Assets:	
Gross income	$69,000	Checking account	$ 1,950
Interest income	450	Savings account	8,950
Total	$69,450	Automobile	1,800
Expenses:		Personal property	14,000
Living	$24,500	Total	$26,700
Insurance premium	350	Liabilities:	
Taxes	14,800	Note to bank	4,500
Medical	585	Net worth	$22,200
Investment	4,000		($26,700 − $4,500)
Total	$44,235		

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

Paula believes her gross income will double in 2022 but her interest income will decrease $150. She plans to reduce her 2022 living expenses by one-half. Paula's insurance company wrote a letter announcing that her insurance premiums would triple in 2022. Her accountant estimates her taxes will decrease $250 and her medical costs will increase $410. Paula also hopes to cut her investments expenses by one-fourth. Paula's accountant projects that her savings and checking accounts will each double in value. On January 2, 2022, Paula sold her automobile and began to use public transportation. Paula forecasts that her personal property will decrease by one-seventh. She has sent her bank a $375 check to reduce her bank note. Could you give Paula an updated list of her 2022 finances? If you round all the way each 2021 and 2022 asset and liability, what will be the difference in Paula's net worth?

Summary Practice Test

Do you need help? Connect videos have step-by-step worked-out solutions.

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

a. Four thousand, eight hundred thirty-nine

b. Seven million, twelve

c. Twelve thousand, three hundred ninety-two

2. Express the following number in verbal form. *LU 1–1(1)*

9,622,364

3. Round the following numbers. *LU 1–1(2)*

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

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

Actual	Estimate	Check
1,886		
9,411		
+ 6,395		

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

Actual	Estimate
8,843	
× 906	

6. Multiply the following by the shortcut method. *LU 1–3(1)*

829,412 × 1,000

7. Divide the following and check the answer by multiplication. *LU 1–3(1, 2)*

Check

$39\overline{)14{,}800}$

8. Divide the following by the shortcut method. *LU 1–3(2)*

6,000 ÷ 60

9. Ling Wong bought a $299 pair of Bluetooth earbuds that was reduced to $205. Ling gave the clerk three $100 bills. What change will Ling receive? *LU 1–2(2)*

10. Sam Song plans to buy a $16,000 Ford Focus with an interest charge of $4,000. Sam figures he can afford a monthly payment of $400. If Sam must pay 40 equal monthly payments, can he afford the Ford Focus? *LU 1–2(1), LU 1–3(2)*

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

Blueprint	The facts	Solving for?	Steps to take	Key points

Steps to solving problem

MY MONEY

My Money = My Plan

What I need to know

"If you fail to plan, then plan to fail" is a quote you may have heard before. This saying is applicable in many situations including your finances. A solid financial plan will guide your current and future financial decisions. Creating and following good financial habits now will pay huge dividends in the future and prepare you for the financial ups and downs you will most likely experience. There are many sources of information on the topic of financial planning. It is important you seek out assistance matching up with the financial goals you have set for yourself. Any assistance you can find is only helpful if you are able to apply the knowledge to your unique financial situation. Therefore, personal financial planning is not a one-size-fits-all strategy but needs to be customized to your unique situation and finances.

What I need to do

Create a monthly budget, build an emergency savings of six times your monthly expenses, and save and invest 20% of all monies received. Manage your money. Pay off all credit cards monthly. Make certain you are earning rewards for your credit card spending. Maximize your 401k. Diversify your investments. Pay at least one additional month's mortgage payment each year. Plan for your retirement, bearing in mind inflation and long-term care needs. Plan your estate. Have a will, a general power of attorney, a medical power of attorney, and a living trust.

Obtaining financial excellence is possible and realistic. Budgeting is important no matter your income level. Establishing a personal budget based on current earnings will develop skills you need to continue budgeting in the future. Identify and document your current income and expenses. Be realistic with your budget amounts and review regularly to make any adjustments. Be sure your budget includes dollars directed to an emergency savings account for those unexpected events. It is acceptable to start small with your savings contributions and increase over time as your income allows. Establishing a habit of saving is more important in the beginning than the dollar amount you can save at first.

Make smart decisions to manage your money. If your credit card balances are more than you can pay off every month, reduce your credit card spending. Use credit cards offering rewards (e.g., airline miles, cash back, etc.) on your purchases and pay off the entire balance monthly to avoid costly interest. Begin investing early in life to maximize the benefit of time. Starting your investments early gives your money more time to work in your favor. Time will also help to even out the volatility you will experience with your investment accounts.

Steps I need to take

1. Create a realistic budget for yourself and commit to following it.
2. Provide for yourself by saving and investing for your future.
3. Protect your loved ones through planning your estate.

Resources I can use

- Mint: Personal Finance & Money (mobile app)—create your personal budget and track your progress.
- https://www.thebalance.com/five-steps-to-an-effective-financial-plan-2386045—steps for creating a personal financial plan.

MY MONEY ACTIVITY

- Record your current expenses and income by tracking all activity for one month.
- Create a personal budget for the next month then year using the monthly figures.
- Track actual versus estimated amounts and make any adjustments.

PERSONAL FINANCE

A KIPLINGER APPROACH

"WHAT YOU'LL PAY TO ADOPT A DOG." Kiplinger's. November 2020.

[redacted]

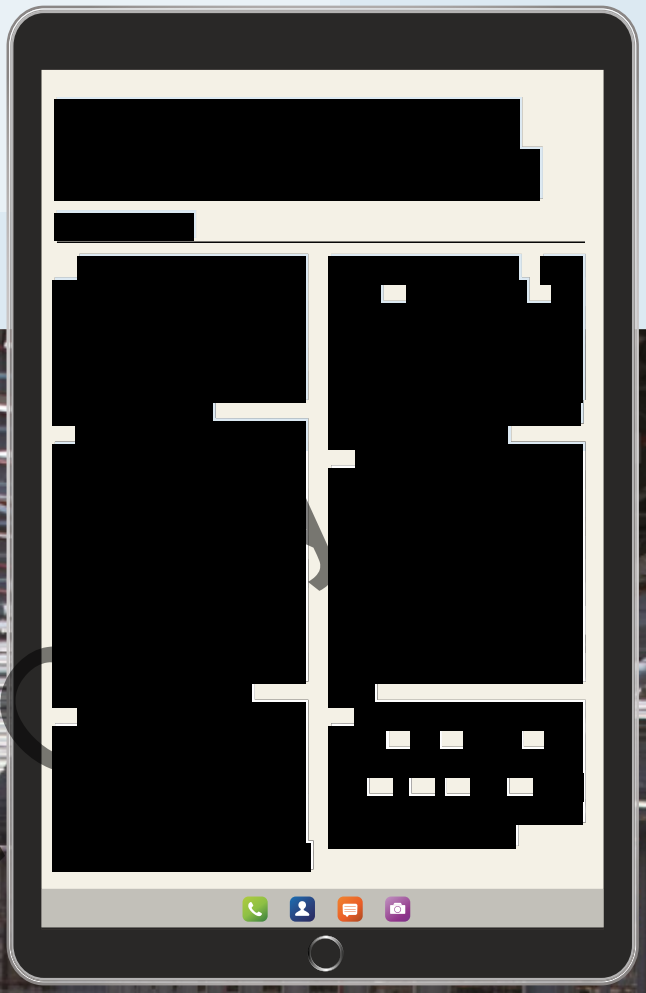
Business Math Issue

Pet insurance is a must for dog owners.

1. List the key points of the article and information to support your position.
2. Write a group defense of your position using math calculations to support your view. If you are in an online course, post to a discussion board.

Chapter 2

Fractions



Cutter, Chip. "Amazon Prepares to Retrain a Third of Its U.S. Workforce." *The Wall Street Journal*, July 12, 2019.

Learning Unit Objectives

LU 2–1: Types of Fractions and Conversion Procedures

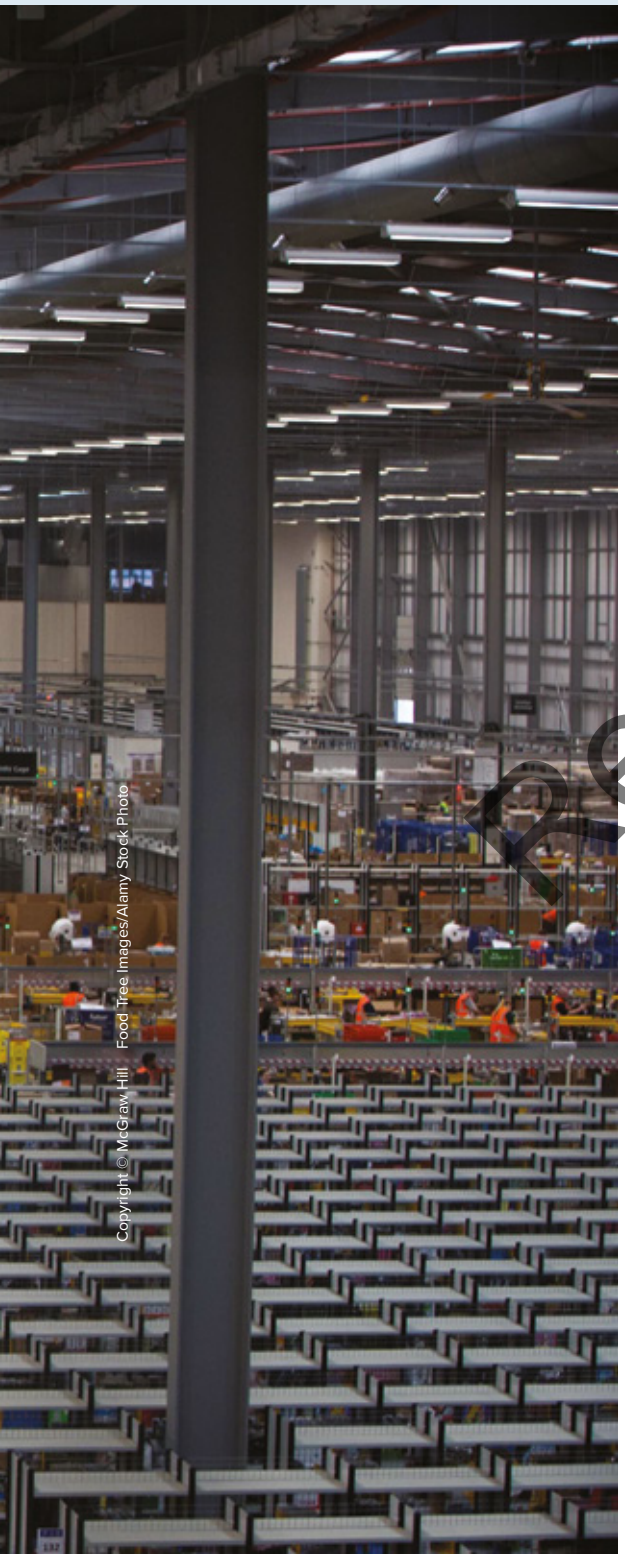
1. Recognize the three types of fractions.
2. Convert improper fractions to whole or mixed numbers and mixed numbers to improper fractions.
3. Convert fractions to lowest and highest terms.

LU 2–2: Adding and Subtracting Fractions

1. Add like and unlike fractions.
2. Find the least common denominator by inspection and prime numbers.
3. Subtract like and unlike fractions.
4. Add and subtract mixed numbers with the same or different denominators.

LU 2–3: Multiplying and Dividing Fractions

1. Multiply and divide proper fractions and mixed numbers.
2. Use the cancellation method in the multiplication and division of fractions.



Essential Question

How can I use fractions to understand the business world and make my life easier?

Math Around the World

The *Wall Street Journal* chapter opener clip "Amazon Prepares to Retrain a Third of Its U.S. Workforce" illustrates the use of a fraction. From the clipping you learn that Amazon plans to spend $700 million over the next six years to retrain $\frac{1}{3}$ of its workforce.

Now let's look at Milk Chocolate M&M'S® candies as another example of using fractions.

As you know, M&M'S® candies come in different colors. Do you know how many of each color are in a bag of M&M'S®? If you go to the M&M'S® website, you learn that a typical bag of M&M'S® contains approximately 17 brown, 11 yellow, 11 red, and 5 each of orange, blue, and green M&M'S®.[1]

The 1.69-ounce bag of M&M'S® shown on the next page contains 55 M&M'S®. In this bag, you will find the following colors:

18 yellow	9 blue	6 brown
10 red	7 orange	5 green

The number of yellow candies in a bag might suggest that yellow is the favorite color of many people. Since this is a business math text, however, let's look at the 55 M&M'S® in terms of fractional arithmetic.

Of the 55 M&M'S® in the 1.69-ounce bag, 5 of these M&M'S® are green, so we can say that 5 parts of 55 represent green candies. We could also say that 1 out of 11 M&M'S® is green. Are you confused?

For many people, fractions are difficult. If you are one of these people, this chapter is for you. First you will review the types of fractions and the fraction conversion procedures. Then you will gain a clear understanding of the addition, subtraction, multiplication, and division of fractions.

[1] Off 1 due to rounding.

Learning Unit 2–1:

Types of Fractions and Conversion Procedures

Note in the *Wall Street Journal* clip "Top Billing" that nearly $\frac{2}{3}$ of all product clicks are for Amazon's private-label products.

This chapter explains the parts of whole numbers called **fractions.** With fractions you can divide any object or unit—a whole—into a definite number of equal parts. For example, the bag of 55 M&M'S® described above contains 6 brown candies. If you eat only the brown M&M'S®, you have eaten 6 parts of 55, or 6 parts of the whole bag of M&M'S®. We can express this in the following fraction:

"Top Billing." *The Wall Street Journal,* September 17, 2019.

$\frac{6}{55}$

6 is the **numerator,** or top of the fraction. The numerator describes the number of equal parts of the whole bag that you ate.

55 is the **denominator,** or bottom of the fraction. The denominator gives the total number of equal parts in the bag of M&M'S®.

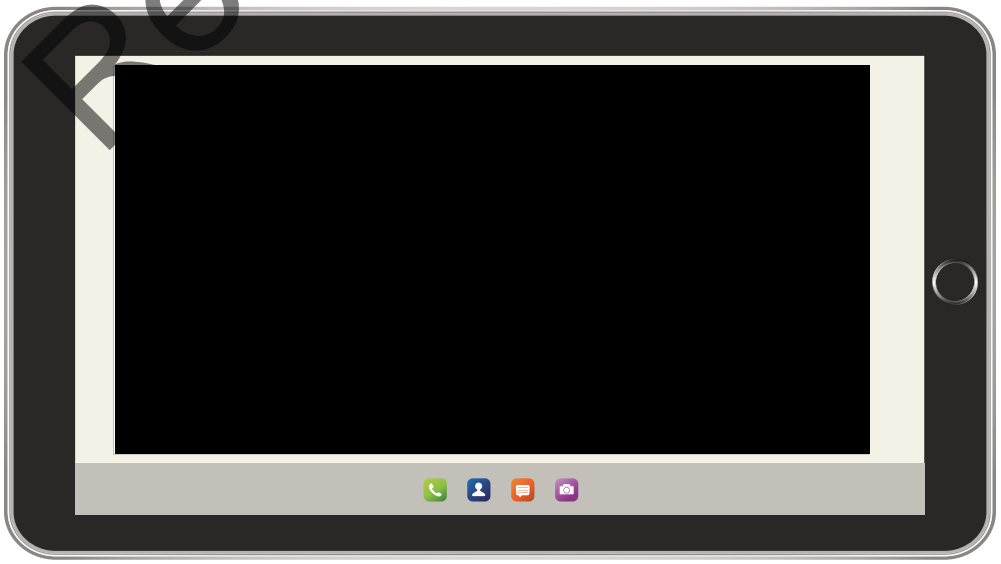
Before reviewing the arithmetic operations of fractions, you must recognize the three types of fractions described in this unit. You must also know how to convert fractions to a workable form.

Learn: Types of Fractions

There are three types of fractions: proper fractions, improper fractions, and mixed numbers.

Proper Fractions

A **proper fraction** has a value less than 1; its numerator is smaller than its denominator.



Examples: $\frac{2}{3}, \frac{1}{4}, \frac{1}{2}, \frac{1}{10}, \frac{1}{12}, \frac{1}{3}, \frac{4}{7}, \frac{9}{10}, \frac{12}{13}, \frac{18}{55}, \frac{499}{1{,}000}, \frac{501}{1{,}000}$

Improper Fractions

An **improper fraction** has a value equal to or greater than 1; its numerator is equal to or greater than its denominator.

Examples: $\frac{15}{15}, \frac{9}{8}, \frac{15}{14}, \frac{22}{19}$

Mixed Numbers

A **mixed number** is the sum of a whole number greater than zero and a proper fraction.

Examples: $7\frac{1}{8}, 5\frac{9}{10}, 8\frac{7}{8}, 33\frac{5}{6}, 139\frac{9}{11}$

Mother Goose & Grimm © 2019 Grimmy Inc., Dist. by King Features Syndicate

Learn: Conversion Procedures

In Chapter 1 we worked with two of the division symbols (÷ and $\overline{)}$). The horizontal line (or the diagonal) that separates the numerator and the denominator of a fraction also indicates division. The numerator, like the dividend, is the number we are dividing into. The denominator, like the divisor, is the number we use to divide. Then, referring to the 6 brown M&M'S® in the bag of 55 M&M'S® $\left(\frac{6}{55}\right)$ shown at the beginning of this unit, we can say that we are dividing 55 into 6, or 6 is divided by 55. Also, in the fraction $\frac{3}{4}$, we can say that we are dividing 4 into 3, or 3 is divided by 4. *Remember "The top dog gets the hat" when converting proper fractions to decimals. For example, in the fraction $\frac{3}{4}$, the 3 is the top dog. The division sign is the hat. Put the hat over the 3 and divide: $4\overline{)3} = .75$.*

Working with the smaller numbers of simple fractions such as $\frac{3}{4}$ is easier, so we often convert fractions to their simplest terms. In this unit we show how to convert improper fractions to whole or mixed numbers, mixed numbers to improper fractions, and fractions to lowest and highest terms.

Converting Improper Fractions to Whole or Mixed Numbers

Business situations often make it necessary to change an improper fraction to a whole number or mixed number. You can use the following steps to make this conversion:

Converting Improper Fractions to Whole or Mixed Numbers

Step 1 Divide the numerator of the improper fraction by the denominator.

Step 2 **a.** If you have no remainder, the quotient is a whole number.

b. If you have a remainder, the whole number part of the mixed number is the quotient. The remainder is placed over the original denominator as the proper fraction of the mixed number.

Examples:

$$\frac{15}{15} = 1 \qquad \frac{16}{5} = 3\frac{1}{5} \qquad \begin{array}{r} 3\ \text{R}1 \\ 5\overline{)16} \\ \underline{15} \\ 1 \end{array}$$

Converting Mixed Numbers to Improper Fractions By reversing the procedure of converting improper fractions to mixed numbers, we can change mixed numbers to improper fractions.

Converting Mixed Numbers to Improper Fractions

Step 1 Multiply the denominator of the fraction by the whole number.

Step 2 Add the product from Step 1 to the numerator of the original fraction.

Step 3 Place the total from Step 2 over the denominator of the original fraction to get the improper fraction.

Example:

$$6\frac{1}{8} = \frac{(8 \times 6) + 1}{8} = \frac{49}{8}$$

Note that the denominator stays the same.

Converting (Reducing) Fractions to Lowest Terms

When solving fraction problems, you always reduce the fractions to their lowest terms. This reduction does not change the value of the fraction. For example, in the bag of M&M'S®, 5 out of 55 were green. The fraction for this is $\frac{5}{55}$. If you divide the top and bottom of the fraction by 5, you have reduced the fraction to $\frac{1}{11}$ without changing its value. Remember, we said in the chapter introduction that 1 out of 11 M&M'S® in the bag of 55 M&M'S® represents green candies. Now you know why this is true.

To reduce a fraction to its lowest terms, begin by inspecting the fraction, looking for the largest whole number that will divide into both the numerator and the denominator without leaving a remainder. This whole number is the **greatest common divisor,** which cannot be zero. When you find this largest whole number, you have reached the point where the fraction is reduced to its **lowest terms.** At this point, no number (except 1) can divide evenly into both parts of the fraction.

Reducing Fractions to Lowest Terms by Inspection

Step 1 By inspection, find the largest whole number (greatest common divisor) that will divide evenly into the numerator and denominator (does not change the fraction value).

Step 2 Divide the numerator and denominator by the greatest common divisor. Now you have reduced the fraction to its lowest terms, since no number (except 1) can divide evenly into the numerator and denominator.

Example:

$$\frac{24}{30} = \frac{24 \div 6}{30 \div 6} = \frac{4}{5}$$

Using inspection, you can see that the number 6 in the above example is the greatest common divisor. When you have large numbers, the greatest common divisor is not so obvious. For large numbers, you can use the following step approach to find the greatest common divisor:

Step Approach for Finding Greatest Common Divisor

Step 1 Divide the smaller number (numerator) of the fraction into the larger number (denominator).

Step 2 Divide the remainder of Step 1 into the divisor of Step 1.

Step 3 Divide the remainder of Step 2 into the divisor of Step 2. Continue this division process until the remainder is a 0, which means the last divisor is the greatest common divisor.

Example:

Step 1

$\frac{24}{30}$ → $24\overline{)30}$ (quotient 1)

$\frac{24}{6}$

Step 2

$6\overline{)24}$ (quotient 4)

$\frac{24}{0}$

$$\frac{24 \div 6}{30 \div 6} = \frac{4}{5}$$

Reducing a fraction by inspection is to some extent a trial-and-error method. Sometimes you are not sure what number you should divide into the top (numerator) and bottom (denominator) of the fraction. The following reference table on divisibility tests will be helpful. Note that to reduce a fraction to lowest terms might result in more than one division.

Will divide evenly into a number if the	2	3	4	5	5	10
	Last digit is 0, 2, 4, 6, 8.	Sum of the digits is divisible by 3.	Last two digits can be divided by 4.	Last digit is 0 or 5.	The number is even and 3 will divide into the sum of digits.	The last digit is 0.
Examples	$\frac{12}{14} = \frac{6}{7}$	$\frac{36}{69} = \frac{12}{23}$ $3 + 6 = 9 \div 3 = 3$ $6 + 9 = 15 \div 3 = 5$	$\frac{140}{160} = \frac{1(40)}{1(60)} = \frac{35}{40} = \frac{7}{8}$	$\frac{15}{20} = \frac{3}{4}$	$\frac{12}{18} = \frac{2}{3}$	$\frac{90}{100} = \frac{9}{10}$

Converting (Raising) Fractions to Higher Terms Later, when you add and subtract fractions, you will see that sometimes fractions must be raised to **higher terms.** Recall that when you reduced fractions to their lowest terms, you looked for the largest whole number (greatest common divisor) that would divide evenly into both the numerator and the denominator. When you raise fractions to higher terms, you do the opposite and multiply the numerator and the denominator by the same whole number. For example, if you want to raise the fraction $\frac{1}{4}$, you can multiply the numerator and denominator by 2.

Example:

$$\frac{1}{4} \times \frac{2}{2} = \frac{2}{8}$$

The fractions $\frac{1}{4}$ and $\frac{2}{8}$ are **equivalent** in value. By converting $\frac{1}{4}$ to $\frac{2}{8}$, you only divided it into more parts.

Let's suppose that you have eaten $\frac{4}{7}$ of a pizza. You decide that instead of expressing the amount you have eaten in 7ths, you want to express it in 28ths.
How would you do this?

To find the new numerator when you know the new denominator (28), use the steps that follow.

Money Tip As a good rule of thumb, students should not borrow more for their education than their expected starting salary after they graduate. Students who borrow more than $25,000 for an associate's degree, $45,000 for a bachelor's degree, $75,000 for a master's degree, $100,000 for a PhD, $160,000 for a law degree, and $215,000 for an MD are probably over-borrowing.

Raising Fractions to Higher Terms When Denominator is Known

Step 1 Divide the *new* denominator by the *old* denominator to get the common number that raises the fraction to higher terms.

Step 2 Multiply the common number from Step 1 by the old numerator and place it as the new numerator over the new denominator.

Example:

$$\frac{4}{7} = \frac{?}{28}$$

Step 1 Divide 28 by 7 = 4.

Step 2 Multiply 4 by the numerator 4 = 16.
Result:

$$\frac{4}{7} = \frac{16}{28}$$ (*Note*: This is the same as multiplying $\frac{4}{7} \times \frac{4}{4}$.)

Note that $\frac{4}{7}$ and $\frac{16}{28}$ are equivalent in value, yet they are different fractions.

Now try the following Practice Quiz to check your understanding of this unit.

Practice Quiz

Complete this Practice Quiz to see how you are doing.

1. Identify the type of fraction—proper, improper, or mixed:

a. $\frac{4}{5}$ **b.** $\frac{6}{5}$ **c.** $19\frac{1}{5}$ **d.** $\frac{20}{20}$

2. Convert to a mixed number:

$\frac{160}{9}$

3. Convert the mixed number to an improper fraction:

$9\frac{5}{8}$

4. Find the greatest common divisor by the step approach and reduce to lowest terms:

a. $\frac{24}{40}$ **b.** $\frac{91}{156}$

5. Convert to higher terms:

a. $\frac{14}{20} = \frac{\quad}{200}$ **b.** $\frac{8}{10} = \frac{\quad}{60}$

✓ Solutions

1. **a.** Proper
b. Improper
c. Mixed
d. Improper

2.
$$9\overline{)160}\quad 17\tfrac{7}{9}$$
$$\begin{array}{r} 9 \\ \hline 70 \\ 63 \\ \hline 7 \end{array}$$

3. $\frac{(9 \times 8) + 5}{8} = \frac{77}{8}$

4. **a.**
$$\begin{array}{r|l} 1 & \\ 24\overline{)40} & \\ 24 & \\ \hline 16 & \end{array} \qquad \begin{array}{r|l} 1 & \\ 16\overline{)24} & \\ 16 & \\ \hline 8 & \end{array} \qquad \begin{array}{r|l} 1 & \\ 8\overline{)16} & \\ 16 & \\ \hline 0 & \end{array}$$

8 is greatest common divisor.

$$\frac{24 \div 8}{40 \div 8} = \frac{3}{5}$$

b.
$$\begin{array}{r|l} 1 & \\ 91\overline{)156} & \\ 91 & \\ \hline 65 & \end{array} \qquad \begin{array}{r|l} 1 & \\ 65\overline{)91} & \\ 65 & \\ \hline 26 & \end{array} \qquad \begin{array}{r|l} 2 & \\ 26\overline{)65} & \\ 52 & \\ \hline 13 & \end{array} \qquad \begin{array}{r|l} 2 & \\ 13\overline{)26} & \\ 26 & \\ \hline 0 & \end{array}$$

13 is greatest common divisor.

$$\frac{91 \div 13}{156 \div 13} = \frac{7}{12}$$

5. **a.** $20\overline{)200}$ $\quad 10$ $\quad 10 \times 14 = 140$ $\quad \frac{14}{20} = \frac{140}{200}$

b. $10\overline{)60}$ $\quad 6$ $\quad 6 \times 8 = 48$ $\quad \frac{8}{10} = \frac{48}{60}$

Learning Unit 2–2:

Adding and Subtracting Fractions

As a result of the pandemic, more teachers are using online video-sharing sites that are modeled after Google Inc.'s YouTube. As you can see in the blackboard illustration, these fractions can be added because the fractions have the same denominator. These are called *like fractions.*

In this unit you learn how to add and subtract fractions with the same denominators **(like fractions)** and fractions with different denominators **(unlike fractions).** We have also included how to add and subtract mixed numbers.

Learn: Addition of Fractions

When you add two or more quantities, they must have the same name or be of the same denomination. You cannot add 6 quarts and 3 pints unless you change the denomination of one or both quantities. You must either make the quarts into pints or the pints into quarts. The same principle also applies to fractions. That is, to add two or more fractions, they must have a **common denominator.**

Adding Like Fractions

Earlier we stated that because the fractions had the same denominator, or a common denominator, they were *like fractions.* Adding like fractions is similar to adding whole numbers.

Adding Like Fractions

Step 1 Add the numerators and place the total over the original denominator.

Step 2 If the total of your numerators is the same as your original denominator, convert your answer to a whole number; if the total is larger than your original denominator, convert your answer to a mixed number.

Example:

$$\frac{1}{7}+\frac{4}{7}=\frac{5}{7}$$

The denominator, 7, shows the number of pieces into which some whole was divided. The two numerators, 1 and 4, tell how many of the pieces you have. So if you add 1 and 4, you get 5, or $\frac{5}{7}$.

Adding Unlike Fractions Since you cannot add *unlike fractions* because their denominators are not the same, you must change the unlike fractions to *like fractions*—fractions with the same denominators. To do this, find a denominator that is common to all the fractions you want to add. Then look for the **least common denominator (LCD).**[2] The LCD is the smallest nonzero whole number into which all denominators will divide evenly. You can find the LCD by inspection or with prime numbers.

[2] Often referred to as the *lowest common denominator.*

Finding the Least Common Denominator (LCD) by Inspection The example that follows shows you how to use inspection to find an LCD (this will make all the denominators the same).

Example:

$$\frac{3}{7}+\frac{5}{21}$$

Inspection of these two fractions shows that the smallest number into which denominators 7 and 21 divide evenly is 21. Thus, 21 is the LCD.

You may know that 21 is the LCD of $\frac{3}{7}+\frac{5}{21}$, but you cannot add these two fractions until you change the denominator of $\frac{3}{7}$ to 21. You do this by building (raising) the equivalent of $\frac{3}{7}$, as explained in Learning Unit 2–1. You can use the following steps to find the LCD by inspection:

Step 1 Divide the new denominator (21) by the old denominator (7): $21 \div 7 = 3$.

Step 2 Multiply the 3 in Step 1 by the old numerator (3): $3 \times 3 = 9$. The new numerator is 9.

Result:

$$\frac{3}{7}=\frac{9}{21}$$

Now that the denominators are the same, you add the numerators.

$$\frac{9}{21}+\frac{5}{21}=\frac{14}{21}=\frac{2}{3}$$

Note that $\frac{14}{21}$ is reduced to its lowest terms $\frac{2}{3}$. Always reduce your answer to its lowest terms.

You are now ready for the following general steps for adding proper fractions with different denominators. These steps also apply to the following discussion on finding LCD by prime numbers.

Adding Unlike Fractions

Step 1 Find the LCD.

Step 2 Change each fraction to a like fraction with the LCD.

Step 3 Add the numerators and place the total over the LCD.

Step 4 If necessary, reduce the answer to lowest terms.

Finding the Least Common Denominator (LCD) by Prime Numbers When you cannot determine the LCD by inspection, you can use the prime number method. First you must understand prime numbers.

Prime Numbers

A **prime number** is a whole number greater than 1 that is only divisible by itself and 1. The number 1 is not a prime number.

Source: FRAZZ ©2010 Jef Mallett/Andrews McMeel Syndication

Example:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43

Note that the number 4 is not a prime number. Not only can you divide 4 by 1 and by 4, but you can also divide 4 by 2. A whole number that is greater than 1 and is only divisible by itself and 1 has become a source of interest to some people.

Example:

$$\frac{1}{3}+\frac{1}{8}+\frac{1}{9}+\frac{1}{12}$$

Step 1 Copy the denominators and arrange them in a separate row.

3 8 9 12

Step 2 Divide the denominators in Step 1 by prime numbers. Start with the smallest number that will divide into at least two of the denominators. Bring down any number that is not divisible. Keep in mind that the lowest prime number is 2.

$$\begin{array}{r|llll} 2 & 3 & 8 & 9 & 12 \\ \hline & 3 & 4 & 9 & 6 \end{array}$$

Note: The 3 and 9 were brought down, since they were not divisible by 2.

Step 3 Continue Step 2 until no prime number will divide evenly into at least two numbers.

Note: The 3 is used, since 2 can no longer divide evenly into at least two numbers.

$$\begin{array}{r|llll} 2 & 3 & 8 & 9 & 12 \\ 2 & 3 & 4 & 9 & 6 \\ \hline 3 & 3 & 2 & 9 & 3 \\ \hline & 1 & 2 & 3 & 1 \end{array}$$

Step 4 To find the LCD, multiply all the numbers in the divisors (2, 2, 3) and in the last row (1, 2, 3, 1).

$$\boxed{2\times 2\times 3}\times\boxed{1\times 2\times 3\times 1}=72\ (\text{LCD})$$

Divisors × Last row

Step 5 Raise each fraction so that each denominator will be 72 and then add fractions.

$$\frac{24}{72}+\frac{9}{72}+\frac{8}{72}+\frac{6}{72}=\frac{47}{72}$$

$\frac{1}{3}=\frac{?}{72}$ $\quad 72\div 3=24$, $\quad 24\times 1=24$

$\frac{1}{8}=\frac{?}{72}$ $\quad 72\div 8=9$, $\quad 9\times 1=9$

The above five steps used for finding LCD with prime numbers are summarized as follows:

Finding Lcd for Two or More Fractions

Step 1 Copy the denominators and arrange them in a separate row.

Step 2 Divide the denominators by the smallest prime number that will divide evenly into at least two numbers.

Step 3 Continue until no prime number divides evenly into at least two numbers.

Step 4 Multiply all the numbers in divisors and last row to find the LCD.

Step 5 Raise all fractions so each has a common denominator and then complete the computation.

Adding Mixed Numbers The following steps will show you how to add mixed numbers:

Adding Mixed Numbers

Step 1 Add the fractions (remember that fractions need common denominators, as in the previous section).

Step 2 Add the whole numbers.

Step 3 Combine the totals of Steps 1 and 2. Be sure you do not have an improper fraction in your final answer. Convert the improper fraction to a whole or mixed number. Add the whole numbers resulting from the improper fraction conversion to the total whole numbers of Step 2. If necessary, reduce the answer to lowest terms.

Example:

$$\begin{array}{rr} 4\frac{7}{20} & 4\frac{7}{20} \\ 6\frac{3}{5} & 6\frac{12}{20} \\ +\,7\frac{1}{4} & +\,7\frac{5}{20} \\ \hline \end{array}$$

$\frac{3}{5}=\frac{?}{20}$

$20\div 5=4$, $\quad 4\times 3=12$

Step 1 $\rightarrow \frac{24}{20}=1\frac{4}{20}$

Step 2 $+\ 17$ $\quad (4+6+7)$

Step 3 $\rightarrow = 18\frac{4}{20}=18\frac{1}{5}$

Using prime numbers to find LCD of example

$$\begin{array}{r|lll} 2 & 20 & 5 & 4 \\ 2 & 10 & 5 & 2 \\ 5 & 5 & 5 & 1 \\ & 1 & 1 & 1 \end{array}$$

$2\times 2\times 5=20$ LCD

Learn: Subtraction of Fractions

The subtraction of fractions is similar to the addition of fractions. This section explains how to subtract like and unlike fractions and how to subtract mixed numbers.

Subtracting Like Fractions To subtract like fractions, use the steps that follow.

Subtracting Like Fractions

Step 1 Subtract the numerators and place the answer over the common denominator.

Step 2 If necessary, reduce the answer to lowest terms.

Example:

$$\frac{9}{10} - \frac{1}{10} = \frac{8 \div 2}{10 \div 2} = \frac{4}{5}$$

$$\uparrow \quad \uparrow$$

Step 1 **Step 2**

Subtracting Unlike Fractions Now let's learn the steps for subtracting unlike fractions.

Subtracting Unlike Fractions

Step 1 Find the LCD.

Step 2 Raise the fraction to its equivalent value.

Step 3 Subtract the numerators and place the answer over the LCD.

Step 4 If necessary, reduce the answer to lowest terms.

Example:

$$\begin{array}{r} \frac{5}{8} \\ -\frac{2}{64} \\ \hline \end{array} \quad \begin{array}{r} \frac{40}{64} \\ -\frac{2}{64} \\ \hline \frac{38}{64} = \frac{19}{32} \end{array}$$

By inspection, we see that LCD is 64.
Thus $64 \div 8 = 8 \times 5 = 40$.

Subtracting Mixed Numbers When you subtract whole numbers, sometimes borrowing is not necessary. At other times, you must borrow. The same is true of subtracting mixed numbers.

Subtracting Mixed Numbers

When Borrowing Is Not Necessary

Step 1 Subtract fractions, making sure to find the LCD.

Step 2 Subtract whole numbers.

Step 3 Reduce the fraction(s) to lowest terms.

When Borrowing Is Necessary

Step 1 Make sure the fractions have the LCD.

Step 2 Borrow from the whole number of the minuend (top number).

Step 3 Subtract the whole numbers and fractions.

Step 4 Reduce the fraction(s) to lowest terms.

Example: Where borrowing is not necessary: Find LCD of 2 and 8. LCD is 8.

$$6\frac{1}{2} \qquad 6\frac{4}{8}$$
$$-\frac{3}{8} \qquad -\frac{3}{8}$$
$$\overline{\qquad} \qquad \overline{\qquad}$$
$$6\frac{1}{8}$$

Example: Where borrowing is necessary:

$$3\frac{1}{2} = \quad 3\frac{2}{4} = \quad 2\frac{6}{4} \left(\frac{4}{4}+\frac{2}{4}\right)$$
$$-1\frac{3}{4} = \quad -1\frac{3}{4} = \quad -1\frac{3}{4}$$
$$\overline{\qquad\qquad} \quad \overline{\qquad\qquad} \quad \overline{\qquad\qquad}$$
LCD is 4. $$1\frac{3}{4}$$

Since $\frac{3}{4}$ is larger than $\frac{2}{4}$, we must borrow 1 from the 3. This is the same as borrowing $\frac{4}{4}$. A fraction with the same numerator and denominator represents a whole. When we add $\frac{4}{4} + \frac{2}{4}$, we get $\frac{6}{4}$. Note how we subtracted the whole number and fractions, being sure to reduce the final answer if necessary.

Learn: How to Dissect and Solve a Word Problem

Let's now look at how to dissect and solve a word problem involving fractions.

The Word Problem Albertsons grocery store has $550\frac{1}{4}$ total square feet of floor space. Albertsons' meat department occupies $115\frac{1}{2}$ square feet, and its deli department occupies $145\frac{7}{8}$ square feet. If the remainder of the floor space is for groceries, what square footage remains for groceries?

	The facts	Solving for?	Steps to take	Key points
Blueprint	*Total square footage:* $550\frac{1}{4}$ sq. ft. *Meat department:* $115\frac{1}{2}$ sq. ft. *Deli department:* $145\frac{7}{8}$ sq. ft.	Total square footage for groceries.	Total floor space – Total meat and deli floor space = Total grocery floor space.	Denominators must be the same before adding or subtracting fractions. $\frac{8}{8} = 1$ Never leave improper fraction as final answer.

Money Tip Create an emergency fund for the unexpected. Having at least six months of monthly expenses in a liquid account will provide you with a great cushion in the event of an unforeseen expense.

Steps to solving problem

1. Calculate total square footage of the meat and deli departments.

$$\begin{array}{rl} \text{Meat:} & 115\frac{1}{2} = 115\frac{4}{8} \\ \text{Deli:} & +\,145\frac{7}{8} = +\,145\frac{7}{8} \\ \hline & 260\frac{11}{8} = 261\frac{3}{8}\text{ sq. ft.} \end{array}$$

2. Calculate total grocery square footage.

$$\begin{array}{l} 550\frac{1}{4} = 550\frac{2}{8} = 549\frac{10}{8} \quad \left(\frac{2}{8}+\frac{8}{8}\right) \\ -261\frac{3}{8} = -261\frac{3}{8} = -\,261\frac{3}{8} \\ \hline 288\frac{7}{8}\text{ sq. ft.} \end{array}$$

Check

$$\begin{array}{l} 261\frac{3}{8} \\ +\,288\frac{7}{8} \\ \hline 549\frac{10}{8} = 550\frac{2}{8} = 550\frac{1}{4}\text{ sq. ft.} \end{array}$$

Note how the above blueprint aid helped to gather the facts and identify what we were looking for. To find the total square footage for groceries, we first had to sum the areas for meat and deli. Then we could subtract these areas from the total square footage. Also note that in Step 1 above, we didn't leave the answer as an improper fraction. In Step 2, we borrowed from the 550 so that we could complete the subtraction.

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

Practice Quiz

Complete this Practice Quiz to see how you are doing.

1. Find LCD by the division of prime numbers:

12, 9, 6, 4

2. Add and reduce to lowest terms if needed:

a. $\frac{3}{40}+\frac{2}{5}$ **b.** $2\frac{3}{4}+6\frac{1}{20}$

3. Subtract and reduce to lowest terms if needed:

a. $\frac{6}{7}-\frac{1}{4}$ **b.** $8\frac{1}{4}-3\frac{9}{28}$ **c.** $4-1\frac{3}{4}$

4. Computerland has $660\frac{1}{4}$ total square feet of floor space. Three departments occupy this floor space: hardware, $201\frac{1}{8}$ square feet; software, $242\frac{1}{4}$ square feet; and customer service, _____ square feet. What is the total square footage of the customer service area? You might want to try a blueprint aid, since the solution will show a completed blueprint aid.

✓ Solutions

1.

$$\begin{array}{r|llll} 2 & 12 & 9 & 6 & 4 \\ 2 & 6 & 9 & 3 & 2 \\ 3 & 3 & 9 & 3 & 1 \\ & 1 & 3 & 1 & 1 \end{array}$$

$\text{LCD} = 2\times 2\times 3\times 1\times 3\times 1\times 1 = \boxed{36}$

2. a. $\frac{3}{40}+\frac{2}{5}=\frac{3}{40}+\frac{16}{40}=\boxed{\frac{19}{40}}$ $\left(\frac{2}{5}=\frac{?}{40}\right)$

$40\div 5 = 8\times 2 = 16$

b. $2\frac{3}{4}$ $2\frac{15}{20}$

$+6\frac{1}{20}$ $+6\frac{1}{20}$

$8\frac{16}{20}=\boxed{8\frac{4}{5}}$

$\frac{3}{4}=\frac{?}{20}$

$20\div 4 = 5\times 3 = 15$

3. a.

$\frac{6}{7}=\frac{24}{28}$

$-\frac{1}{4}=-\frac{7}{28}$

$\boxed{\frac{17}{28}}$

b. $8\frac{1}{4}=8\frac{7}{28}=7\frac{35}{28}$ $\longleftarrow\left(\frac{28}{28}+\frac{7}{28}\right)$

$-3\frac{9}{28}=-3\frac{9}{28}=-3\frac{9}{28}$

$4\frac{26}{28}=\boxed{4\frac{13}{14}}$

c. $3\frac{4}{4}$

$-1\frac{3}{4}$

$\boxed{2\frac{1}{4}}$

Note how we showed the 4 as $3\frac{4}{4}$.

Practice Quiz *Continued*

4. Computerland's total square footage for customer service:

	The facts	Solving for?	Steps to take	Key points
Blueprint	*Total square footage:* $660\frac{1}{4}$ sq. ft. *Hardware:* $201\frac{1}{8}$ sq. ft. *Software:* $242\frac{1}{4}$ sq. ft.	Total square footage for customer service.	Total floor space – Total hardware and software floor space = Total customer service floor space.	Denominators must be the same before adding or subtracting fractions.

Steps to solving problem

1. Calculate the total square footage of hardware and software.

$$\begin{array}{rl} 201\frac{1}{8} = & 201\frac{1}{8} \text{ (hardware)} \\ +242\frac{1}{4} = & +242\frac{2}{8} \text{ (software)} \\ \hline & 443\frac{3}{8} \end{array}$$

2. Calculate the total square footage for customer service.

$$660\frac{1}{4} = 660\frac{2}{8} = 659\frac{10}{8} \text{ (total square footage)}$$

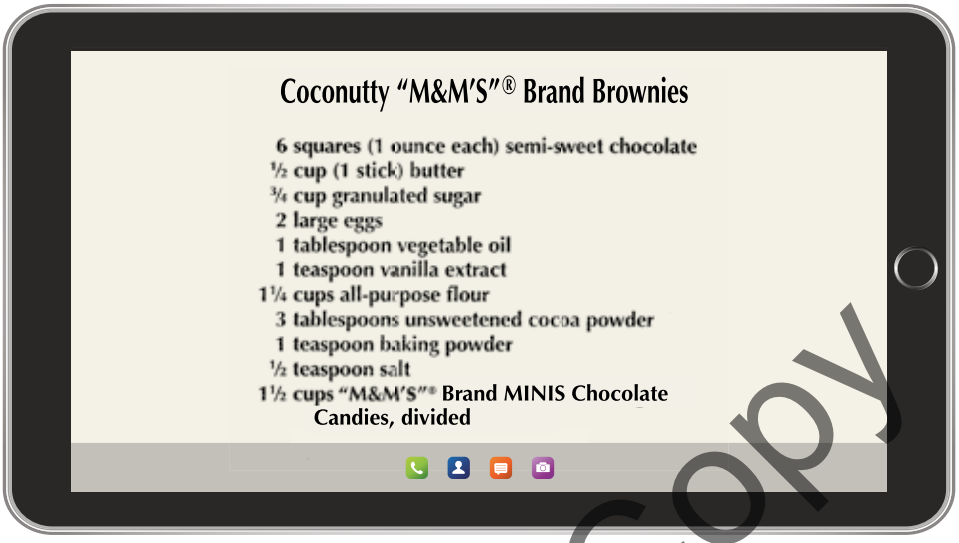
$$-443\frac{3}{8} = -443\frac{3}{8} = -443\frac{3}{8} \text{ (hardware plus software)}$$

$216\frac{7}{8}$ sq. ft. (customer service)

Learning Unit 2–3:

Multiplying and Dividing Fractions

The following recipe for Coconutty "M&M'S"® Brand Brownies makes 16 brownies. What would you need if you wanted to triple the recipe and make 48 brownies?



Source: Adapted from Mars, Inc.

In this unit you learn how to multiply and divide fractions.

Learn: Multiplication of Fractions

Multiplying fractions is easier than adding and subtracting fractions because you do not have to find a common denominator. This section explains the multiplication of proper fractions and the multiplication of mixed numbers.

Multiplying Proper Fractions[3]

Step 1 Multiply the numerators and the denominators.

Step 2 Reduce the answer to lowest terms or use the cancellation method.

First let's look at an example that results in an answer that we do not have to reduce.

Example:

$$\frac{1}{7} \times \frac{5}{8} = \frac{5}{56}$$

In the next example, note how we reduce the answer to lowest terms.

Example:

$$\frac{5}{1} \times \frac{1}{6} \times \frac{4}{7} = \frac{20}{42} = \frac{10}{21}$$

Keep in mind $\frac{5}{1}$ is equal to 5.

[3] You would follow the same procedure to multiply improper fractions.

We can reduce $\frac{20}{42}$ by the step approach as follows:

$$\begin{array}{r} 2 \\ 20\overline{)42} \\ \underline{40} \\ 2 \end{array} \qquad \begin{array}{r} 10 \\ 2\overline{)20} \\ \underline{20} \\ 0 \end{array}$$

$$\frac{20 \div 2}{42 \div 2} = \boxed{\frac{10}{21}}$$

We could also have found the greatest common divisor by inspection.

As an alternative to reducing fractions to lowest terms, we can use the **cancellation** technique. Let's work the previous example using this technique.

Example:

$$\frac{5}{1} \times \frac{1}{\cancel{6}_{3}} \times \frac{\overset{2}{\cancel{4}}}{7} = \boxed{\frac{10}{21}}$$

2 divides evenly into 4 twice and into 6 three times.

Note that when we cancel numbers, we are reducing the answer before multiplying. We know that multiplying or dividing both numerator and denominator by the same number gives an equivalent fraction. So we can divide both numerator and denominator by any number that divides them both evenly. It doesn't matter which we divide first. Note that this division reduces $\frac{10}{21}$ to its lowest terms.

Multiplying Mixed Numbers The following steps explain how to multiply mixed numbers:

Multiplying Mixed Numbers

Step 1 Convert the mixed numbers to improper fractions.

Step 2 Multiply the numerators and denominators.

Step 3 Reduce the answer to lowest terms or use the cancellation method.

Example:

$$2\frac{1}{3} \times 1\frac{1}{2} = \frac{7}{\cancel{3}_{1}} \times \frac{\overset{1}{\cancel{3}}}{2} = \frac{7}{2} = \boxed{3\frac{1}{2}}$$

Step 1 **Step 2** **Step 3**

Before we look at dividing fractions, reference the article below from the *Wall Street Journal*, "Seeing is Believing," showing research of the brain and its relationship to your fingers and math skills.

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Learn: Division of Fractions

When you studied whole numbers in Chapter 1, you saw how multiplication can be checked by division. The multiplication of fractions can also be checked by division, as you will see in this section on dividing proper fractions and mixed numbers.

Dividing Proper Fractions The division of proper fractions introduces a new term—the **reciprocal.** To use reciprocals, we must first recognize which fraction in the problem is the divisor—the fraction that we divide by. Let's assume the problem we are to solve is $\frac{1}{8} \div \frac{2}{3}$. We read this problem as "$\frac{1}{8}$ divided by $\frac{2}{3}$." The divisor is the fraction after the division sign (or the second fraction). The steps that follow show how the divisor becomes a reciprocal.

Jef Mallett dated 2/27/2013/Andrews McMeel Syndication

Dividing Proper Fractions

Step 1 Invert (turn upside down) the divisor (the second fraction). The inverted number is the *reciprocal.*

Step 2 Multiply the fractions.

Step 3 Reduce the answer to lowest terms or use the cancellation method.

Do you know why the inverted fraction number is a reciprocal? Reciprocals are two numbers that when multiplied give a product of 1. For example, 2 (which is the same as $\frac{2}{1}$) and $\frac{1}{2}$ are reciprocals because multiplying them gives 1.

Example:

$$\frac{1}{8} \div \frac{2}{3} \qquad \frac{1}{8} \times \frac{3}{2} = \frac{3}{16}$$

Dividing Mixed Numbers Now you are ready to divide mixed numbers by using improper fractions.

Dividing Mixed Numbers

Step 1 Convert all mixed numbers to improper fractions.

Step 2 Invert the divisor (take its reciprocal) and multiply. If your final answer is an improper fraction, reduce it to lowest terms. You can do this by finding the greatest common divisor or by using the cancellation technique.

Example:

$$8\frac{3}{4} \div 2\frac{5}{6}$$

Step 1 $\frac{35}{4} \div \frac{17}{6}$

Step 2 $\frac{35}{\cancel{4}_{2}} \times \frac{\overset{3}{\cancel{6}}}{17} = \frac{105}{34} = 3\frac{3}{34}$ Here we used the cancellation technique.

Learn: How to Dissect and Solve a Word Problem

The Word Problem Jamie ordered $5\frac{1}{2}$ cords of oak. The cost of each cord is \$150. He also ordered $2\frac{1}{4}$ cords of maple at \$120 per cord. Jamie's neighbor, Al, said that he would share the wood and pay him $\frac{1}{5}$ of the total cost. How much did Jamie receive from Al?

Note how we filled in the blueprint aid columns. We first had to find the total cost of all the wood before we could find Al's share—$\frac{1}{5}$ of the total cost.

Blueprint	The facts	Solving for?	Steps to take	Key points
	Cords ordered: $5\frac{1}{2}$ at \$150 per cord; $2\frac{1}{4}$ at \$120 per cord. *Al's cost share:* $\frac{1}{5}$ the total cost.	What will Al pay Jamie?	Total cost of wood × $\frac{1}{5}$ = Al's cost.	Convert mixed numbers to improper fractions when multiplying. Cancellation is an alternative to reducing fractions.

Money Tip Make good buying decisions. Do not spend more money than you make. In fact, remember to pay yourself first by putting away money each paycheck for your retirement—even \$10 each paycheck adds up.

Steps to solving problem

1. Calculate the cost of oak. $5\frac{1}{2} \times \$150 = \frac{11}{\cancel{2}_{1}} \times \overset{\$75}{\cancel{\$150}} = \$825$

2. Calculate the cost of maple. $2\frac{1}{4} \times \$120 = \frac{9}{\cancel{4}_{1}} \times \overset{\$30}{\cancel{\$120}} = \$270$

3. What Al pays. $\frac{1}{\cancel{5}_{1}} \times \overset{\$219}{\cancel{\$1,095}} = \$219$ ($\overline{\$1,095}$ (total cost of wood))

You should now be ready to test your knowledge of the final unit in the chapter.

Practice Quiz

Complete this Practice Quiz to see how you are doing.

1. Multiply (use cancellation technique):

a. $\frac{4}{8} \times \frac{4}{6}$ **b.** $35 \times \frac{4}{7}$

2. Multiply (do not use canceling; reduce by finding the greatest common divisor):

$\frac{14}{15} \times \frac{7}{10}$

3. Complete the following. Reduce to lowest terms as needed.

a. $\frac{1}{9} \div \frac{5}{6}$ **b.** $\frac{51}{5} \div \frac{5}{9}$

4. Jill Estes bought a mobile home that was $8\frac{1}{8}$ times as expensive as the home her brother bought. Jill's brother paid \$16,000 for his mobile home. What is the cost of Jill's new home?

✓ Solutions

1. a. $\frac{\overset{1}{\cancel{4}}}{\underset{2}{\cancel{8}}} \times \frac{1}{\underset{3}{\cancel{6}}} = \frac{1}{3}$ **b.** $\frac{\overset{5}{\cancel{35}}}{1} \times \frac{4}{\underset{1}{\cancel{7}}} = 20$

2. $\frac{14}{15} \times \frac{7}{10} = \frac{98 \div 2}{150 \div 2} = \frac{49}{75}$

$98\overline{)150}$ 1, remainder 52 → $52\overline{)98}$ 1, remainder 46 → $46\overline{)52}$ 1, remainder 6 → $6\overline{)46}$ 7, remainder 4 → $4\overline{)6}$ 1, remainder 2 → $2\overline{)4}$ 2, remainder 0

3. a. $\frac{1}{9} \times \frac{6}{5} = \frac{6 \div 3}{45 \div 3} = \frac{2}{15}$ **b.** $\frac{51}{5} \times \frac{9}{5} = \frac{459}{25} = 18\frac{9}{25}$

4. Total cost of Jill's new home:

	The facts	Solving for?	Steps to take	Key points
Blueprint	Jill's mobile home: $8\frac{1}{8}$ as expensive as her brother's. *Brother paid:* \$16,000.	Total cost of Jill's new home.	$8\frac{1}{8} \times$ Total cost of Jill's brother's mobile home = Total cost of Jill's new home.	Canceling is an alternative to reducing.

Steps to solving problem

1. Convert $8\frac{1}{8}$ to a mixed number. $\frac{65}{8}$

2. Calculate the total cost of Jill's home. $\frac{65}{\underset{1}{\cancel{8}}} \times \overset{\$2{,}000}{\cancel{\$16{,}000}} = \$130{,}000$

Chapter 2 Review

Topic/Procedure/Formula	Example	You try it*
Types of fractions *Proper:* Value less than 1; numerator smaller than denominator. *Improper:* Value equal to or greater than 1; numerator equal to or greater than denominator. *Mixed:* Sum of whole number greater than zero and a proper fraction.	$\frac{3}{5}, \frac{7}{9}, \frac{8}{15}$ $\frac{14}{14}, \frac{19}{18}$ $6\frac{3}{8}, 9\frac{8}{9}$	**Identify type of fraction** $\frac{3}{10}, \frac{9}{8}, 1\frac{4}{5}$
Fraction conversions *Improper to whole or mixed:* Divide numerator by denominator; place remainder over old denominator. *Mixed to improper:* $\frac{\text{Whole number} \times \text{Denominator} + \text{Numerator}}{\text{Old denominator}}$	$\frac{17}{4} = 4\frac{1}{4}$ $4\frac{1}{8} = \frac{32+1}{8} = \frac{33}{8}$	**Convert to mixed number** $\frac{18}{7}$ **Convert to improper fraction** $5\frac{1}{7}$
Reducing fractions to lowest terms 1. Divide numerator and denominator by largest possible divisor (does not change fraction value). 2. When reduced to lowest terms, no number (except 1) will divide evenly into both numerator and denominator.	$\frac{18 \div 2}{46 \div 2} = \frac{9}{23}$	**Reduce to lowest terms** $\frac{16}{24}$
Step approach for finding greatest common denominator 1. Divide smaller number of fraction into larger number. 2. Divide remainder into divisor of Step 1. Continue this process until no remainder results. 3. The last divisor used is the greatest common divisor.	$\frac{15}{65} \rightarrow 15\overline{)65}$ R 5; $5\overline{)15}$ R 0 5 is greatest common divisor.	**Find greatest common denominator** $\frac{20}{50}$
Raising fractions to higher terms Multiply numerator and denominator by same number. Does not change fraction value.	$\frac{15}{41} = \frac{?}{410}$ $410 \div 40 = 10 \times 15 = 150$	**Raise to higher terms** $\frac{16}{31} = \frac{?}{310}$

Chapter 2 Review *(Continued)*

Topic/Procedure/Formula	Example	You try it*
Adding and subtracting like and unlike fractions When denominators are the same (like fractions), add (or subtract) numerators, place total over original denominator, and reduce to lowest terms. When denominators are different (unlike fractions), change them to like fractions by finding LCD using inspection or prime numbers. Then add (or subtract) the numerators, place total over LCD, and reduce to lowest terms.	$\frac{4}{9}+\frac{1}{9}=\frac{5}{9}$ $\frac{4}{9}-\frac{1}{9}=\frac{3}{9}=\frac{1}{3}$ $\frac{4}{5}+\frac{2}{7}=\frac{28}{35}+\frac{10}{35}=\frac{38}{35}=1\frac{3}{35}$	**Add** $\frac{3}{7}+\frac{2}{7}$ **Subtract** $\frac{5}{7}-\frac{2}{7}$ **Add** $\frac{5}{8}+\frac{3}{40}$
Prime numbers Whole numbers larger than 1 that are only divisible by itself and 1.	2, 3, 5, 7, 11	**List the next two prime numbers after 11**
LCD by prime numbers **1.** Copy denominators and arrange them in a separate row. **2.** Divide denominators by smallest prime number that will divide evenly into at least two numbers. **3.** Continue until no prime number divides evenly into at least two numbers. **4.** Multiply all the numbers in the divisors and last row to find LCD. **5.** Raise fractions so each has a common denominator and complete computation.	$\frac{1}{3}+\frac{1}{6}+\frac{1}{8}+\frac{1}{12}+\frac{1}{9}$ 2 | 3 6 8 12 9 2 | 3 3 4 6 9 3 | 3 3 2 3 9 1 1 2 1 3 $2\times2\times3\times1\times1\times2\times1\times3=72$	**Find LCD** $\frac{1}{2}+\frac{1}{4}+\frac{1}{5}$
Adding mixed numbers **1.** Add fractions. **2.** Add whole numbers. **3.** Combine totals of Steps 1 and 2. If denominators are different, a common denominator must be found. Answer cannot be left as improper fraction.	$1\frac{4}{7}+1\frac{3}{7}$ Step 1: $\frac{4}{7}+\frac{3}{7}=\frac{7}{7}$ Step 2: $1+1=2$ Step 3: $2\frac{7}{7}=3$	**Add mixed numbers** $2\frac{1}{4}+3\frac{3}{4}$
Subtracting mixed numbers **1.** Subtract fractions. **2.** If necessary, borrow from whole numbers. **3.** Subtract whole numbers and fractions if borrowing was necessary. **4.** Reduce fractions to lowest terms. If denominators are different, a common denominator must be found.	$12\frac{2}{5}-7\frac{3}{5}$ $11\frac{7}{5}-7\frac{3}{5}$ $=4\frac{4}{5}$ Due to borrowing $\frac{5}{5}$ from number 12 $\frac{5}{5}+\frac{2}{5}=\frac{7}{5}$ The whole number is now 11.	**Subtract mixed numbers** $11\frac{1}{3}$ $-2\frac{2}{3}$

Chapter 2 Review (*Continued*)

Topic/Procedure/Formula	Example	You try it*
Multiplying proper fractions **1.** Multiply numerators and denominators. **2.** Reduce answer to lowest terms or use cancellation method.	$\frac{4}{\cancel{7}_{1}} \times \frac{\overset{1}{\cancel{7}}}{9} = \boxed{\frac{4}{9}}$	**Multiply and reduce** $\frac{4}{5} \times \frac{25}{26}$
Multiplying mixed numbers **1.** Convert mixed numbers to improper fractions. **2.** Multiply numerators and denominators. **3.** Reduce answer to lowest terms or use cancellation method.	$1\frac{1}{8} \times 2\frac{5}{8}$ $\frac{9}{8} \times \frac{21}{8} = \frac{189}{64} = \boxed{2\frac{61}{64}}$	**Multiply and reduce** $2\frac{1}{4} \times 3\frac{1}{4}$
Dividing proper fractions **1.** Invert divisor. **2.** Multiply. **3.** Reduce answer to lowest terms or use cancellation method.	$\frac{1}{4} \div \frac{1}{8} = \frac{1}{\cancel{4}_{1}} \times \frac{\overset{2}{\cancel{8}}}{1} = \boxed{2}$	**Divide** $\frac{1}{8} \div \frac{1}{4}$
Dividing mixed numbers **1.** Convert mixed numbers to improper fractions. **2.** Invert divisor and multiply. If final answer is an improper fraction, reduce to lowest terms by finding greatest common divisor or using the cancellation method.	$1\frac{1}{2} \div 1\frac{5}{8} = \frac{3}{2} \div \frac{13}{8}$ $= \frac{3}{\cancel{2}_{1}} \times \frac{\overset{4}{\cancel{8}}}{13}$ $= \boxed{\frac{12}{13}}$	**Dividing mixed numbers** $3\frac{1}{4} \div 1\frac{4}{5}$

Key Terms

Cancellation
Common denominator
Denominator
Equivalent
Fraction
Greatest common divisor
Higher terms
Improper fraction
Least common denominator (LCD)
Like fractions
Lowest terms
Mixed numbers
Numerator
Prime numbers
Proper fraction
Reciprocal
Unlike fractions

*Worked-out solutions are in Appendix A.

Chapter 2 Review (*Continued*)

Critical Thinking Discussion Questions with Chapter Concept Check

1. What are the steps to convert improper fractions to whole or mixed numbers? Give an example of how you could use this conversion procedure when you eat at Pizza Hut.
2. What are the steps to convert mixed numbers to improper fractions? Show how you could use this conversion procedure when you order doughnuts at Dunkin' Donuts.
3. What is the greatest common divisor? How could you use the greatest common divisor to write an advertisement showing that 35 out of 60 people prefer MCI to AT&T?
4. Explain the step approach for finding the greatest common divisor. How could you use the MCI–AT&T example in question 3 to illustrate the step approach?
5. Explain the steps of adding or subtracting unlike fractions. Using a ruler, measure the heights of two different-size cans of food and show how to calculate the difference in height.
6. What is a prime number? Using the two cans in question 5, show how you could use prime numbers to calculate the LCD.
7. Explain the steps for multiplying proper fractions and mixed numbers. Assume you went to Staples (a stationery superstore). Give an example showing the multiplying of proper fractions and mixed numbers.
8. **Chapter Concept Check.** Using all the information you have learned about fractions, search the web to find out how many cars are produced in the United States in a year and what fractional part represents cars produced by foreign-owned firms. Finally, present calculations using fractions.
9. Explain how you can use fractions to summarize the pandemic in the United States.

End-of-Chapter Problems

Name _____ Date _____

Check figures for odd-numbered problems in Appendix A.

Drill Problems

Identify the following types of fractions: *LU 2-1(1)*

2–1. $\frac{9}{10}$ **2–2.** $\frac{12}{11}$ **2–3.** $\frac{25}{13}$

Convert the following to mixed numbers: *LU 2-1(2)*

2–4. $\frac{91}{10}$ **2–5.** $\frac{921}{15}$

Convert the following to improper fractions: *LU 2-1(2)*

2–6. $8\frac{7}{8}$ **2–7.** $19\frac{2}{3}$

Reduce the following to the lowest terms. Show how to calculate the greatest common divisor by the step approach. *LU 2-1(3)*

2–8. $\frac{16}{38}$ **2–9.** $\frac{44}{52}$

Convert the following to higher terms: *LU 2-1(3)*

2–10. $\frac{9}{10} = \frac{\quad}{70}$

Determine the LCD of the following (a) by inspection and (b) by division of prime numbers: *LU 2-2(2)*

2–11. $\frac{3}{4}, \frac{7}{12}, \frac{5}{6}, \frac{1}{5}$ **Check**

Inspection

2–12. $\frac{5}{6}, \frac{7}{18}, \frac{5}{9}, \frac{2}{72}$ **Check**

Inspection

2–13. $\frac{1}{4}, \frac{3}{32}, \frac{5}{48}, \frac{1}{8}$ **Check**

Inspection

Add the following and reduce to lowest terms: *LU 2-2(1), LU 2-1(3)*

2–14. $\frac{3}{9}+\frac{3}{9}$

2–15. $\frac{3}{7}+\frac{4}{21}$

2–16. $6\frac{1}{8}+4\frac{3}{8}$

2–17. $6\frac{3}{8}+9\frac{1}{24}$

2–18. $9\frac{9}{10}+6\frac{7}{10}$

Subtract the following and reduce to lowest terms: *LU 2-2(3), LU 2-1(3)*

2–19. $\frac{11}{12}-\frac{1}{12}$

2–20. $14\frac{3}{8}-10\frac{5}{8}$

2–21. $12\frac{1}{9}-4\frac{2}{3}$

Multiply the following and reduce to lowest terms. Do not use the cancellation technique for these problems. *LU 2-3(1), LU 2-1(3)*

2–22. $17\times\frac{4}{2}$

2–23. $\frac{5}{6}\times\frac{3}{8}$

2–24. $8\frac{7}{8}\times 64$

Multiply the following. Use the cancellation technique. *LU 2-3(1), LU 2-1(2)*

2–25. $\frac{4}{10}\times\frac{30}{60}\times\frac{6}{10}$

2–26. $3\frac{3}{4}\times\frac{8}{9}\times 4\frac{9}{12}$

Divide the following and reduce to lowest terms. Use the cancellation technique as needed. *LU 2-3(2), LU 2-1(2)*

2–27. $\frac{12}{9}\div 4$

2–28. $18\div\frac{1}{5}$

2–29. $4\frac{2}{3}\div 12$

2–30. $3\frac{5}{6}\div 3\frac{1}{2}$

Word Problems

2–31. Michael Wittry has been investing in his Roth IRA retirement account for 20 years. Two years ago, his account was worth $215,658. After losing $\frac{1}{3}$ of its original value, it then gained $\frac{1}{2}$ of its new value back. What is the current value of his Roth IRA? *LU 2-3(1)*

End-of-Chapter Problems (*Continued*)

2–32. Delta pays Pete Rose $180 per day to work in the maintenance department at the airport. Pete became ill on Monday and went home after $\frac{1}{6}$ of a day. What did he earn on Monday? Assume no work, no pay. *LU 2-3(1)*

2–33. The Spanish flu infected $\frac{1}{3}$ of the worldwide population in 1918–1919. If the worldwide population was 1,500,000, how many people contracted the disease?

2–34. Joy Wigens, who works at Putnam Investments, received a check for $1,600. She deposited $\frac{1}{4}$ of the check in her Citibank account. How much money does Joy have left after the deposit? *LU 2-3(1)*

2–35. Lee Jenkins worked the following hours as a manager for a local Pizza Hut: $14\frac{1}{4}, 5\frac{1}{4}, 8\frac{1}{2}$ and $7\frac{1}{4}$. How many total hours did Lee work? *LU 2-2(1)*

2–36. Lester bought a piece of property in Vail, Colorado. The sides of the land measure $115\frac{1}{2}$ feet, $66\frac{1}{4}$ feet, $106\frac{1}{8}$ feet, and $110\frac{1}{4}$ feet. Lester wants to know the perimeter (sum of all sides) of his property. Can you calculate the perimeter for Lester? *LU 2-2(1)*

2–37. Tiffani Lind got her new weekly course schedule from Roxbury Community College in Boston. Following are her classes and their length: Business Math, $2\frac{1}{2}$ hours; Introduction to Business, $1\frac{1}{2}$ hours; Microeconomics, $1\frac{1}{2}$ hours; Spanish, $2\frac{1}{4}$ hours; Marketing, $1\frac{1}{4}$ hours; and Business Statistics, $1\frac{3}{4}$ hours. How long will she be in class each week? *LU 2-2(1)*

2–38. Seventy-seven million people were born between 1946 and 1964. The U.S. Census classifies this group of individuals as baby boomers. It is said that today and every day for the next 18 years, 10,000 baby boomers will reach 65. If $\frac{1}{4}$ of the 65 and older age group uses e-mail, $\frac{1}{5}$ obtains the news from the Internet, and $\frac{1}{6}$ searches the Internet, find the LCD and determine total technology usage for this age group as a fraction. *LU 2-2(1, 2)*

2–39. At a local Walmart store, a Coke dispenser held $19\frac{1}{4}$ gallons of soda. During working hours, $12\frac{3}{4}$ gallons were dispensed. How many gallons of Coke remain? *LU 2-2(2, 3)*

2–40. If two coronavirus vaccines have been administered to a total of 398,675,414 people in the United States, and the Pfizer-BioNTech vaccine was administered to $\frac{9}{17}$ of the U.S. population, how many people received the Moderna vaccine? Round to the nearest whole person.

2–41. A local garden center charges $250 per cord of wood. If Logan Grace orders $3\frac{1}{2}$ cords, what will the total cost be? *LU 2-3(1)*

2–42. A local Target store bought 90 pizzas at Pizza Hut for its holiday party. Each guest ate $\frac{1}{6}$ of a pizza and there was no pizza left over. How many guests did Target have for the party? *LU 2-3(1)*

2–43. Marc, Steven, and Daniel entered into a Subway sandwich shop partnership. Marc owns $\frac{1}{9}$ of the shop and Steven owns $\frac{1}{4}$. What part does Daniel own? *LU 2-2(1, 2)*

2–44. Lionel Sullivan works for Burger King. He is paid time and one-half for Sundays. If Lionel works on Sunday for 6 hours at a regular pay of $8 per hour, what does he earn on Sunday? *LU 2-3(1)*

2–45. DaveRamsey.com's "Baby Step 3" out of "7 Baby Steps" for financial health recommends a $1,000 emergency fund if you have debt; and, once you are free of debt, he recommends a fully funded emergency fund of at least six months of monthly expenses depending on your job situation. If your starting goal is to have a 4-month emergency fund and your monthly expenses total $2,750, how much more do you have to save if you currently have $\frac{2}{3}$ of your fund saved? Round to the nearest dollar.

excel **2–46.** A trip to the White Mountains of New Hampshire from Boston will take you $2\frac{3}{4}$ hours. Assume you have traveled $\frac{1}{11}$ of the way. How much longer will the trip take? *LU 2-3(1, 2)*

End-of-Chapter Problems (*Continued*)

excel **2–47.** Andy, who loves to cook, makes apple cobbler for his family. The recipe (serves 6) calls for $1\frac{1}{2}$ pounds of apples, $3\frac{1}{4}$ cups of flour, $\frac{1}{4}$ cup of margarine, $2\frac{3}{8}$ cups of sugar, and 2 teaspoons of cinnamon. Since guests are coming, Andy wants to make a cobbler that will serve 15 (or increase the recipe $2\frac{1}{2}$ times). How much of each ingredient should Andy use? *LU 2-3(1, 2)*

2–48. Mobil allocates $1{,}692\frac{3}{4}$ gallons of gas per month to Jerry's Service Station. The first week, Jerry sold $275\frac{1}{2}$ gallons; second week, $280\frac{1}{4}$ gallons; and third week, $189\frac{1}{8}$ gallons. If Jerry sells $582\frac{1}{2}$ gallons in the fourth week, how close is Jerry to selling his allocation? *LU 2-2(4)*

2–49. A marketing class at North Shore Community College conducted a viewer preference survey. The survey showed that $\frac{5}{6}$ of the people surveyed preferred Apple's iPhone over the Blackberry. Assume 2,400 responded to the survey. How many favored using a Blackberry? *LU 2-3(1, 2)*

2–50. The price of a used Toyota LandCruiser has increased to $1\frac{1}{4}$ times its earlier price. If the original price of the LandCruiser was $30,000, what is the new price? *LU 2-3(1, 2)*

2–51. Tempco Corporation has a machine that produces $12\frac{1}{2}$ baseball gloves each hour. In the last 2 days, the machine has run for a total of 22 hours. How many baseball gloves has Tempco produced? *LU 2-3(2)*

2–52. Alicia, an employee of Dunkin' Donuts, receives $23\frac{1}{4}$ days per year of vacation time. So far this year she has taken $3\frac{1}{8}$ days in January, $5\frac{1}{2}$ days in May, $6\frac{1}{4}$ days in July, and $4\frac{1}{4}$ days in September. How many more days of vacation does Alicia have left? *LU 2-2(1, 2, 3)*

excel **2–53.** A Hamilton multitouch watch was originally priced at $600. At a closing of the Alpha Omega Jewelry Shop, the watch is being reduced by $\frac{1}{4}$. What is the new selling price? *LU 2-3(1)*

2–54. Shelly Van Doren hired a contractor to refinish her kitchen. The contractor said the job would take $49\frac{1}{2}$ hours. To date, the contractor has worked the following hours:

Monday	$4\frac{1}{4}$
Tuesday	$9\frac{1}{8}$
Wednesday	$4\frac{1}{4}$
Thursday	$3\frac{1}{2}$
Friday	$10\frac{5}{8}$

How much longer should the job take to be completed? *LU 2-2(4)*

2–55. An issue of *Taunton's Fine Woodworking* included plans for a hall stand. The total height of the stand is $81\frac{1}{2}$ inches. If the base is $36\frac{5}{16}$ inches, how tall is the upper portion of the stand? *LU 2-2(4)*

2–56. Albertsons grocery planned a big sale on apples and received 750 crates from the wholesale market. Albertsons will bag these apples in plastic. Each plastic bag holds $\frac{1}{9}$ of a crate. If Albertsons has no loss to perishables, how many bags of apples can be prepared? *LU 2-3(1)*

End-of-Chapter Problems (*Continued*)

2–57. Frank Puleo bought 6,625 acres of land in ski country. He plans to subdivide the land into parcels of $13\frac{1}{4}$ acres each. Each parcel will sell for $125,000. How many parcels of land will Frank develop? If Frank sells all the parcels, what will be his total sales? *LU 2-3(1)*

If Frank sells $\frac{3}{5}$ of the parcels in the first year, what will be his total sales for the year?

2–58. A local Papa Gino's conducted a food survey. The survey showed that $\frac{1}{9}$ of the people surveyed preferred eating pasta to hamburger. If 5,400 responded to the survey, how many actually favored hamburger? *LU 2-3(1)*

2–59. Tamara, Jose, and Milton entered into a partnership that sells men's clothing on the web. Tamara owns $\frac{3}{8}$ of the company and Jose owns $\frac{1}{4}$. What part does Milton own? *LU 2-2(1, 3)*

2–60. *Quilters Newsletter Magazine* gave instructions on making a quilt. The quilt required $4\frac{1}{2}$ yards of white-on-white print, 2 yards blue check, $\frac{1}{2}$ yard blue-and-white stripe, $2\frac{3}{4}$ yards blue scraps, $\frac{3}{4}$ yard yellow scraps, and $4\frac{7}{8}$ yards lining. How many total yards are needed? *LU 2-2(1, 2)*

2–61. A trailer carrying supplies for a Krispy Kreme from Virginia to New York will take $3\frac{1}{4}$ hours. If the truck traveled $\frac{1}{5}$ of the way, how much longer will the trip take? *LU 2-3(1, 2)*

2–62. Land Rover has increased the price of a FreeLander by $\frac{1}{5}$ from the original price. The original price of the FreeLander was $30,000. What is the new price? *LU 2-3(1, 2)*

Challenge Problems

2–63. *Woodsmith* magazine gave instructions on how to build a pine cupboard. Lumber will be needed for two shelves $10\frac{1}{4}$ inches long, two base sides $12\frac{1}{2}$ inches long, and two door stiles $29\frac{1}{8}$ inches long. Your lumber comes in 6 foot lengths. **(a)** How many feet of lumber will you need? **(b)** If you want $\frac{1}{2}$ a board left over, is this possible with two boards?
LU 2-2(1, 2, 3, 4)

End-of-Chapter Problems (*Continued*)

2–64. Jack MacLean has entered into a real estate development partnership with Bill Lyons and June Reese. Bill owns $\frac{1}{4}$ of the partnership, while June has a $\frac{1}{5}$ interest. The partners will divide all profits on the basis of their fractional ownership. The partnership bought 900 acres of land and plans to subdivide each lot into $2\frac{1}{4}$ acres. Homes in the area have been selling for $240,000. By time of completion, Jack estimates the price of each home will increase by $\frac{1}{3}$ of the current value. The partners sent a survey to 12,000 potential customers to see whether they should heat the homes with oil or gas. One-fourth of the customers responded by indicating a 5-to-1 preference for oil. From the results of the survey, Jack now plans to install a 270-gallon oil tank at each home. He estimates that each home will need five fills per year. The current price of home heating fuel is $1 per gallon. The partnership estimates its profit per home will be $\frac{1}{8}$ the selling price of each home. From the above, please calculate the following:
LU 2-1(1, 2, 3), LU 2-2(1, 2, 3, 4), LU 2-3(1, 2)

a. Number of homes to be built.

b. Selling price of each home.

c. Number of people responding to survey.

d. Number of people desiring oil.

e. Average monthly cost per house to heat using oil.

f. Amount of profit Jack will receive from the sale of homes.

Summary Practice Test

Do you need help? Connect videos have step-by-step worked-out solutions.

Identify the following types of fractions. *LU 2-1(1)*

1. $5\frac{1}{8}$ **2.** $\frac{2}{7}$ **3.** $\frac{20}{19}$

4. Convert the following to a mixed number. *LU 2-1(2)*

$\frac{163}{9}$

5. Convert the following to an improper fraction. *LU 2-1(2)*

$8\frac{1}{8}$

6. Calculate the greatest common divisor of the following by the step approach and reduce to lowest terms. *LU 2-2(1, 2)*

$\frac{63}{90}$

7. Convert the following to higher terms. *LU 2-1(3)*

$\frac{16}{94} = \frac{?}{376}$

8. Find the LCD of the following by using prime numbers. Show your work. *LU 2-2(2)*

$\frac{1}{8} + \frac{1}{3} + \frac{1}{2} + \frac{1}{12}$

9. Subtract the following. *LU 2-2(4)*

$$\begin{array}{r} 15\frac{4}{5} \\ -8\frac{19}{20} \\ \hline \end{array}$$

Complete the following using the cancellation technique. *LU 2-3(1, 2)*

10. $\frac{3}{4} \times \frac{2}{4} \times \frac{6}{9}$ **11.** $7\frac{1}{9} \times \frac{6}{7}$ **12.** $\frac{3}{7} \div 6$

13. A trip to Washington from Boston will take you $5\frac{3}{4}$ hours. If you have traveled $\frac{1}{3}$ of the way, how much longer will the trip take? *LU 2-3(1)*

Summary Practice Test (*Continued*)

14. Quiznos produces 640 rolls per hour. If the oven runs $12\frac{1}{4}$ hours, how many rolls will the machine produce? *LU 2-3(1, 2)*

15. A taste-testing survey of Zing Farms showed that $\frac{2}{3}$ of the people surveyed preferred the taste of veggie burgers to regular burgers. If 90,000 people were in the survey, how many favored veggie burgers? How many chose regular burgers? *LU 2-3(1)*

16. Jim Janes, an employee of Enterprise Co., worked $9\frac{1}{4}$ hours on Monday, $4\frac{1}{2}$ hours on Tuesday, $9\frac{1}{4}$ hours on Wednesday, $7\frac{1}{2}$ hours on Thursday, and 9 hours on Friday. How many total hours did Jim work during the week? *LU 2-2(1, 2)*

17. JCPenney offered a $\frac{1}{3}$ rebate on its $39 hair dryer. Joan bought a JCPenney hair dryer. What did Joan pay after the rebate? *LU 2-3(1)*

MY MONEY

Landing Your Dream Job!

What I need to know

As you work through your college courses, you aspire to attaining a degree or credential to get you the job, promotion, or career move you are seeking. As you prepare for that eventual career it is important to understand and anticipate the level of salary you will earn upon your graduation. Additionally, assess the types of employment matching closest to your career aspirations. The potential job market has changed due to the coronavirus pandemic. As you consider your career options you may discover your ideal position is not what you had originally anticipated. This newfound flexibility can be used to your advantage to pursue a variety of career options.

What I need to do

Research expected salaries before committing to a desired course of study. This information is available through your institution and is provided based upon the program of study you pursue. Although only a range may be given from your college, it will give you a rough estimate from which to determine your educational path. Compare the cost you will incur to attain your degree to the expected salary upon graduation to determine the cost effectiveness of each degree option you are considering. Ultimately you will want to determine whether a career field will fit into your financial plans. How does this salary range compare to your financial goals and will you be able to meet these goals with such earnings? Place the salary expectation against your budget to see how it will meet your expenses. Furthermore, determine what salary range will allow for spending opportunities outside of your expenses such as investments, savings, entertainment, etc.

Seek out advice from professionals in the field you are considering for some insights on the career. Ask these professionals about their personal experiences within this career field. What do they like best about their chosen profession? What do they see as the future opportunities within this career? Are there other factors to consider outside of just salary such as benefits, personal growth, contribution to a greater cause, etc.? If these professionals had it to do all over again, what might they do differently as it relates to career preparedness? The knowledge you gain will assist you in selecting an educational field of study to achieve your desired career.

Steps I need to take

1. Be flexible with your job search and open yourself to a variety of career options.
2. Know the financial impact of your chosen career to determine best fit.
3. Learn from others by gaining valuable insights from within your desired career field.

Resources I can use

- Indeed Job Search (mobile app)—find your next career and express your interest directly with employers.
- https://www.payscale.com/—salary expectations by education level, job title and much more.
- https://www.themuse.com/advice/job-search-coronavirus—tips for how your job search has changed because of the coronavirus pandemic.

MY MONEY ACTIVITY

- Search for job openings related to your degree
- Compare the expected salaries to obtain a range for this position.
- How does the expected salary fit into your financial goals?

Appendix A

Check Figures

Worked-Out Solutions to You Try It Problems

Odd-Numbered Drill and Word Problems for End-of-Chapter Problems.

Challenge Problems (all).

Cumulative Reviews (all).

Odd-Numbered Additional Assignments by Learning Unit from Appendix A.

Worked-Out Solutions to You Try It Problems, Check Figures to Drill and Word Problems (Odds), Challenge Problems, and Cumulative Reviews

Chapter 1

You Try It

1. 571 → Five hundred seventy-one
7,943 → Seven thousand, nine hundred forty-three

2. 691 = 691 = 690
Identify digit; Less than 5

3. 429,685 → 429,685 → 400,000
Identify digit; Less than 5

4.
$$\begin{array}{r} {\scriptstyle 1}\\ 76\\ +38\\ \hline 114 \end{array}$$

5.
$$\begin{array}{r} {\scriptstyle 512}\\ 629\\ -134\\ \hline 495 \end{array}$$

6.
$$\begin{array}{r} 491\\ \times 28\\ \hline 3928\\ 982\\ \hline 13{,}748 \end{array}$$

$13 \times 10 = 130$ (attach 1 zero)
$13 \times 1{,}000 = 13{,}000$ (attach 3 zeros)

7.
$$\begin{array}{r} 5\text{R}15\\ 16\overline{)95}\\ \underline{80}\\ 5 \end{array}$$

$4{,}000 \div 100 = 40$ (drop 2 zeros)
$4{,}000 \div 1{,}000 = 4$ (drop 3 zeros)

End-of-Chapter Problems

1–1. 105

1–3. 154

1–5. 13,580

1–7. 113,690

1–9. 38

1–11. 3,600

1–13. 1,074

1–15. 31,110

1–17. 340,531

1–19. 126,000

1–21. 90

1–23. 86 R4

1–25. 405

1–27. 1,616

1–29. 24,876

1–31. 17,989; 18,000

1–33. 80

1–35. 133

1–37. 216

1–39. 19 R21

1–41. 7,690; 6,990

1–43. 70,470; 72,000

1–45. 700

1–47. $27,738

1–49. $240; $200; $1,200; $1,080

1–51. $2,436; $3,056; $620 more

1–53. 905,600

1–55. 1,080

1–57. a. $4,569

b. $4,600

c. $31

1–59. $879 decrease

1–61. $1,872,000

Appendix A (*Continued*)

1–63. $4,815; $250,380

1–65. $64,180

1–67. 200,000; 10,400,000

1–69. $1,486

1–71. Average $33; no concern

1–73. $40 per sq yard

1–75. $7,680 difference between drugstore and bakery

1–76. $12,000 difference

Chapter 2

You Try It

1. $\frac{3}{10}$ proper, $\frac{9}{8}$ improper, $1\frac{4}{5}$ mixed

2. $\frac{18}{7} = 2\frac{4}{7}$ $\quad 5\frac{1}{7} = \frac{35+1}{7} = \frac{36}{7}$

3. $\frac{16 \div 8}{24 \div 8} = \frac{2}{3}$

4. $\frac{20}{50} = 20\overline{)50}^{\,2}$

$\underline{40}$

10

$10\overline{)20}^{\,2}$

$\underline{20}$

0

10 is greatest common denominator

5. $\frac{16}{31} = \frac{\quad}{310}$

$310 \div 31 = 10$ $\quad 10 \times 16 = 160$

6. $\frac{3}{7} + \frac{2}{7} = \frac{5}{7}$ $\quad \frac{5}{7} - \frac{2}{7} = \frac{3}{7}$

$\frac{5}{8} = \frac{25}{40}$

$+\frac{3}{40} = \frac{3}{40}$

$\frac{28}{40} = \frac{7}{10}$

7. Prime numbers 2, 3, 5, 7, 11, 13, 17

8. $\frac{1}{2} + \frac{1}{4} + \frac{1}{5} =$ $2 \,\big/ \, 2 \quad 4 \quad 5$

$1 \quad 2 \quad 5$

$2 \times 1 \times 2 \times 5 = 20$ LCD

9. $2\frac{1}{4}$

$+3\frac{3}{4}$

$5\frac{4}{4} = 6$

10. $11\frac{1}{3}$ $\quad 10\frac{4}{3}$

$-2\frac{2}{3}$ $\quad -2\frac{2}{3}$

$8\frac{2}{3}$

11. $\frac{4}{5} \times \frac{25}{26} = \frac{\overset{2}{\cancel{4}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{5}{\cancel{25}}}{\underset{13}{\cancel{26}}} = \frac{10}{13}$

12. $2\frac{1}{4} \times 3\frac{1}{4} = \frac{9}{4} \times \frac{13}{4} = \frac{117}{16} = 7\frac{5}{16}$

13. $\frac{1}{8} \div \frac{1}{4} = \frac{1}{\cancel{8}_{\,2}} \times \frac{\overset{1}{\cancel{4}}}{1} = \frac{1}{2}$

14. $3\frac{1}{4} \div 1\frac{4}{5} = \frac{13}{4} \div \frac{9}{5} = \frac{13}{4} \times \frac{5}{9} = \frac{65}{36}$

End-of-Chapter Problems

2–1. Proper

2–3. Improper

2–5. $61\frac{2}{5}$

2–7. $\frac{59}{3}$

2–9. $\frac{11}{13}$

2–11. 60 ($2 \times 2 \times 3 \times 5$)

2–13. 96 ($2 \times 2 \times 2 \times 2 \times 2 \times 3$)

2–15. $\frac{13}{21}$

2–17. $15\frac{5}{12}$

2–19. $\frac{5}{6}$

2–21. $7\frac{4}{9}$

2–23. $\frac{5}{16}$

2–25. $\frac{3}{25}$

2–27. $\frac{1}{3}$

2–29. $\frac{7}{18}$

2–31. $215,658

2–33. $500,000 infected

2–35. $35\frac{1}{4}$ hours

2–37. $10\frac{3}{4}$ hours

2–39. $6\frac{1}{2}$ gallons

2–41. $875

2–43. $\frac{23}{36}$

2–45. $3,667

2–47. $3\frac{3}{4}$ lbs apple; $8\frac{1}{8}$ cups flour; $\frac{5}{8}$ cup marg; $5\frac{15}{16}$ cups sugar; 5 teaspoons cin.

2–49. 400 people

2–51. 275 gloves

2–53. $450

2–55. $45\frac{3}{16}$

2–57. $62,500,000; $37,500,000

2–59. $\frac{3}{8}$

2–61. $2\frac{3}{5}$ hours

2–63. $8\frac{31}{48}$ feet; Yes

2–64. **a.** 400 homes **b.** $320,000
c. 3,000 people **d.** 2,500 people
e. $112.50 **f.** $8,800,000

Chapter 3

You Try It

1. .8256 → Ten thousandths place

2. .841 = .8
Less than 5

3. $\frac{9}{1,000} = .009$
$\frac{3}{10,000} = .0003$

4. $\frac{1}{7} = .142 = .1$

5. $5\frac{4}{5} = \frac{4}{5} = .80 + 5 = 5.80$

6. .865 $\frac{865}{}$ $\frac{865}{1}$ $\frac{865}{1,000}$ (attach 3 zeros)

7.
$$\begin{array}{r} 1.7 \\ 3.0 \\ \underline{.8} \\ 5.5 \end{array} \qquad \begin{array}{r} {\scriptstyle 5\,10} \\ 6.\cancel{0}\cancel{0} \\ \underline{-4.10} \\ 1.90 \end{array}$$

8.
$$\begin{array}{r} 3.49 \text{ (2 places)} \\ \underline{.015 \text{ (3 places)}} \\ 1745 \\ 349 \\ \underline{} \\ .05235 \end{array}$$

9.
$$\begin{array}{r} 1.5 \\ 33\overline{)49.5} \\ \underline{33} \\ 165 \\ \underline{165} \\ 0 \end{array}$$

10.
$$\begin{array}{r} .46 = .5 \\ 3.2\overline{)1.480} \\ \underline{128} \\ 200 \\ 192 \end{array}$$

11. $6.92 \times 100 = 692$ (move 2 places to right)
$6.92 \div 100 = .0692$ (move 2 places to left)

End-of-Chapter Problems

3–1. Hundredths

3–3. .7; .74; .739

3–5. 5.8; 5.83; 5.831

3–7. 6.6; 6.56; 6.556

3–9. $4,822.78

3–11. .08

3–13. .06

3–15. .91

3–17. 16.61

3–19. $\frac{71}{100}$

3–21. $\frac{125}{10,000}$

3–23. $\frac{825}{1,000}$

3–25. $\frac{7,065}{10,000}$

3–27. $28\frac{48}{100}$

3–29. .005

3–31. .0085

3–33. 818.1279

3–35. 3.4

3–37. 2.32

3–39. 1.2; 1.26791

3–41. 4; 4.0425

3–43. 24,526.67

3–45. 161.29

3–47. 6.82

3–49. .04

3–51. .63

3–53. 2.585

3–55. .0086

3–57. 486

3–59. 3.950

3–61. 7,913.2

3–63. .583

3–65. $19.57

3–67. $0.75

3–69. $119.47

Appendix A (*Continued*)

3–71. $29.00

3–73. 91 million

3–75. $423.16

3–77. $105.08

3–79. $24,996.78

3–81. 6.7 million more claims

3–83. 0.9% difference

3–85. $6,465.60

3–86. Yes, $16,200

3–87. $560.45

Cumulative Review 1, 2, 3

1. $216

2. $200,000

3. $50,560,000

4. $25.50

5. $225,000

6. $750

7. $369.56

8. $130,000,000

9. $63.64

Chapter 4

You Try It

Sample

1. Pete Co. 24-111-9

Pay to the order of Reel Bank Pete Co. 24-111-9

Pay to the order of Reel Bank for deposit only Pete Co. 24-111-9

Checkbook

Beg. balance		$300
2. *Less:* NSF	$50	
ATM service charge	20	70
Ending balance		$230

End-of-Chapter Problems

4–1. $4,720.33

4–3. $4,705.33

4–5. $753

4–7. $540.82

4–9. $577.95

4–11. $998.86

4–13. $1,530

4–15 $136.45

4–16. $1,862.13

4–17. $3,061.67

Chapter 5

You Try It

1. $E + 15 = 14$
$-15 \quad -15$
$E = -1$

2. $B - 40 = 80$
$+40 \quad +40$
$B = 120$

3. $\frac{5C}{5} = 75$
$C = 15$

4. $\frac{A}{6} = 60 \quad (6)\frac{A}{6} = 6(60)$
$A = 360$

5. $\frac{C}{4} + 10 = 17$
$-10 \quad -10$
$\frac{C}{4} = 7$
$(4)\frac{C}{4} = 7(4)$
$C = 28$

6. $7(B - 10) = 35$
$7B - 70 = 35$
$+70 \quad +70$
$\frac{7B}{7} = \frac{105}{7}$
$B = 15$

7. $5B + 3B = 16$
$\frac{8B}{8} = \frac{16}{8}$
$B = 2$

Sit. 1. $P - \$53 = \$110$
$+53 \quad +53$
$P = \$163$

Sit. 2. $\frac{1}{7}B = \$6{,}000$

$7\left(\frac{B}{7}\right) = 6{,}000(7)$

$B = \$42{,}000$

Sit. 3. $9S - S = 640$

$$\frac{8S}{8} = \frac{640}{8}$$

$S = 80 \qquad 9S = 720$

Sit. 4. $9S + S = 640$

$$\frac{10S}{10} = \frac{640}{10}$$

$S = 64 \qquad 9S = 576$

Sit. 5. $400(3N) + 300N = 15{,}000$

$$\frac{1{,}500N}{1{,}500} = \frac{15{,}000}{1{,}500}$$

$N = 10$

$3N = 30$

Sit. 6. $400S + 300(40 - S) = 15{,}000$

$400S + 12{,}000 - 300S = 15{,}000$

$100S + 12{,}000 = 15{,}000$

$-12{,}000 - 12{,}000$

$$\frac{100S}{100} = \frac{3{,}000}{100}$$

$S = 30$

$40 - S = 10$

End-of-Chapter Problems

5–1. $X = 440$

5–3. $Q = 300$

5–5. $Y = 15$

5–7. $Y = 12$

5–9. $P = 25$

5–11. Fred 25; Lee 35

5–13. Josh, 16; Jessica, 240

5–15. 50 shorts; 200 T-shirts

5–17. $B = 70$

5–19. $N = 63$

5–21. $Y = 7$

5–23. $P = \$610.99$

5–25. Pete = 90; Bill = 450

5–27. 48 TP rolls; 240 wet wipes

5–29. $A = 135$

5–31. $M = 60$

5–33. 211 Boston; 253 Colorado Springs

5–35. $W = 129$

5–37. Shift 1: 3,360; shift 2: 2,240

5–39. 22 boxes of hammers 18 boxes of wrenches

5–41. 135,797 lenders

5–42. a. 2.5

b. 15 miles

c. 6 hours

5–43. $B = 4$

Chapter 6

You Try It

1. $.92 = 92\%$

$.009 = .9\%$

$5.46 = 546\%$

2. $\frac{2}{9} = 22.222\% = 22.22\%$

3. $78\% = .0078$ (2 places to left)

$96\% = .96$ (2 places to left)

$246\% = 2.46$ (2 places to left)

$7\frac{3}{4}\% = 7.75\% = .0775$

$\frac{3}{4}\% = .75\% = .0075$

$\frac{1}{2}\% = .50\% = .0050$

4. $\frac{3}{5} = .60 = 60\%$

5. $74\% \rightarrow 74 \times \frac{1}{100} = \frac{74}{100} = \frac{37}{50}$

$\frac{1}{5}\% \rightarrow \frac{1}{5} \times \frac{1}{100} = \frac{1}{500}$

$121\% \rightarrow 121 \times \frac{1}{100} = \frac{121}{100} = 1\frac{21}{100}$

$17\frac{1}{5}\% \rightarrow \frac{86}{5} \times \frac{1}{100} = \frac{86}{500} = \frac{43}{250}$

$17.75\% \rightarrow 17\frac{3}{4}\% = \frac{71}{4} \times \frac{1}{100} = \frac{71}{400}$

6. Portion ($1,600) = Base ($2,000) × Rate (.80)

7. $\text{Rate (25\%)} = \dfrac{\text{Portion (\$500)}}{\text{Base (\$2,000)}}$

8. $\text{Base (\$1,000)} = \dfrac{\text{Portion (\$200)}}{\text{Rate (.20)}}$

9. $\dfrac{\text{Difference in price (\$100)}}{\text{Base (orig. \$500)}} = 20\%$

End-of-Chapter Problems

6–1. 88%

6–3. 40%

6–5. 356.1%

6–7. .04

6–9. .643

6–11. 1.19

6–13. 8.3%

6–15. 87.5%

6–17. $\frac{1}{25}$

6–19. $\frac{19}{60}$

6–21. $\frac{27}{400}$

6–23. 10.5

6–25. 102.5

6–27. 156.6

6–29. 114.88

6–31. 16.2

6–33. 141.67

6–35. 10,000

6–37. 17,777.78

6–39. 108.2%

6–41. 110%

6–43. 400%

6–45. 59.40

6–47. 1,100

6–49. 40%

6–51. +20%

6–53. 80%

6–55. $10,000

6–57. $640 per month

6–59. 677.78%

6–61. 6%

6–63. $2,434.50

6–65. 21,068,800 more

6–67. 900

6–69. $742,500

6–71. $220,000

6–73. 33.3%

6–75. 21,068,800

6–77. $39,063.83

6–79. $138.89

6–81. $1,900

6–83. $102.50

6–85. 3.7%

6–87. $2,571

6–89. $41,176

6–91. 40%

6–93. 585,000

6–94. a. 68%

b. 125%

c. $749,028

d. $20

e. 7 people

6–95. $55,429

Chapter 7

You Try It

1. $700 × .20 = $140

2. 1.00 − .20 = .80 $700 × .80 = $560

3. Seller will pay the freight

4. $\frac{\$240}{.40} = \$600$
(100% − 60%)

5. $200 × .06 = $12.00 $188 × .08 = $15.04

$188.00 − 15.04 = $172.96 .94 × .92 = .8648 NPER × $200 = $172.96

6. .94 × .92 × $2,000 = $1,729.60

7. 1.0000 − .8648 (.94 × .92)
.1352 × $2,000 = $270.40

8. $2,000 − 80 (Freight and returns)
$1,920 × .02 = $38.40

9. April 12, May 2

10. $700 − 100 = $600 × .98 = $588 + 100 = $688

11. No discount; pay full $700

12. November 10; November 30

13. $300/.98 = $306.12

End-of-Chapter Problems

7–1. 9504; .0496; $59.52; $1,140.48

7–3. 893079; .106921; $28.76; $240.24

7–5. $369.70; $80.30

7–7. $1,392.59; $457.41

7–9. June 28; July 18

7–11. June 15; July 5

7–13. July 10; July 30

7–15. $138; $6,862

7–17. $2; $198

7–19. $408.16; $291.84

7–21. $219.80 TD, $879.20 NP

7–23. .648; .352; $54.56; $100.44

7–25. $15,668.73 NP; $1,331.27 TD

7–27. $5,100; $5,250

7–29. $5,850

7–31. $1,357.03

7–33. $8,173.20

7–35. $8,333.33; $11,666.67

7–37. $99.99

7–39. $489.90; $711.10

7–41. $4,658.97

7–43. $1,083.46; $116.54

7–45. $5,008.45

7–47. $781.80 paid

7–48. **a.** $1,500

b. 8.34%

c. $164.95

d. $16,330.05

e. $1,664.95

7–49. $4,794.99

Chapter 8

You Try It

1. $S = C + M$
$S = \$400 + \$200$
$S = \$600$

2. $\frac{\$50}{\$200} = 25\%$

$\frac{\$50}{.25} = \$200$

3. $S = C + M$
$S = \$8 + .10(\$8)$
$S = \$8 + \$.80$
$S = \$8.80$

4. $S = C + M$
$\$200 = C + .60\,C$
$\frac{\$200}{1.60} = \frac{1.60C}{1.60}$
$\$125 = C$

5. $M = S - C$
$(\$2{,}500) = (\$4{,}500) - (\$2{,}000)$

6. $\frac{\$700}{\$2{,}800} = 25\%$

$\frac{\$700}{.50} = \$1{,}400$

7. $S = C + M$
$S = \$800 + .40(S)$
$\underline{-.40} \qquad \underline{-.40}$
$\frac{.60S}{.60} = \frac{\$800}{.60}$
$S = \$1333.33$

8. $S = C + M$
$\$2{,}000 = C + .70(\$2{,}000)$
$\$2{,}000 = C + \$1{,}400$
$\frac{-1{,}400}{\$600} = \frac{-1{,}400}{C}$

9. $\frac{.47}{1 + .47} = \frac{.47}{1.47} = 32\%$ rounded

10. $\$50 \times .20 = \$10$ $\quad \frac{\$10}{\$50} = 20\%$

11. $TS = TC + TM$
$TS = \$9 + .30(\$9)$
$TS = \$9 + \$2.7$
$TS = \$11.70$
$\frac{\$11.70}{45} = \$.26$

12. $\frac{\$70{,}000}{\$20} = 3{,}500$ units

End-of-Chapter Problems

8–1. $600; $2,600

8–3. $4,285.71

8–5. $6.90; 45.70%

8–7. $450; $550

8–9. $110.83

8–11. $34.20; 69.8%

8–13. 11%

8–15. $3,830.40; $1,169.60; 23.39%

8–17. $16,250; $4.00

8–19. $166.67

8–21. $14.29

8–23. $600; $262.50

8–25. $84

8–27. 42.86%

8–29. $320

8–31. 20,000

8–33. $44; 56%

8–35. $195

8–37. $.59

8–39. $2.31

8–41. 12,000

8–43. $7.65

8–45. $266

8–46. $94.98; $20.36; loss

Cumulative Review 6, 7, 8

1. 650,000

2. $296.35

3. $133

4. $2,562.14

5. $48.75

6. $259.26

7. $1.96; $1.89

Chapter 9

You Try It

1. 38 hrs × $9.25 = $351.50

2.

Reg $	**Overtime $**
(40 × $7)	+ (3 × $10.50)
$280	+ $31.50 = $311.50
	gross pay

3. 2,250 × $.79 = $1,777.50

4. 600 × $.79 = $474
300 × $.88 = +264
$738

5. $175,000 × .07 = $12,286.96

6. $6,000 × .05 = $300
$2,000 × .09 = 180
$4,000 × .12 = 480
$960

7. $600 + ($6,000 × .04)
$600 + 240 = $840

8.

Gross $490.00		$ 490.00
Less: FIT	$0.70	− 79.80
SS	30.38	483.00
Med.	7.11	7
	$451.81	$7.00 × .10 = $0.70

9. Social Security = $142,800 × .062 = $8,853.60

Medicare = $160,000 × .0145 = $2,320

10. $1,400
− 865
$ 535
$38.20 + ($535 × .12) = $102.40

11. FUTA $200 × .006 = $1.20
SUTA $200 × .054 = $10.80

End-of-Chapter Problems

9–1. 37; $331.15

9–3. $12.00; $452

9–5. $1,680

9–7. $60

9–9. $13,000

9–11. $4,500

9–13. $11,900; $6,900; $138; $388

9–15. $49.60; $130.50

9–17. $174.40; $124.00; $29.00; $1,672.60

9–19. $752.60; $85.20

9–21. $1,315.28

9–23. $2,130.72

9–25. $825

9–27. $1,128.75

9–29. $357; $8,853.60

9–31. $1,084.70

9–32. a. $420.19

b. $422.33

c. $2.14

9–33. $1,653.60, $193.13 understated; $52

Chapter 10

You Try It

1. $4,000 × .03 × $\frac{18}{12}$ = $180

2. $3,000 × .04 × $\frac{45}{365}$ = $14.79

Feb 22 53
Jan 8 − 8
45

3. $3,000 × .04 × $\frac{45}{360}$ = $15.00

4. $\$2{,}000 \times .04 \times \frac{90}{360} = \$20$

5. $\dfrac{\$20}{.04 \times \frac{90}{360}} = \$2{,}000$

6. $\dfrac{\$20}{\$2{,}000 \times \frac{90}{360}} = 4\%$

7. $\dfrac{20}{\$2{,}000 \times .04} = .25 \times 360 = 90 \text{ days}$

8. $\$4{,}000 \times .04 \times \frac{30}{360} = \$13.33$

$$\begin{array}{r} \$400.00 \\ -\ \ 13.33 \\ \hline \$386.67 \end{array}$$

$\$4{,}000 - 386.67 = \$3{,}613.33$

$\$3{,}613.33 \times .04 \times \frac{40}{360} = \$16.06$

$\$300 - \$16.06 = \$283.94$

$\$3{,}613.33 - \$283.94 = \$3{,}329.39$

$\$3{,}329.39 \times .04 \times \frac{20}{360} = \$7.40$

$\$3{,}329.39 + \$7.40 = \$3{,}336.79$

Total interest $= \$13.33 + \$16.06 + \$7.40 = \$36.79$

End-of-Chapter Problems

10–1. \$303.75; \$9,303.75

10–3. \$1,012.50; \$21,012.50

10–5. \$28.23; \$613.23

10–7. \$20.38; \$1,020.38

10–9. \$73.78; \$1,273.78

10–11. \$1,904.76

10–13. \$4,390.61 balance due

10–15. \$618.75; \$15,618.75

10–17. \$2,377.70; Save \$1.08

10–19. 4.7 years

10–21. \$21,596.11

10–23. \$714.87; \$44.87

10–25. 266 days

10–27. \$2,608.65

10–29. \$18,666.85

10–31. 12.37%

10–33. 15 days

10–35. 5.6%

10–37. 179 days

10–39. **a.** \$1,000

b. 8%

c. \$280; \$1,400

10–40. \$7.82; \$275.33

Chapter 11

You Try It

1. $\$4{,}000 \times .02 \times \frac{30}{360} = \$6.67$

$$\begin{array}{r} \$4{,}000.00 \\ -\ \ 6.67 \\ \hline \$3{,}993.33 \text{ Proceeds} \end{array}$$

2. $\$15{,}000 \times .04 \times \frac{40}{360} = \$66.67$

$$\begin{array}{r} \$15{,}000.00 \\ -\ \ 66.67 \\ \hline \end{array} \qquad \frac{\$66.67}{\$14{,}933.33 \times \frac{40}{360}} = 4.02\%$$

3. Dec 15 349
Nov 5 −309
40 days

$\$2{,}000 \times .03 \times \frac{60}{360} = \$10$

$MV = \$2{,}010$ (Left to go)

$\$2{,}010 \times .05 \times \frac{20}{360} = \$5.58$

$\$2{,}010 - \$5.58 = \$2{,}004.42$ Proceeds

End-of-Chapter Problems

11–1. \$93.33; \$5,906.67

11–3. 25 days

11–5. \$51,451.39; 57; \$733.18; \$50,718.21

11–7. 1.003%

11–9. \$7,566.67; 6.9%

11–11. \$8,937

11–13. \$5,309.80

11–15. \$5,133.33; 56; \$71.87; \$5,061.46

11–17. \$4,836.44

11–19. ¥20,188

11–21. \$13,294.85

11–23. **a.** \$90.13

b. \$177.50

c. 3.64%

d. 3.61%

11–24. \$2,127.66; 9.57%

Chapter 12

You Try It

1.
$$\begin{array}{r} \$200 \\ \times\ 1.04 \\ \hline \$208 \end{array} \qquad \begin{array}{r} \$\ \ 208 \\ \times\ \ 1.04 \\ \hline \$216.32 \end{array}$$

2. $\$4{,}000 \times 1.4258$ (3% 12 periods)
$= \$5{,}703.20$

3. Table 1.0609 (3% 2 periods)

6.09%

$4,000 × 1.0609 = $4,243.60

−4,000.00

$ 243.60

$\frac{\$243.60}{\$4,000.00} = 6.09\%$

4. Table .7880 (1.5% 16 periods)

× $6,000

$4,728

End-of-Chapter Problems

12–1. 4; 1%; $598.35; $23.35

12–3. $15,450; $450

12–5. 6.14%

12–7. 16; $1\frac{1}{2}\%$; .7880; $4,728

12–9. 28; $\frac{1}{2}\%$; .8697; $15,306.72

12–11. $17,600.72

12–13. $64,188

12–15. Mystic $4,775, Four Rivers $3,728

12–17. $25,734.40

12–19. $12,698

12–21. $12,900.87

12–23. $51,210

12–25. No. $13,439 (compounding) or $11,161.50 (p. v.)

12–27. $3,739.20

12–29. $27,757.40

12–31. $5,217.68

12–33. $20,016

12–34. $105,878.50

12–35. $689,125; $34,125 Bank B

Chapter 13

You Try It

1. 4.4399 (7% 4 periods)

× 6,000

$26,639.40

2. $6,000 × 5.7507 = $34,504.20 (7% 5 periods)

− 6000.00

$28,504.20

3. 5.2421 (4% 6 periods)

× $ 20,000

$104,842

4. .0302 (5% 20 periods)

× $400,000

$ 12,080

End-of-Chapter Problems

13–1. $67,431.50

13–3. $53,135.10

13–5. $3,118.59

13–7. End of first year $2,405.71

13–9. $1,410

13–11. $3,397.20

13–13. $137,286; $1,721,313

13–15. $38,841.30

13–17. $900,655

13–19. $421,885.11

13–21. $13,838.25

13–23. Annuity $12,219.18 or $12,219.93

13–25. $3,625.60

13–27. $111,013.29

13–29. $404,313.97

13–31. $1,043,565.60

13–33. $199.29

13–34. $120,747.09

Cumulative Review 10, 11, 12, 13

1. Annuity $2,058.62 or $2,058.59

2. $3,355.56

3. $116,963.02

4. $3,113.92

5. $5,797.92

6. $18,465.20

7. $17,518.05

8. $55,251

Chapter 14

You Try It

1. $5,400 amount financed

− 100

$5,300

2. $129.99 × 60 = $7,799.40

− 5,300.00

$2,499.40 FC

3. $7,799.40 + $100 = $7,899.40

4. $\frac{\$2,499.40}{\$5,300.00} \times \$100 = 47.16$ (between 16.25% and 16.50%)

5. $\frac{\$2,499.40 + \$5,300}{60} = \$129.99$

$\frac{\$5,300}{1,000} = 5.3 \times 24.32 = \$128.9$
(off due to using 16% instead of using between 16.25% and 16.50%)

6. $5,000 × .035 = $175
$275 − $175 = $100
$5,000 − $100 = $4,900

7. 12 days × $200 = $2,400

4 days × $120 [$200 − $80] = $480

14 days × $180 [$120 + $60] = $2,520

Total = $5,400

$5,400/30 = $180 daily balance

Finance charge = $180 × 2.5% = $4.50

End-of-Chapter Problems

14–1. Finance charge $5,240

14–3. Finance charge $1,279.76; 12.75%–13%

14–5. $119.39; $119.37

14–7. $2,741; $41.12

14–9. $1,354.08

14–11. **a.** $4,050

b. $1,656

c. $5,756

d. $40.89, falls between 14.25% and 14.50%

e. $95.10

14–13. $1,245; $18.68; $1,318.68

14–15. $940.36

14–17. $298.12

14–19. 5% APR

14–21. Peg is correct

14–22. 15.48%

Chapter 15

You Try It

1. $\frac{\$70,000}{\$1,000} = 70 \times \$4.49045 = \$314.33$

2. 30 years = 360 payments × $ 314.33
$113,158.80 − $70,000 = $43,158.80 interest

3.

Payment	Interest	Principal reduction	Balance
1	$204.17	$110.16	$69,889.84
	$\left(\$70,000 \times .035 \times \frac{1}{12} = \$204.17\right)$ ($314.33 − $204.17)	($70,000 − $110.16)	
2	$203.85	$110.48	$69,779.36
	$\left(\$69,889.84 \times .035 \times \frac{1}{12}\right)$ ($314.33 − $203.85)	($69,889.84 − $110.48)	

End-of-Chapter Problems

15–1. $628.66

15–3. $989.49

15–5. $88,743.20

15–7. $1,423.43; $179,326.57

15–9. $70,789.60

15–11. $635.92; $116,931.20

15–13. Payment 3, $119,271.85

15–15. $57,873.60

15–17. $87.43

15–19. No. They would spend $57,676.71 more on interest.

15–21. $589.90

15–22. **a.** $92,495.50

b. $1,128.83

c. $213,878.80

Chapter 16

You Try It

1. $ 400 40%
+ 600 60%
$1,000 100%

2.

	2023	2022	Change	%	
Cash		$8,000	$2,000	$6,000	300% $\frac{\$6,000}{\$2,000}$

3. $400 − $20 − $5 = $375 net sales

4. $50 + $200 − $20 = $230

5. $400 − $250 = $150 gross profit

6. $210 − $180 = $30 net income

7.

2024	2023	2022
1,200	800	1,000
120%	80%	100%
$\left(\frac{1,200}{1,000}\right)$	$\frac{200}{1,000}$	

8. $\frac{\$40,000}{\$160,000} = .25$

Appendix A (*Continued*)

9. $\frac{\$40{,}000 - \$2{,}000 - \$3{,}000}{\$160{,}000} = \frac{\$35{,}000}{\$160{,}000} = .22$

10. $\frac{\$4{,}000}{\left(\frac{\$60{,}000}{360}\right)} = 24 \text{ days}$

11. $\frac{\$180{,}000}{\$70{,}000} = 257.14$

12. $\frac{\$16{,}000}{-\$110{,}000} = -14.55\%$

13. $\frac{\$60{,}000}{70{,}000} = .86$

14. $\frac{\$16{,}000}{\$60{,}000} = .27$

End-of-Chapter Problems

16–1. Total assets $84,000

16–3. Inventory −16.67%;
mortgage note +13.79%

16–5. Net sales 13.62%;
Net earnings 2020 47.92%

16–7. Depreciation $100; + 16.67%

16–9. 1.43; 1.79

16–11. .20; .23

16–13. .06; .08

16–15. 13.57%

16–17. 87.74%; 34.43%; .13; 55.47%

16–19. 2024 68% sales

16–21. $9,447 net worth

16–23. Net income 615.14% decrease

16–25. $3,470; 6.8%; $431; .8%

16–26. 3.5; 2.3

Chapter 17

You Try It

1. $\frac{\$50{,}000 - \$10{,}000}{4} = \frac{\$40{,}000}{4} = \$10{,}000 \text{ per year}$

2. $\frac{\$4{,}000 - \$500}{700} = \frac{\$3{,}500}{700} = \$5 \text{ depreciation per unit}$

$150 \times \$5 = \$750$

3.

Year	Cost	Depreciation expense	Book value at end of year
1	$40,000	$20,000 ($40,000 × .50)	$20,000
2	$20,000	$10,000 = ($20,000 × .50)	$10,000

4. .20 × $7,000 = $1,400 depreciation expense

End-of-Chapter Problems

17–1. Book value (end of year) $35,000

17–3. Book value (end of year) $25,000

17–5. Book value (end of year) $15,000

17–7. Book value (end of year) $15,000

17–9. Book value (end of year) $5,400

17–11. $2,240

17–13. $18,000

17–15. $22,560

17–17. $15,000

17–19. $6,000; $18,000

17–21. $6,760 below

17–23. $83,667

17–25. $768.80

17–27. $5,262

17–28. **a.** $87,750

b. $11.40

c. $21,489

d. 4 years

17–29. $13,320; $1.11

Chapter 18

You Try It

1. $4 \times 9 = 36$
$3 \times 10 = 30$
66 total cost
$1 \times \$9 = \$9$
$1 \times \$10 = \$10$
$\$19$
$\$66 - 19 = \$47$ Cost of goods sold

2. $\frac{89}{15} = \$5.93$ unit cost
$4 \times \$5.93 = \$23.72$

3. FIFO $4 \times \$7 = \$28$

4. LIFO $4 \times \$5 = \$20$

5.

	Cost	Retail
Cost of goods available for sale	$88,000	$117,000
		− 90,000
Net sales		$27,000

Cost ratio: $\frac{\$88{,}000}{\$117{,}000} = 75\%$
$.75 \times \$27{,}000 = \$20{,}250$

6. Cost of goods available for sale $42,000

Net sales at retail $20,000

× .25

COGS at retail 5,000

Ending inventory $37,000

7. $$\frac{\$90{,}000}{\left(\frac{\$40{,}000+\$60{,}000}{2}\right)}=\frac{\$90{,}000}{\$50{,}000}=1.8$$

8. Total sq. ft. for dept. 10,000

.40 to Dept A $30,000 × .40 = $12,000
.60 to Dept B 30,000 × .60 = 18,000

End-of-Chapter Problems

18–1. $7,180; $22,635

18–3. $543; $932

18–5. $10

18–7. $36

18–9. $72

18–11. $140.80

18–13. $147.75; $345.60

18–15. $188.65; $304.70

18–17. 3.56; 3.25

18–19. .75; $67,500

18–21. $10,550; $24,645

18–23. $45,000

18–25. $55,120

18–27. $38,150

18–29. $3,511.16

18–31. $1,205 EI; $3,950 COGS

18–33. $13,499.50

18–34. $1,900

Chapter 19

You Try It

1. $62.80 − $5.02 = $57.78

× .06

$3.47 sales tax

2. $6,000 + $300 + $600 = $6,900

3. $200,000 × .40 = $80,000 assessed value

4. $$\frac{\$700{,}000}{\$8{,}400{,}000}=.0833$$

5. 1. 8.33% 2. $8.33

3. $83.3 4. $\frac{.0833}{.001}=83.3=83$ mills

6. 1. 9.5% × $40,000 = $3,800

2. $\frac{\$40{,}000}{\$100}=400\times\$9.50=\$3{,}800$

3. $\frac{\$40{,}000}{\$1{,}000}=40\times\$95=\$3{,}800$

4. $\frac{\$.0950}{.001}=95\times.001\times\$40{,}000=\$3{,}800$

End-of-Chapter Problems

19–1. $928

19–3. $83,018.87

19–5. $39,000

19–7. $.0233

19–9. 6.99%; $6.99; $69.90; 69.90

19–11. $4,462.50

19–13. $16,985.05

19–15. $112.92

19–17. $634,000

19–19. $6,940

19–21. $64,000

19–23. $4,726.88

19–25. $23,065 more in Minn.

19–27. $3,005

19–29. $3,665

19–30. $979

Chapter 20

You Try It

1. 1. $\frac{\$90{,}000}{\$1{,}000}=90\times\$2.44=\$219.60$

2. $\frac{\$90{,}000}{\$1{,}000}=90\times\$11.84=\$1{,}065.60$

3. $\frac{\$90{,}000}{\$1{,}000}=90\times\$15.60=\$1{,}404.00$

4. $\frac{\$90{,}000}{\$1{,}000}=90\times\$27.64=\$2{,}487.60$

2. Option 1 : $\frac{\$60{,}000}{\$1{,}000}=60\times\$265=\$15{,}900$

Option 2: 60 × $550 = $33,000

Option 3: 21 yr 300 days

3. $\frac{\$80{,}000}{\$100}=800\times\$.61=\$488$

$\frac{\$20{,}000}{\$100}=200\times\$.65=\underline{\$130}$

Total $\underline{\$618}$

4. 600 × $.44 = $264

Refund $600 − $264 = $336

5. $\$600 \times \frac{1}{3} = \$200$

$\$600 - \$200 = \$400$

6. $\frac{\$40{,}000}{\$60{,}000} \times \$9{,}000 = \$6{,}000$

7.

10/20/5	$184 ($55 + $129)
Bodily	94
Property	132
Collision	196
Comprehensive	178
Total premium	$784

End-of-Chapter Problems

20–1. $2,762

20–3. $138.75

20–5. $53,000

20–7. 21 years, 300 days

20–9. $518; $182

20–11. $16,500

20–13. $1,067

20–15. $208 vs $240

20–17. $801 No cash value

20–19. $118,750

20–21. $1,100

20–23. $373.67

20–25. $22,900; $10,700

20–27. $24,000; $16,300

20–29. Annual premium between $1,895.50 and $2,274.60

20–31. $40,625

20–32. $7,512.64; $1,942.00; $787.89

20–33. $176.00

Chapter 21

You Try It

1. $\frac{\$.88}{\$53.88} = 1.63\%$

2. $\frac{\$53.88}{\$3.70} = 14.56 = 15$

3. $30{,}000 \times \$.80 = 24{,}000$
$30{,}000 \times \$.80 = 24{,}000$
$48{,}000$ to preferred

$\$300{,}000$
$- \ 48{,}000$
$\$252{,}000 \div 60{,}000 = \$4.20$ to common

4. $\$1{,}022.25 \times 6 = \$6{,}133.50$

5. $\frac{\$40}{1{,}011.20} = 3.96\%$

6. $\$12.44 + \$.05 = \$12.49$

End-of-Chapter Problems

21–1. $25,305

21–3. 3.3%

21–5. 10

21–7. $41,983.20

21–9. 2021 preferred $8,000

2022 0

2023 preferred $127,000

common $33,000

21–11. $2,280

21–13. $260; $2,725; 9.5%

21–15. $12.04; −$.06; 9.6%

21–17. Gain $6,606.48

21–19. 49, 7.3%

21–21. $4,843.75; $75

21–23. 4.5%

21–25. Stock 6.7%; bond 11.9%

21–27. Yes, $16.02

21–29. $443.80

21–31. 43.2 shares

21–33. $31,025

21–34. **a.** 1,287 shares

b. 2,574 shares

c. 5,147 shares

d. $26,381.76 for (a); $52,388.43 for (b); $103,756.44 for (c)

21–35. $1,014.33

Chapter 22

You Try It

1. $\frac{41+29+16+15+18}{5} = 23.8$

2.

Value	Frequency	Product
80	2	160
90	3	270
100	$\frac{1}{6}$	$\frac{100}{690}$

Mean $= \frac{690}{6} = 115$

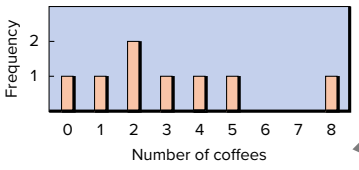
3. 4 7 9 14 16

4. 7

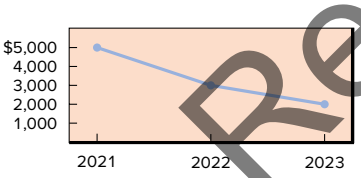
5.

Coffees consumed	Tally	Frequency
0	I	1
1	I	1
2	II	2
3	I	1
4	I	1
5	I	1
6		0
7		0
8	I	1

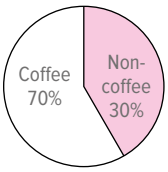
6.



7.



8.



$.70 \times 360° = 252°$
$.30 \times 360° = 108°$

9. $\frac{\$12{,}000}{\$9{,}000} \times 100 = 133.3$

10. Range $= 14 - 2 = 12$

11. 1. Mean $= \frac{19}{5} = 3.8$

2. $8 - 3.8 = 4.2$
$1 - 3.8 = -2.8$
$6 - 3.8 = 2.2$
$2 - 3.8 = -1.8$
$2 - 3.8 = -1.8$

3. $(4.2)^2 = 17.64$
$(-2.8)^2 = 7.84$
$(2.2)^2 = 4.84$
$(-1.8)^2 = 3.24$
$(-1.8)^2 = 3.24$

4. 36.8

5. $36.8 \div 4 = 9.2$

6. Standard deviation = 3.03

End-of-Chapter Problems

22–1. 6.25

22–3. $77.23

22–5. 2.7

22–7. 31.5

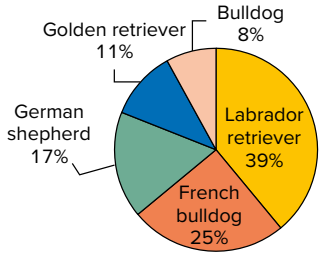
22–9. 8

22–11. 142.9

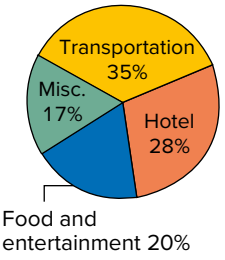
22–13. $200–$299.99 ||||

22–15. Traditional watch 183.6°

22–17.



22–19. Transportation 126°
Hotel 100.8°
Food 72°
Miscellaneous 61.2°



22–21. 250

22–23. **a.** 57,000,000 mean
62,900,000 median

b. AAA = 30.42%
Riser = 22.18%
Casto = 22.07%

Balbon = 12.70%

Hunter = 12.63%

c. 109.51°, 79.85°, 79.45°, 45.72°, 45.47°

22–24. 24.94%; 15.42%; 10.88%; 13.15%; 18.59%; 17.01%

89.78°, 55.51°, 39.17°, 47.34°, 66.92°, 61.24°

Optional Assignment

1. 98

3. 4.3

5. 16%; 2.5%

7. 68%; 81.5%; 2.5%; 2.5%; 47.5%

9. 5.02

Check Figures (Odds) to Additional Assignments by Learning Unit from Appendix A

LU 1–1

1. a. Eight thousand, eight hundred twenty-one

d. Fifty-eight thousand, three

3. a. 80; 380; 860; 5,980; 210

c. 21,000; 1,000; 4,000; 10,000

5. a. Hundreds place

c. Ten thousands place

e. Billions place

7. Five hundred sixty-five

9. $375,985

11. Two thousand, nineteen

LU 1–2

1. a. 1,006

c. 1,319

d. 179

3. a. Estimated 50; 52

c. Estimated 10; 9

5. $71,577

7. $19,973

9. 12,797 lbs

11. Estimated $9,400; $9,422

13. $746 discount

LU 1–3

1. a. Estimated 4,000; actual 2,400

c. Estimated 15,000,000; actual 16,184,184

3. a. Estimated 1,000; actual 963 R5

c. Estimated 20; actual 25 R8

5. 5,040

7. $78

9. 27

11. $43,200

13. 40 stacks and 23 "extra" bricks

LU 2–1

1. a. Improper

b. Proper

c. Improper

d. Mixed number

e. Improper

f. Mixed number

3. a. $\frac{46}{5}$ **c.** $\frac{31}{7}$ **f.** $\frac{53}{3}$

5. a. 6; $\frac{6}{7}$ **b.** 15; $\frac{2}{5}$ **e.** 12; $\frac{8}{11}$

7. $\frac{13}{4}$

9. $\frac{17}{25}$

11. $\frac{60}{100}$

13. $\frac{7}{12}$

LU 2–2

1. a. 32 **b.** 180 **c.** 480 **d.** 252

3. a. $\frac{1}{3}$ **b.** $\frac{2}{3}$ **e.** $6\frac{1}{8}$ **h.** $56\frac{5}{6}$

5. $3\frac{1}{40}$ yards

7. $17\frac{5}{12}$ miles

9. $4\frac{8}{9}$ hours

LU 2–3

1. a. 1 **b.** $\frac{1}{4}$ **g.** 35 **i.** $1\frac{17}{18}$

3. a. $1\frac{1}{4}$ **b.** 3 **g.** 24 **l.** $\frac{4}{7}$

5. $39,000

7. 714

9. $20\frac{2}{3}$ miles

11. $412,000

LU 3–1

1. a. .62 **b.** .6 **c.** .953 **d.** .401 **e.** .06

3. a. Hundredths place

d. Thousandths place

5. a. $\frac{2}{5}$ **b.** $\frac{11}{25}$

g. $\frac{5}{16}$ **l.** $9\frac{1}{25}$

7. .286

9. $\frac{566}{1,000}$

11. .333

13. .0020507

LU 3–2

1. a. 31.608 **b.** 5.2281 **d.** 3.7736

3. a. .3 **b.** .1 **c.** 1,480.0 **d.** .1

5. a. 6,870 **c.** .0272

e. 34,700 **i.** 8,329.8

7. $4.53

9. $111.25

11. 15

LU 4–1

1. a. $430.64 **b.** 3 **c.** $867.51

3. a. Neuner Realty Co.

b. Kevin Jones

h. $2,756.80

LU 4–2

1. $1,435.42

3. Add $3,000; deduct $22.25

5. $2,989.92

7. $1,315.20

LU 5–1

1. a. $4N = 180$ **e.** $14 + \frac{N}{3} = 18$

h. $2N + 3N + 8 = 68$

LU 5–2

1. $80

3. $45 telephone; $135 utility

5. 51 tickets—Sherry;
408 tickets—Linda

7. 12 necklaces ($48);
36 watches ($252)

9. $157.14

LU 6–1

1. a. 8% **b.** 72.9%
i. 503.8% **l.** 80%

3. a. 70% **c.** 162.5%

h. 50% **n.** 1.5%

5. a. $\frac{1}{4}$ **b.** .375 **c.** 50%

d. $.66\overline{6}$ **n.** $1\frac{1}{8}$

7. 2.9%

9. $\frac{39}{100}$

11. $\frac{9}{10{,}000}$

LU 6–2

1. a. $20,000; 30%; $4,000

c. $7.00; 12%; $.84

3. a. 33.3% **b.** 3% **c.** 27.5%

5. a. −1,584; −26.6%

d. −20,000; −16.7%

7. $9,000

9. $3,196

11. 329.5%

LU 7–1

1. a. $120 **b.** $360 **c.** $50

d. $100 **e.** $380

3. a. $75 **b.** $21.50; $40.75

5. a. .7125; .2875 **b.** .7225; .2775

7. $3.51

9. $81.25

11. $315

13. 45%

LU 7–2

1. a. February 18; March 10

d. May 20; June 9

e. October 10; October 30

3. a. .97; $1,358 **c.** .98; $367.99

5. a. $16.79; $835.21

7. $16,170

9. a. $439.29 **b.** $491.21

11. $209.45

13. a. $765.31 **b.** $386.99

LU 8–1

1. a. $19.90 **b.** $2.72

c. $4.35 **d.** $90 **e.** $116.31

3. a. $2; 80% **b.** $6.50; 52%

c. $.28; 28.9%

5. a. $1.52 **b.** $225

c. $372.92 **d.** $625

7. a. $199.60 **b.** $698.60

9. a. $258.52 **b.** $90.48

11. a. $212.50 **b.** $297.50

13. $8.17

LU 8–2

1. a. $10.00 **b.** $57.50

c. $34.43 **d.** $27.33 **e.** $.15

3. a. $6.94 **b.** $882.35 **c.** $30

d. $171.43 **e.** $0.36

5. a. 28.57% **b.** 33.33%

d. 53.85%

7. $346.15

9. 39.39%

11. $2.29

13. 63.33%

LU 8–3

1. a. $80; $120 **b.** $525; $1,574.98

3. a. $410 **b.** $18.65

5. a. $216; $324; $5.14

b. $45; $63.90; $1.52

7. 17%

9. $21.15

11. $273.78

13. $.79

LU 8–4

1. a. $6.00 **b.** $11.11

3. a. 16,667 **b.** 7,500

5. 5,070

7. 22,222

LU 9–1

1. a. $427.50; 0; $427.50

b. $360; $40.50; $400.50

3. a. $438.85 **b.** $615.13

5. a. $5,200 **b.** $3,960

c. $3,740 **d.** $4,750

7. $723.00

9. $3,846.25

11. $2,032.48

LU 9–2

1. a. $2,300; $2,300

3. $0; $2,000

5. $236.30 FIT

7. $143.75

9. $613.51

11. $690.01

LU 10–1

1. a. $240 **b.** $1,080 **c.** $1,275

3. a. $131.25 **b.** $4.08 **c.** $98.51

5. a. $515.63 **b.** $6,015.63

7. a. $5,459.66

9. $659.36

11. $360

Appendix A (*Continued*)

LU 10–2

1. a. $4,371.44 **b.** $4,545.45
c. $3,433.33
3. a. 60; .17 **b.** 120; .33
c. 270; .75 **d.** 145; .40
5. 5%
7. $250
9. $3,000
11. 119 days

LU 10–3

1. a. $2,568.75; $1,885.47; $920.04;$0
3. $4,267.59
5. $4,715.30; $115.30

LU 11–1

1. I; B; D; I; D; I; B; D
3. a. 2% **c.** 13%
5. $15,963.75
7. $848.75; $8,851.25
9. $14,300
11. $7,855

LU 11–2

1. a. $5,075.00
b. $16,480.80
c. $994.44
3. a. $14.76
b. $223.25
c. $3.49
5. $4,031.67
7. $8,262.74
9. $5,088.16
11. $721.45

LU 12–1

1. a. $573.25 year 2
b. $3,115.57 year 4
3. a. $25,306; $5,306
b. $16,084; $6,084
5. $7,430.50
7. $8,881.20
9. $2,129.40
11. $3,207.09; $207.09
13. $3,000; $3,469; $3,498

LU 12–2

1. a. .9804 **b.** .3936
c. .5513
3. a. $1,575.50; $924.50
b. $2,547.02; $2,052.98
5. $14,509.50
7. $13,356.98
9. $16,826.40
11. $652.32
13. $18,014.22

LU 13–1

1. a. $1,000; $2,080; $3,246.40
3. a. $6,888.60 **b.** $6,273.36
5. $325,525
7. $13,412
9. $30,200.85
11. $33,650.94

LU 13–2

1. a. $2,638.65
b. $6,375.24; $7,217.10
3. $2,715.54
5. $24,251.85
7. $47,608
9. $456,425
11. Accept Jason $265,010

LU 13–3

1. a. $4,087.50 **b.** $21,607
c. $1,395 **d.** $201.45
e. $842.24
3. $16,200
5. $24,030
7. $16,345
9. $8,742

LU 14–1

1. a. $1,200; $192
b. $9,000; $1,200
3. a. 14.75% **b.** 10% **c.** 11.25%
5. a. $3,528 **b.** $696 **c.** $4,616
7. a. $22,500 **b.** $4,932 **c.** $29,932
9. a. $20,576 **b.** 12.75%

LU 14–2

1. a. $465; $8,535
b. $915.62; $4,709.38
3. a. $332.03 **b.** $584.83
c. $384.28
5. Final payment $784.39
7. $51.34
9. $35
11. $922.48
13. 7.50% to 7.75%

LU 15–1

1. a. $1,095.31 **b.** $965.24
c. $3,150.22 **d.** $2,694.47
3. a. $92.86 6.7% **b.** $151.86 7.8%
5. $733.16
7. a. $1,560.70 **b.** $1,443.04
9. a. $117.68 **b.** $51,284.40
11. $294,589

LU 15–2

1. a. $1,691.03; $513.54; $1,177.49
3. #4 balance outstanding $190,128.26
5. $112,897.60
7. a. $696.04 **b.** $81,812.80
9. $44,271.43
11. $30,022.20

LU 16–1

1. Total assets $224,725

3. Merch. inventory 13.90%; 15.12%

LU 16–2

1. Net income $57,765

3. Purchases 73.59%; 71.43%

LU 16–3

1. Sales 2023, 93.5%; 2022, 93.2%

3. .22

5. 59.29%

7. .83

9. COGS 119.33%; 111.76%; 105.04%

11. .90

13. 5.51%

15. 11.01%

LU 17–1

1. a. 4% **b.** 25%
c. 10% **d.** 20%

3. a. $2,033; $4,667
b. $1,850; $9,750

5. $8,625 depreciation per year

7. $2,800 depreciation per year

9. $95

11. a. $12,000 **b.** $6,000
c. $18,000 **d.** $45,000

LU 17–2

1. a. $.300 **b.** $.192 **c.** $.176

3. a. $.300, $2,600
b. $.192, $300,824

5. $5,300 book value end of year 5

7. a. $.155 **b.** $20,001.61

LU 17–3

1. a. 8% **b.** 20% **c.** 25%

3. a. $4,467; $2,233
b. $3,867; $7,733

5. $121, year 6

7. a. 28.57% **b.** $248 **c.** $619

9. a. 16.67% **b.** $2,500
c. $10,814 **d.** $2,907

LU 17–4

1. a. 33%; $825; $1,675

3. Depreciation year 8, $346

5. $125

7. a. $15,000 **b.** $39,000
c. $21,600 **d.** 2001

9. $68,440

LU 18–1

1. a. $5,120; $3,020
b. $323,246; $273,546

3. $35,903; $165,262

5. $10,510.20; $16,345

7. $37.62; $639.54

9. $628.40

11. $3,069; $952; $2,117

LU 18–2

1. a. $85,700; $143,500; .597; $64,500; $38,507

3. $85,000

5. $342,000; $242,500; 5.85; 6.29

7. $60,000; $100,000; $40,000

9. $70,150

11. $5,970

13. 3.24; 3.05

15. $32,340; $35,280; $49,980; $29,400

LU 19–1

1. a. $26.80; $562.80
b. $718.80; $12,698.80

3. a. $20.75; $43.89; $463.64

5. Total is **(a)** $1,023; **(b)** $58.55

7. $5.23; $115.23

9. $2,623.93

11. $26.20

13. $685.50

LU 19–2

1. a. $68,250 **b.** $775,450

3. a. $7.45; $74.50; 74.50

5. $9.10

7. $8,368.94

9. $42,112

11. $32,547.50

LU 20–1

1. a. $9.27; 25; $231.75

3. a. $93.00; $387.50; $535.00; $916.50

5. $1,242.90

7. $14,265

9. $47.50 more

11. $68,750

LU 20–2

1. a. $488 **b.** $2,912

3. a. $68,000; $60,000
b. $41,600; $45,000

5. $1,463

7. $117,187.50

9. $336,000

11. a. $131,250 **b.** $147,000

LU 20–3

1. a. $98; $160; $258

3. a. $312 **b.** $233
c. $181 **d.** $59; $20

5. a. $647 **b.** $706

7. $601

9. $781

11. $10,000; $8,000

13. $60,000; $20,000

15. $19.50; $110.50

LU 21–1

1. a. $43.88 **f.** 49

3. $27.06

5. $1,358.52 gain

7. $18,825.15

9. $7.70

Appendix A (*Continued*)

LU 21–2

1. a. IBM **b.** $10\frac{1}{4}$ **c.** 2032
d. $102.50 **e.** 102.375

3. a. $1,025 **b.** $1,023.75

5. a. $3,075
b. $307.50

7. a. $30 discount
b. $16.25 premium
c. $42.50 premium

9. a. $625 **b.** $375 discount
c. $105 **d.** 16.8%

11. 7.8%; 7.2%

13. 8.98%

LU 21–3

1. $11.90

3. $15.20

5. +$.14

7. 7.6%

9. $1.45; $18.45

11. $.56; $14.66

13. $1,573.50

15. $123 loss

17. a. 2032; 2034
b. 9.3% Comp USA; 6.9% GMA
c. $1,023.75 Comp USA
$1,016.25 GMA
d. Both at premium
e. $1,025 Comp USA;
$1,028.75 GMA

LU 22–1

1. a. 20.4 **b.** 83.75 **c.** 10.07

3. a. 59.5
b. 50

5. a. 63.7; 62; 62

7. $1,500,388.50

9. $10.75

11. $9.98

LU 22–2

1. 18: 𝍸 || 7

3. 25–30: 𝍸 ||| 8

5. 7.2°

7. 145–154: |||| 4

9. 98.4°; 9.9°; 70.5°; 169.2°; 11.9°

Appendix B

Metric System

John Sullivan: Angie, I drove into the gas station last night to fill the tank up. Did I get upset! The pumps were not in gallons but in liters. This country (U.S.) going to metric is sure making it confusing.

Angie Smith: Don't get upset. Let me first explain the key units of measure in metric, and then I'll show you a convenient table I keep in my purse to convert metric to U.S. (also called customary system), and U.S. to metric. Let's go on.

The metric system is really a decimal system in which each unit of measure is exactly 10 times as large as the previous unit. In a moment, we will see how this aids in conversions. First, look at the middle column (Units) of this to see the basic units of measure:

U.S.	Thousands	Hundreds	Tens	Units	Tenths	Hundredths	Thousandths
Metric	Kilo- 1,000	Hecto- 100	Deka- 10	Gram Meter Liter 1	Deci- .1	Centi- .01	Milli- .001

- Weight: Gram (think of it as $\frac{1}{30}$ of an ounce).
- Length: Meter (think of it for now as a little more than a yard).
- Volume: Liter (a little more than a quart).

To aid you in looking at this, think of a decimeter, a centimeter, or a millimeter as being "shorter" (smaller) than a meter, whereas a dekameter, hectometer, and kilometer are "larger" than a meter. For example:

1 centimeter = $\frac{1}{100}$ of a meter; or 100 centimeters equals 1 meter.
1 millimeter = $\frac{1}{1{,}000}$ meter; or 1,000 millimeters equals 1 meter.
1 hectometer = 100 meters.
1 kilometer = 1,000 meters.

Remember we could have used the same setup for grams or liters. Note the summary here.

Length	Volume	Mass
1 meter:	1 liter:	1 gram:
= 10 decimeters	= 10 deciliters	= 10 decigrams
= 100 centimeters	= 100 centiliters	= 100 centigrams
= 1,000 millimeters	= 1,000 milliliters	= 1,000 milligrams
= .1 dekameter	= .1 dekaliter	= .1 dekagram
= .01 hectometer	= .01 hectoliter	= .01 hectogram
= .001 kilometer	= .001 kiloliter	= .001 kilogram

Practice these conversions and check solutions.

Appendix B *(Continued)*

Practice Quiz

Convert the following:

1. 7.2 meters to centimeters
2. .89 meter to millimeters
3. 64 centimeters to meters
4. 350 grams to kilograms
5. 7.4 liters to centiliters
6. 2,500 milligrams to grams

✓ Solutions

1. 7.2 meters = 7.2 × 100 = 720 centimeters (remember, 1 meter = 100 centimeters)
2. .89 meter = .89 × 1,000 = 890 millimeters (remember, 1 meter = 1,000 millimeters)
3. 64 centimeters = 64/100 = .64 meters (remember, 1 meter = 100 centimeters)
4. 350 grams = $\frac{350}{1{,}000}$ = .35 kilogram (remember 1 kilogram = 1,000 grams)
5. 7.4 liters = 7.4 × 100 = 740 centiliters (remember, 1 liter = 100 centiliters)
6. 2,500 milligrams = $\frac{2{,}500}{1{,}000}$ = 2.5 grams (remember, 1 gram = 1,000 milligrams)

Angie: Look at the table of conversions and I'll show you how easy it is. Note how we can convert liters to gallons. Using the conversion from metric to U.S. (liters to gallons), we see that you multiply numbers of liters by .26, so for 37.95 liters we get 37.95 × .26 = 9.84 gallons.

Common conversion factors for U.S./metric

A. To convert from U.S. to	Metric	Multiply by	B. To convert from metric to	U.S.	Multiply by
Length:			*Length:*		
Inches (in)	Meters (m)	.025	Meters (m)	Inches (in)	39.37
Feet (ft)	Meters (m)	.31	Meters (m)	Feet (ft)	3.28
Yards (yd)	Meters (m)	.91	Meters (m)	Yards (yd)	1.1
Miles	Kilometers (km)	1.6	Kilometers (km)	Miles	.62
Weight:			*Weight:*		
Ounces (oz)	Grams (g)	28	Grams (g)	Ounces (oz)	.035
Pounds (lb)	Grams (g)	454	Grams (g)	Pounds (lb)	.0022
Pounds (lb)	Kilograms (kg)	.45	Kilograms (kg)	Pounds (lb)	2.2
Volume or capacity:			*Volume or capacity:*		
Pints	Liters (L)	.47	Liters (L)	Pints	2.1
Quarts	Liters (L)	.95	Liters (L)	Quarts	1.06
Gallons (gal)	Liters (L)	3.8	Liters (L)	Gallons	.26

John: How would I convert 6 miles to kilometers?

Angie: Take the number of miles times 1.6; thus 6 miles × 1.6 = 9.6 kilometers.

John: If I weigh 120 pounds, what is my weight in kilograms?

Angie: 120 times .45 (use the conversion table) equals 54 kilograms.

John: OK. Last night, when I bought 16.6 liters of gas, I really bought 4.3 gallons (16.6 liters times .26).

Practice Quiz

Convert the following:

1. 10 meters to yards
2. 110 quarts to liters
3. 78 kilometers to miles
4. 52 yards to meters
5. 82 meters to inches
6. 292 miles to kilometers

✓ Solutions

1. 10 meters × 1.1 = 11 yards
2. 110 quarts × .95 = 104.5 liters
3. 78 kilometers × .62 = 48.36 miles
4. 52 yards × .91 = 47.32 meters
5. 82 meters = 39.37 = 3,228.34 inches
6. 292 miles × 1.6 = 467.20 kilometers

Appendix B: Problems

Drill Problems

Convert:

1. 65 centimeters to meters
2. 7.85 meters to centimeters
3. 44 centiliters to liters
4. 1,500 grams to kilograms
5. 842 millimeters to meters
6. 9.4 kilograms to grams
7. .854 kilogram to grams
8. 5.9 meters to millimeters
9. 8.91 kilograms to grams
10. 2.3 meters to millimeters

Convert, rounding to the nearest tenth:

11. 50.9 kilograms to pounds

12. 8.9 pounds to grams

13. 395 kilometers to miles

14. 33 yards to meters

15. 13.9 pounds to grams

16. 594 miles to kilometers

17. 4.9 feet to meters

18. 9.9 feet to meters

19. 100 yards to meters

20. 40.9 kilograms to pounds

21. 895 miles to kilometers

22. 1,000 grams to pounds

23. 79.1 meters to yards

24. 12 liters to quarts

25. 2.92 meters to feet

26. 5 liters to gallons

27. 8.7 meters to feet

28. 8 gallons to liters

29. 1,600 grams to pounds

30. 310 meters to yards

Word Problems

31. A metric ton is 39.4 bushels of corn. China bought 450,000 metric tons of U.S. corn, valued at $105 million, for delivery after September 30. Convert the number of bushels purchased from metric tons to bushels of corn.

Glossary/Index

Note: Page numbers followed by n indicate material found in footnotes.