

Savings Accounts

Before YOU READ

What You'll Learn

- Section 5-1** Complete a savings account deposit slip, and compute the total deposit.
- Section 5-2** Fill out a savings account withdrawal slip.
- Section 5-3** Compute the new balance on a savings account statement.
- Section 5-4** Calculate simple interest.
- Section 5-5** Figure out the compound interest and the amount.
- Section 5-6** Find compound interest using tables.
- Section 5-7** Find interest for daily compounding.
- Section 5-8** Compute the future value of an ordinary annuity and an annuity due.

When Will You Ever Use This?

Achieving your dreams will take hard work and money. Although the hard work takes dedication, so does saving money. To accomplish your future goals, you've got to have money. Saving money is a crucial step to living a financially free life.

Key Words to Know

- savings account
- deposit
- withdrawal
- account statement
- interest
- simple interest
- principal
- annual interest rate
- compound interest
- daily compounding
- annuity
- ordinary annuity
- annuity due

Mathematics Online

To learn more about savings accounts, visit busmath.glencoe.com.



Living *in the* Real World

Understanding the Williams Sisters

Jaydene Williams has offered to drive her 10-year-old sister, Aisha, to their State Bank. Aisha is going to open her first savings account today. To earn money, she has been doing extra work around the house—raking leaves and washing windows. Read how this sibling twosome tackles the process of starting a savings account.

Read on. Go to . . .

| | |
|---|--------|
| <i>Earning Money for Your Account</i> . . . | p. 196 |
| <i>Carrying Your Worth in a Shoebox</i> . . | p. 199 |
| <i>It Happens Four Times a Year</i> | p. 202 |
| <i>Interest on Washing Windows</i> | p. 205 |
| <i>Compounding Is Good for You</i> | p. 208 |
| <i>The Work's Done for You</i> | p. 211 |
| <i>Growing Faster</i> | p. 214 |
| <i>Get Proof</i> | p. 217 |
| <i>Assessment</i> | p. 221 |

SECTION 5-1 Deposits

Section Objective

Complete a savings account deposit slip, and compute the total deposit.

To open a **savings account**, which is a special bank account that earns interest, you must make a **deposit**. A deposit is the money you give the bank to hold in your savings account. Each time you make a deposit, it is added to your account's balance. To do this you fill out a savings account deposit slip to record currency, coins, and checks that you are depositing. If you want to receive cash back, subtract the amount from the subtotal to find the total deposit amount.

$$\text{Total Deposit} = (\text{Currency} + \text{Coins} + \text{Checks}) - \text{Cash Received}$$

Living in the Real World

Understanding the Williams Sisters

Earning Money for Your Account Jaydene has explained to her sister that a savings account actually earns money for the account owner. "The bank takes all the money people put into it and invests it by making mortgage loans, car loans, buying government securities, and loaning it to other banks. It earns money for the bank, and the bank shares some of that extra money with its customers."

Draw Conclusions If you deposited \$100 into a savings account with 2.3 percent interest, what would be your total balance at the end of the year?

Continued on page 199



Example 1

Gustavo Barrera has a check for \$145.58 and a check for \$47.51. He also has 14 one-dollar bills. He would like to receive \$20 in cash and deposit the rest of the money in his savings account. What is the total deposit?

STEP: Compute the total deposit.

$$\begin{aligned} & (\text{Currency} + \text{Coins} + \text{Checks}) - \text{Cash Received} \\ & (\$14.00 + \$145.58 + \$47.51) - \$20.00 = \\ & \qquad \qquad \qquad \$207.09 \qquad \qquad - \$20.00 \qquad = \mathbf{\$187.09 \text{ total deposit}} \end{aligned}$$

Need Help? Go to...

Workshop 4:
Adding Decimals,
page 10

Workshop 5:
Subtracting
Decimals, page 12

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter. Find the total deposit.

- $(\$160.00 + \$10.95 + \$114.35) - \$25.00 =$
- $(\$125.60 + \$180.00 + \$22.21) - \$20.00 =$

Example 2

Robert Cassidy wants to deposit the following into his savings account: 28 one-dollar bills, 8 five-dollar bills, 24 quarters, 35 dimes, 90 pennies, a check for \$29.34, and a check for \$124.19. He wants to receive a fifty-dollar bill in cash. How much will he deposit?

Figure 5.1

| SAVINGS DEPOSIT | | DOLLARS | CENTS |
|---|----------------------|------------|-----------|
| Date | March 11, 20-- | | |
| Account Number | 0113014 | | |
| Currency + Coins + Checks | | | |
| Name | Robert Cassidy | | |
| SIGN HERE IF CASH RECEIVED FROM DEPOSIT | | | |
| <i>Robert Cassidy</i> | | | |
| CASH | CURRENCY | 68 | 00 |
| | COINS | 10 | 40 |
| CHECKS | LIST SEPARATELY 14-6 | 29 | 34 |
| | 35-165 | 124 | 19 |
| | SUBTOTAL | 231 | 93 |
| | LESS CASH RECEIVED | 50 | 00 |
| | TOTAL DEPOSIT | 181 | 93 |

STEP: Compute the total deposit.

$$\begin{aligned} \text{The currency deposit: } & \$28 + (8 \times \$5) = \\ & \$28 + \$40 = \$68 \end{aligned}$$

$$\begin{aligned} \text{The coins deposit: } & (24 \times \$0.25) + (35 \times \$0.10) + \$0.90 = \\ & \$6.00 + \$3.50 + 0.90 = \$10.40 \end{aligned}$$

$$\$68.00 + \$10.40 + \$29.34 + \$124.19 - \$50.00 = \mathbf{\$181.93 \text{ total deposit}}$$

CONCEPT CHECK



Complete the problem, then check your answer at the end of the chapter. Find the total deposit.

- Checks: \$152.54 and \$147.46.
Cash: 54 one-dollar bills, 12 five-dollars, 6 ten-dollar bills, 35 quarters, 18 dimes, 40 nickels, and 75 pennies. Less a fifty-dollar bill as cash received.

SECTION 5-1 PRACTICE

Find the subtotal and total deposit.

- Guadalupe Garcia wants to deposit \$74.00 in cash and a check for \$124.17.
- Ernest McMahon deposits \$73.23 in cash and \$3.95 in coins.
- Kenneth Hal deposits a check for \$335.28, another check for \$61.88, and \$90 in cash.
- Zina Templeton deposits a check for \$823.40, a check for \$29.50, and \$50 in cash.

Continued on next page



| | Deposits | Subtotal | Less Cash Received | Total Deposit |
|-----|---------------------------|----------|--------------------|---------------|
| 8. | \$ 44.00 8.35 26.80 | a. | \$ 0.00 | b. |
| 9. | 76.00 9.27 44.38 | a. | 0.00 | b. |
| 10. | 52.96 39.75 | a. | 30.00 | b. |
| 11. | 180.81 115.35 | a. | 150.00 | b. |
| 12. | 64.89 39.57 928.12 | a. | 20.00 | b. |

13. Joe Gryster deposited a check for \$475.77 and another check for \$94.26 in his savings account. He received \$70.00 in cash. What was his total deposit?
14. Ande Corbin completed a savings account deposit slip on which he recorded checks for \$327.19 and \$52.88 for deposit. He received \$38.00 in cash. What was his total deposit?
15. Laura Martinez deposited 4 twenty-dollar bills, 9 ten-dollar bills, 35 quarters, 8 dimes, 97 pennies, and a check for \$75.96 in her savings account. What was her total deposit?
16. David Rodero operates a booth during special concert events. Following each event he makes a deposit in his savings account. He has checks for \$40, \$50, and \$35. He has cash and coins consisting of 8 fifty-dollar bills, 12 twenty-dollar bills, 12 ten-dollar bills, 8 five-dollar bills, 22 one-dollar bills, 48 quarters, 19 dimes, 22 nickels, and 52 pennies. He would like to receive a hundred-dollar bill in cash. What is his total deposit?
17. Winona Gendron is a street vendor selling souvenirs in front of Comerica Baseball Park. She deposits her sales income directly into a savings account. Her deposit today consists of 5 one-hundred-dollar bills, 8 fifty-dollar bills, 25 twenty-dollar bills, 22 five-dollar bills, 8 two-dollar bills, 19 one-dollar bills, 18 half-dollars, 42 quarters, 36 dimes, 28 nickels, and one check for \$40.00. What is the total deposit?

MAINTAINING YOUR SKILLS

Need Help? Go to...

► Skill 5: Adding
Decimals, page 732

► Skill 6: Subtracting
Decimals, page 733

Add.

| | | | | | | | |
|-----|--------------------|-----|--------------------|-----|---------------------|-----|----------------------|
| 18. | \$31.50 + 42.45 | 19. | \$40.46 + 18.32 | 20. | \$173.79 + 45.93 | 21. | \$551.16 + 146.81 |
|-----|--------------------|-----|--------------------|-----|---------------------|-----|----------------------|

Subtract.

| | | | | | | | |
|-----|--------------------|-----|---------------------|-----|---------------------|-----|---------------------|
| 22. | \$98.93 - 20.00 | 23. | \$692.57 - 35.40 | 24. | \$103.33 - 60.00 | 25. | \$687.28 - 75.00 |
|-----|--------------------|-----|---------------------|-----|---------------------|-----|---------------------|

SECTION 5-2 Withdrawals

Section Objective

Fill out a savings account withdrawal slip.

To withdraw is to take away. So when you fill out a **withdrawal** slip, you're taking money out of your bank account. Your withdrawal is subtracted from the account's balance. When making a withdrawal from a savings account, you need to be able to write dollar amounts in *word form*, with the decimal portion expressed as a fraction. (You learned the same process in Chapter 4 Checking Accounts.)

Living in the Real World

Understanding the Williams Sisters

Carrying Your Worth in a Shoebox Pennies rattle in the shoe box Aisha is carrying. "OK, so how do I deposit all my money?" Aisha asks as she and her sister enter the bank.

"Well, first," Jaydene says, "we'll have to open a savings account for you and deposit your money into it. Then you can take money out when you need it. That's called making a withdrawal."

"Do I just go up to the window and ask for my money when I want it back?"

"Well sort of," Jaydene says, "but first you have to fill out a piece of paper called a withdrawal slip."

Draw Conclusions Where else can you find a withdrawal slip other than at the lobby of the bank?

Continued on page 202



Example 1

Need Help? Go to...

Workshop 1:
Writing and
Reading Numbers,
page 4

- Write \$45.00 in word form.
- Write \$355 in word form.
- Write *twenty-five and $\frac{50}{100}$ dollars* as a numeral.

STEP: Write the amounts in word form or as numerals.

- \$45.00 in word form is **forty-five and $\frac{00}{100}$ dollars**.
- \$355.00 in word form is **three hundred fifty-five and $\frac{00}{100}$ dollars**.
- Twenty-five and $\frac{50}{100}$ dollars as a numeral is **\$25.50**.

CONCEPT CHECK

Complete the problems, then check your answers at the end of the chapter. Write each of the following in word form or as a numeral.

- \$60.00
- \$280.50
- Ninety-eight and $\frac{75}{100}$ dollars
- Six thousand five hundred eighty-six and $\frac{95}{100}$ dollars

SELF-CHECK

Example 2

Dalton Rhodes would like to withdraw \$45 from his savings account. His account number is 0113014. How should he fill out the withdrawal slip? (Note: In order to prevent someone from altering your check, you always start writing out the amount to the left.)

Figure 5.2

| State Bank | | Savings Withdrawal | |
|--|-------------------|--------------------------------------|---------|
| DATE | November 14, 20-- | ACCOUNT NUMBER | 0113014 |
| | | AMOUNT | \$45.00 |
| NOT NEGOTIABLE—TO BE USED ONLY AT COUNTER OF THIS BANK BY DEPOSITOR PERSONALLY | | | |
| Forty-five and $\frac{00}{100}$ | | DOLLARS | |
| NAME (SIGNATURE) | | Dalton Rhodes | |
| ADDRESS | | 18 Laurel Lane, Bridgetown, CT 05120 | |

- STEP 1:** Write the date of withdrawal.
- STEP 2:** Write the savings account number.
- STEP 3:** Write the amount withdrawn in words with cents expressed as a fraction of a dollar. (Note that you start at the far left.)
- STEP 4:** Write the amount withdrawn as a numeral.
- STEP 5:** Did he sign the withdrawal slip?

CONCEPT CHECK

SELF-CHECK

Complete the problem, then check your answer at the end of the chapter.

5. Tyrone Shumpert would like to withdraw \$150 from his savings account. Use the withdrawal slip to answer the following:

Figure 5.3

| University Bank | | Savings Withdrawal | |
|--|------------------|--|----------|
| DATE | January 10, 20-- | ACCOUNT NUMBER | 559821 |
| | | AMOUNT | \$150.00 |
| NOT NEGOTIABLE—TO BE USED ONLY AT COUNTER OF THIS BANK BY DEPOSITOR PERSONALLY | | | |
| One hundred fifty and $\frac{00}{100}$ | | DOLLARS | |
| NAME (SIGNATURE) | | Tyrone Shumpert | |
| ADDRESS | | 5532 Hilltop Court, Lake Havasu City, AZ 86403 | |

- a. What is the date of withdrawal?
- b. What is the savings account number?
- c. Is the amount withdrawn correctly written in word form?
- d. Who signed the withdrawal slip?

FYI

Make sure you ask how many free withdrawals the bank allows each month. If you withdraw more than the limit, you may be charged \$5.00 or more per withdrawal.



Write each amount in word form, as it would appear on a withdrawal slip.

6. \$25.00 7. \$150.00 8. \$44.93
9. \$68.74 10. \$406.00 11. \$137.51

Write each as a numeral.

12. Thirty-five and $\frac{00}{100}$ dollars
13. Nine hundred thirty-two and $\frac{25}{100}$ dollars
14. Seventy-four and $\frac{10}{100}$ dollars
15. Seven thousand five hundred eighty-five and $\frac{00}{100}$ dollars

For Problems 16 to 20 write (a) the account number, (b) the amount as a numeral, and (c) the amount in words.

16. Avis Bogart's savings account number is 81-0-174927. He fills out a savings withdrawal slip for \$318.29 to purchase a gift.
17. Nina Cantu has been saving for a trip abroad. Her travel agent has arranged a trip to Europe that will cost \$2,460. Cantu withdraws the amount from her savings account. Her account number is 13-122-541.
18. Damone Bashier has been saving to buy a commemorative stamp for his stamp collection. He fills out the savings withdrawal slip shown for \$76.70. His account number is 06-029-175.

19.

| Farmer's Mercantile | | |
|--|-------------------|----------|
| Date | Savings Acct. No. | |
| 5/19/20-- | 17594179 | \$831.95 |
| Pay to Myself or to Home Finance Co. | | |
| Dollars | | |
| And Charge to the above Numbered Account | | |
| Sign Here | Calvin Gordon | |
| Withdrawal | | |

20.

| Farmer's Mercantile | | |
|--|-------------------|----------|
| Date | Savings Acct. No. | |
| 1/12/20-- | 16010368 | \$374.28 |
| Pay to Myself or to Odessa French | | |
| Dollars | | |
| And Charge to the above Numbered Account | | |
| Sign Here | Odessa French | |
| Withdrawal | | |

MAINTAINING YOUR SKILLS

Write in words with cents expressed as a fraction of a dollar.

21. \$94.78 22. \$219.34
23. \$162.05 24. \$15.71

Write as a numeral.

25. Thirty-nine and $\frac{41}{100}$ dollars
26. Two hundred fifty-one and $\frac{27}{100}$ dollars
27. Six thousand three hundred forty and $\frac{22}{100}$ dollars
28. Twenty-five thousand six hundred ninety-six and $\frac{29}{100}$ dollars

Need Help? Go to...

➤ Skill 1: Numbers,
page 727

SECTION 5-3 Account Statements

Section Objective

Compute the new balance on a savings account statement.

When you have a savings account, your bank may mail you a monthly or quarterly **account statement**. The account statement shows all deposits, withdrawals, and interest credited to your account.

$$\text{New Balance} = \text{Previous Balance} + \text{Interest} + \text{Deposits} - \text{Withdrawals}$$

Living in the Real World

Understanding the Williams Sisters

It Happens Four Times a Year “How do I know the bank is really putting my money into my account?” Aisha asks, narrowing her eyes.

“They will give you a copy of the deposit slip,” Jaydene says, “and then every three months, they’ll send you an account statement. You check it against the records you’ve been keeping to see if they are the same. The statement will show everything that’s happened in your account since the last statement—deposits, withdrawals, and your interest.”

Draw Conclusions Why is it important to reconcile your savings account?

Continued on page 205



Example 1

Your savings account statement shows a previous balance of \$1,258.22 and \$2.10 in interest. You made deposits of \$210.00, \$50.00, and \$40.00. You had withdrawals of \$50.00 and \$75.00. What is your new balance?

STEP: Compute the new balance.

$$\begin{array}{r} \text{Previous Balance} + \text{Interest} + \text{Deposits} - \text{Withdrawals} \\ \$1,258.22 + \$2.10 + (\$210 + \$50 + \$40) - (\$50 + \$75) \\ = \$1,258.22 + \$2.10 + \$300 - \$125 \\ = \$1,435.32 \text{ new balance} \end{array}$$

Need Help? Go to...

- ▶ **Workshop 4:**
Adding Decimals,
page 10
- ▶ **Workshop 5:**
Subtracting
Decimals, page 12

CONCEPT CHECK

Complete the problems, then check your answers at the end of the chapter.

SELF-CHECK

| | Previous Balance | + | Interest | + | Deposits | - | Withdrawals | = | New Balance |
|----|------------------|---|----------|---|----------|---|-------------|---|-------------|
| 1. | \$ 998.50 | + | \$1.25 | + | \$ 80 | - | \$100 | = | |
| 2. | 1,589.33 | + | 2.67 | + | 750 | - | 440 | = | |

Example 2

Christine Yamaguchi receives her savings account statement quarterly. After checking her passbook and transactions to be sure all items have been recorded correctly, she checks the calculations. What is the balance in her account on July 1?

Figure 5.4

| Savings Account Statement | | | | |
|-----------------------------|------------|-----------------------------|----------|-----------|
| Name Christine Yamaguchi | | Beginning Date | | 4/01/20-- |
| | | Ending Date | | 7/01/20-- |
| Account Number | 5891235 | Interest Earned This Period | | 4.11 |
| Date | Withdrawal | Deposit | Interest | Balance |
| 4/01 | | | | 274.50 |
| 4/15 | | 250.00 | | 524.50 |
| 5/11 | | 125.00 | | 649.50 |
| 6/10 | 100.00 | | | 549.50 |
| 7/01 | | | 4.11 | 553.61 |
| 7/01 | | 80.00 | | 633.61 |

STEP: Find the new balance.

$$\begin{aligned} & \text{Previous Balance} + \text{Interest} + \text{Deposits} - \text{Withdrawals} \\ & \$274.50 + \$4.11 + (\$250 + \$125 + \$80) - \$100.00 \\ & = \$633.61 \text{ new balance} \end{aligned}$$



$$274.5 \text{ + } 4.11 \text{ + } 250 \text{ + } 125 \text{ + } 80 \text{ - } 100 \text{ = } 633.61$$

CONCEPT CHECK

SELF-CHECK

Complete the problem, then check your answer at the end of the chapter.

3. Previous balance, \$700; interest, \$1.50; deposits of \$100.00 and \$250.00; withdrawals of \$80.00 and \$110.00. What is the new balance?

SECTION 5-3 PRACTICE

| | Previous Balance | + | Interest | + | Deposits | - | Withdrawals | = | New Balance |
|----|------------------|---|----------|---|----------|---|-------------|---|-------------|
| 4. | \$ 400.00 | + | \$ 1.90 | + | \$ 50.00 | - | \$ 150.00 | = | |
| 5. | 485.00 | + | 1.95 | + | 125.00 | - | 200.00 | = | |
| 6. | 674.00 | + | 1.22 | + | 160.00 | - | 190.00 | = | |
| 7. | 7,381.19 | + | 9.64 | + | 231.43 | - | 180.00 | = | |

8. Judi Imhoff's previous balance is \$717.52. Imhoff receives \$4.36 in interest, \$125.00 and \$276.95 in deposits, and \$90.00 in withdrawals. What is her new balance?

Continued on next page



9. Darrick Taylor's previous balance is \$2,161.41. On his bank statement there is a record of \$20.04 in interest, deposits of \$345.00 and \$575.80, and withdrawals of \$210.00 and \$945.00. What is his new balance?
10. Sara Averett's previous balance is \$74,561.49, with \$1,017.98 in interest, deposits of \$918.37 and \$944.56, and withdrawals of \$959.40 and \$14,391.47. What is her new balance?
11. Kevin Elliott received his savings account statement. Fill in the missing information on Elliott's statement.

Figure 5.5

| Savings Account Statement | | | | | |
|---------------------------|------------|----------------|----------|-----------------------------|--|
| Name | | Beginning Date | | 1/15/20-- | |
| Kevin Elliott | | Ending Date | | 7/15/20-- | |
| Account Number | | 12-36-5000 | | Interest Earned This Period | |
| | | | | f. | |
| Date | Withdrawal | Deposit | Interest | Balance | |
| 01/15 | | | | \$503.27 | |
| 01/28 | | \$ 45.00 | | 548.27 | |
| 02/03 | | 80.40 | | 628.67 | |
| 02/15 | | | \$2.85 | 631.52 | |
| 03/15 | | | 2.86 | 634.38 | |
| 04/10 | \$400.00 | | | 234.38 | |
| 04/15 | | | 2.37 | a. | |
| 05/01 | | 335.60 | | b. | |
| 05/15 | | | 2.28 | c. | |
| 06/15 | | | 2.61 | d. | |
| 07/15 | | | 2.62 | e. | |

MAINTAINING YOUR SKILLS

Need Help? Go to...

- ▶ Skill 5: Adding Decimals, page 732
- ▶ Skill 6: Subtracting Decimals, page 733

Add.

12. $\$450.00 + \$9.50 + \$40.00$
13. $\$385.00 + \$7.52 + \$875.00$
14. $\$793.60 + \$2.38 + \$5.00$
15. $\$426.30 + \$278.41 + \$342.91$

Subtract.

16. $\$7,942.70 - \$3,453.80$
17. $\$16,865.95 - \$14,991.39$
18. $\$338.49 - \299.39
19. $\$41,215.24 - \$11,645.91$

SECTION 5-4 Simple Interest

Section Objective

Calculate simple interest.

When you deposit money into a savings account, you are permitting the bank to use the money. The bank pays you **interest**, or a rental fee for letting them use your money. The most common method of calculating interest is the **simple interest** formula. This is the interest paid on the original **principal**, the amount of money earning interest. Simple interest is based on three factors: the principal, the interest rate, and the amount of time for which the principal is borrowed.

To figure out how much interest your money will earn in the first year, multiply the principal by the **annual interest rate**, the percent of the principal that you earn as interest based on one year.

To compute use this formula:

$$\text{Interest} = \text{Principal} \times \text{Rate} \times \text{Time}$$

(Important Note: In this formula, rate is expressed as a decimal, fraction, or percent; time is expressed in years or a fraction of a year.)

Living in the Real World

Understanding the Williams Sisters

Interest on Washing Windows Aisha hears her older sister mention the word “interest” when she talks about savings accounts. “You know I’m *interested* in starting a savings account,” Aisha says.

Jaydene laughs, “I’m talking about *interest* on your money. The money you put in your account is called ‘the principal.’ The ‘interest’ is a little extra money the bank gives you for keeping your money in their bank.”

Draw Conclusions What is your definition of *interest*?

Continued on page 208

Need Help? Go to...

- **Workshop 6:**
Multiplying
Decimals, page 14
- **Workshop 13:**
Fraction to
Decimal, Decimal
to Percent, page 28

Example 1

Joyce Tyler deposits \$900 in a savings account at Hamler State Bank. The account pays an annual interest rate of $5\frac{1}{2}$ percent. She makes no other deposits or withdrawals. After three months, the interest is calculated. How much simple interest does her money earn?

STEP: Find the interest at $5\frac{1}{2}$ percent.

Principal \times **Rate** \times **Time**

$$\$900.00 \times 5\frac{1}{2}\% \times \frac{3}{12}$$

$$\$900.00 \times 0.055 \times 0.25 = \$12.375 \text{ or } \$12.38 \text{ interest}$$



$$900 \times 5.5\% \div 12 = 12.375 \text{ or}$$

$$900 \times 0.055 \times 0.25 = 12.375$$

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter.

- | | |
|---|---|
| <p>1. Principal: \$400 Annual interest rate: 6 percent What is the interest after 3 months?</p> | <p>2. Principal: \$1,500 Annual interest rate: 2.5 percent What is the interest after 6 months?</p> |
|---|---|

Example 2

Lena Green's bank computes 4 percent interest on a daily basis. She has \$1,000 in the account for 10 days. She makes a deposit of \$600 and it is in the account for 15 days. She withdraws \$400 and the balance earns interest for 6 days. How much interest does she earn? What is the amount in the account at the end of the month?

STEP: Find the interest at 4 percent for each set of days.

Principal × Rate × Time

(Note: Remember that the time has to be a fraction of a year, so divide the number of days by 365.)

| | | | | | | |
|-------------------------------------|---|----|---|------------------|---|----------------|
| \$1,000 | × | 4% | × | $\frac{10}{365}$ | = | \$ 1.10 |
| (\$1,000 + \$600) | × | 4% | × | $\frac{15}{365}$ | = | 2.63 |
| (\$1,600 - \$400) | × | 4% | × | $\frac{6}{365}$ | = | 0.79 |
| Total interest for the month | | | | | = | \$ 4.52 |

The amount in the account is $(\$1,200 + \$4.52) = \$1,204.52$

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter.

3. Some banks calculate the interest on a daily basis. The daily interest is added to the account at the end of the month. Complete the following interest calculations:

| | Principal | × | Rate | × | Time | = | Interest |
|----|------------------------------------|---|------|---|------------------|---|----------|
| a. | \$2,000 | × | 0.03 | × | $\frac{12}{365}$ | = | |
| b. | 3,000 | × | 0.03 | × | $\frac{8}{365}$ | = | |
| c. | 2,500 | × | 0.03 | × | $\frac{5}{365}$ | = | |
| d. | 2,000 | × | 0.03 | × | $\frac{6}{365}$ | = | |
| e. | Total interest | | | | | = | |
| f. | Total amount in the account | | | | | = | |

4. On May 1 Geraldo Saldana opened a savings account that paid 3.5 percent interest at Fulton Savings Bank with a deposit of \$3,600. Ten days later he deposited \$3,000. Fourteen days later he deposited \$5,000. No other deposits or withdrawals were made. Six days later the bank calculated the daily interest.
- How much simple interest did his money earn?
 - How much was in the account at the end of the 30 days?

SECTION 5-4 PRACTICE

| | Principal | × | Rate | = | Annual Interest | × | Time | = | Interest |
|----|-----------|---|-------|---|-----------------|---|------------------|---|----------|
| 5. | \$ 720.00 | × | 0.06 | = | a. | × | $\frac{3}{12}$ | = | b. |
| 6. | 960.00 | × | 0.02 | = | a. | × | $\frac{1}{12}$ | = | b. |
| 7. | 327.00 | × | 0.04 | = | a. | × | $\frac{6}{12}$ | = | b. |
| 8. | 4,842.00 | × | 0.05 | = | a. | × | $\frac{12}{365}$ | = | b. |
| 9. | 3,945.37 | × | 0.065 | = | a. | × | $\frac{8}{365}$ | = | b. |

| | Principal | × | Rate | × | Time | = | Interest | |
|--------|------------------------------------|---|------|---|------------------|---|----------|--|
| 10. a. | \$5,000 | × | 0.02 | × | $\frac{15}{365}$ | = | | |
| b. | 4,000 | × | 0.02 | × | $\frac{5}{365}$ | = | | |
| c. | 1,000 | × | 0.02 | × | $\frac{5}{365}$ | = | | |
| d. | 1,500 | × | 0.02 | × | $\frac{5}{365}$ | = | | |
| e. | Total interest | | | | | | = | |
| f. | Total amount in the account | | | | | | = | |

11. Tye LaFleure deposited \$760. No other deposits or withdrawals were made. After 3 months the interest was computed at an annual interest rate of 5 percent. How much simple interest did his money earn?
12. Malicia Dukes-Miller deposited \$2,430. She made no other deposits or withdrawals. After 1 month the interest was computed at an annual rate of 6 percent. How much simple interest did her money earn?
13. Vernon Taber deposited his \$2,000 scholarship money in a savings account at State Home Savings Bank on June 1. At the end of 2 months, interest was computed at an annual interest rate of 6 percent. How much simple interest did his money earn?
14. On March 1 Tessa Obee deposited her IRS refund check for \$9,364.85 in a savings account at State Bank. The account pays 4 percent interest calculated on a daily basis. Five days later on March 6 she withdrew \$1,000.00. On March 18, 12 days later, she withdrew \$2,000.00. On March 28, 10 days later, she withdrew another \$2,000.00. Three days later on March 31 interest was computed. How much simple interest did her money earn?

MAINTAINING YOUR SKILLS

Need Help? Go to...

➤ **Skill 14:** Changing Fractions/Decimals, page 741

➤ **Skill 28:** Writing Percents as Decimals, page 755

Change the fractions and mixed numbers to decimals.

15. $\frac{1}{2}$

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

17. $\frac{1}{4}$

18. $5\frac{1}{2}$

19. $6\frac{1}{4}$

20. $7\frac{3}{4}$

Write the percents as decimals.

21. $5\frac{1}{2}\%$

22. $6\frac{1}{4}\%$

23. $9\frac{1}{2}\%$

24. $7\frac{3}{4}\%$

25. $10\frac{5}{8}\%$

26. $5\frac{3}{8}\%$

SECTION 5-5 Compound Interest

Section Objective

Figure out the compound interest and the amount.

Interest that you earn in a savings account during an interest period is added to your account. Your new balance is used to calculate the interest for the next interest period and the next interest period and so on.

Compound interest is interest earned not only on the original principal, but also on the interest earned during previous interest periods. Think of compound interest as having a snowball effect—a little snowball starts at the top of a big hill and as it rolls down, it keeps picking up more snow, making it bigger and bigger. The first step to figure out compound interest is to use this formula:

$$\text{Amount} = \text{Principal} + \text{Interest}$$

The amount is the balance in the account at the end of an interest period. Once you have the amount, then you do a series of simple interest computations. To find the compound interest, you find the difference between the amount in the account and the original principal. The formula looks like this:

$$\text{Compound Interest} = \text{Amount} - \text{Original Principal}$$

Living in the Real World

Understanding the Williams Sisters

Compounding Is Good for You Mr. Gleason, a bank teller, smiles when Aisha tells him she wants to open a savings account. She requests a passbook, but he tells her that most banks no longer issue them. Instead most have gone to the monthly account statement. Deposits, withdrawals, and interest are tracked there.

Draw Conclusions Give an example of compound interest. How does it work for you?

Continued on page 211



Need Help? Go to...

- **Skill 14:** Changing Fractions/Decimals, page 741
- **Skill 28:** Writing Percents as Decimals, page 755
- **Skill 30:** Finding the Percentage, page 757
- **Application K:** Chronological Expressions, page 766

Example 1

Jamal Quillet deposited \$1,800 in a savings account, which earns 6 percent interest that is compounded quarterly. He made no deposits or withdrawals. What was the amount in the account at the end of the second quarter?

STEP: Find the amount for each quarter.

| First Quarter | | | | | | |
|---------------|---|----------|---|---------------|---|------------|
| Principal | × | Rate | × | Time | = | Interest |
| \$1,800.00 | × | 6% | × | $\frac{1}{4}$ | = | \$27.00 |
| Principal | + | Interest | | | = | Amount |
| \$1,800.00 | + | \$27.00 | | | = | \$1,827.00 |

| Second Quarter | | | | | | |
|----------------|---|----------|---|---------------|---|------------|
| Principal | × | Rate | × | Time | = | Interest |
| \$1,827.00 | × | 6% | × | $\frac{1}{4}$ | = | \$27.41 |
| Principal | + | Interest | | | = | Amount |
| \$1,827.00 | + | \$27.41 | | | = | \$1,854.41 |



$$1800 \text{ M+ } \times 6 \% 108 \times .25 = 27 \text{ + RM}$$

$$1800 = 1827 \text{ CM M+ } \times 6 \% 109.62 \times .25 =$$

$$27.405 \text{ + RM } 1827 = 1854.405$$

CONCEPT CHECK

SELF-CHECK ✓

Complete the problem, then check your answer at the end of the chapter.

- Two thousand dollars is deposited at 8 percent compounded semiannually. Find the amount in the account after 1 year.

Example 2

In Example 1 Jamal Quillet deposited \$1,800 in a savings account that earns 6 percent interest compounded quarterly. You determined that the amount in his account at the end of the second quarter was \$1,854.41. What is the compound interest?

STEP: Figure out the compound interest.

Amount – Original Principal

$$\$1,854.41 - \$1,800.00 = \$54.41 \text{ compound interest}$$

CONCEPT CHECK

SELF-CHECK ✓

Complete the problem, then check your answer at the end of the chapter.

- How much did the account in Self-Check Problem 1 earn in compound interest?

SECTION 5-5 PRACTICE

| | Principal | Annual Interest Rate | Interest Period | First Period Interest | Amount | Second Period Interest | Amount |
|----|-----------|----------------------|-----------------|-----------------------|----------|------------------------|--------|
| 3. | \$ 900.00 | 6% | quarterly | \$13.50 | \$913.50 | a. | b. |
| 4. | 400.00 | 6% | monthly | 2.00 | 402.00 | a. | b. |
| 5. | 2,360.00 | $4\frac{1}{2}\%$ | semiannually | 53.10 | a. | b. | c. |
| 6. | 18,260.00 | $2\frac{1}{2}\%$ | quarterly | a. | b. | c. | d. |
| 7. | 27,721.00 | 9.513% | annually | a. | b. | c. | d. |

Continued on next page

8. Alicia Martin's savings account has a principal of \$1,200. It earns 6 percent interest compounded quarterly.
 - a. What is the amount in the account at the end of the second quarter?
 - b. How much is the compound interest?
9. Angelo Larragu's savings account has a principal of \$800. It earns 6 percent interest compounded quarterly.
 - a. What is the amount in the account at the end of the second quarter?
 - b. How much is the compound interest?
10. Manny Simpson deposited \$860 in a new regular savings account that earns 5.5 percent interest compounded semiannually. He made no other deposits or withdrawals. What was the amount in the account at the end of 1 year?
11. Jana Dejute deposited \$4,860 in a new credit union savings account on the first of the quarter. The principal earns 4 percent interest compounded quarterly. She made no other deposits or withdrawals. What was the amount in her account at the end of 6 months?
12. Betty and Sam Sim's savings account had a balance of \$9,544 on May 1. The account earns interest at a rate of 5.25 percent compounded monthly.
 - a. What is the amount in their account at the end of August if no deposits or withdrawals were made during the period?
 - b. How much is the compound interest?
13. Ernie Boddy had \$3,620 on deposit at Savings Bank on July 1. The money earns interest at a rate of 6.5 percent compounded quarterly.
 - a. What is the amount in the account on April 1 of the following year if no deposits or withdrawals were made?
 - b. How much is the compound interest?
14. The Vassillis opened a savings account with a deposit of \$2,000 on January 1. The account pays interest at 6 percent compounded semiannually. On July 1 they deposited another \$2,000.
 - a. What amount will they have in their account on July 1?
 - b. What will they have in the account on January first one year later?
 - c. How much is the compound interest?

MAINTAINING YOUR SKILLS

Write the percents as decimals.

15. $5\frac{1}{4}\%$

16. $8\frac{1}{2}\%$

17. $5\frac{3}{4}\%$

Find the percentage.

18. $\$950 \times 8\%$

19. $\$760 \times 6\frac{1}{2}\%$

20. $\$3,620 \times 9\%$

Write the fractions as decimals. Round answers to the nearest hundredth.

21. $\frac{3}{10}$

22. $\frac{4}{12}$

23. $\frac{5}{8}$

Need Help? Go to...

► **Skill 28: Writing Percents as Decimals**, page 755

► **Skill 30: Finding the Percentage**, page 757

► **Skill 14: Changing Fractions/Decimals**, page 741

Compound Interest Tables

Section Objective

Find compound interest using tables.

To compute compound interest quickly, you can use a compound interest table, which shows the amount of \$1.00 for many interest rates and interest periods. To use the table you must know the *total number of interest periods* and the *interest rate per period*. Throughout this chapter, you'll use these formulas:

$$\text{Amount} = \text{Original Principal} \times \text{Amount of \$1.00}$$

$$\text{Compound Interest} = \text{Amount} - \text{Original Principal}$$

Living in the Real World

Understanding the Williams Sisters

The Work's Done for You Figuring compound interest seems complicated to Aisha, but Mr. Gleason tells her that if you know the number of interest periods and the interest rate per period, you can use a table to figure out the amount of compound interest your money has earned.

Draw Conclusions In your own words, how do you read a chart in order to find the information you need?

Continued on page 214

Example 1

State Bank pays 6 percent interest compounded quarterly on regular savings accounts. Marta Carmona deposited \$3,000 for 2 years. She made no other deposits or withdrawals. How much interest did Carmona earn during the 2 years? (Note: Use the Compound Interest—Amount of \$1.00 table on page 797 to solve this problem.)

STEP 1: Find the total interest periods.

$$\begin{array}{l} \text{Periods per Year} \times \text{Number of Years} \\ 4 \text{ quarters per year} \times 2 \text{ years} = 8 \end{array}$$

STEP 2: Find the interest rate per period.

$$\begin{array}{l} \frac{\text{Annual Rate}}{\text{Number of Periods per Year}} \\ \frac{6\%}{4} = 1.5\% \end{array}$$

STEP 3: Find the amount of \$1.00 for 8 periods at 1.5 percent per period using the Compound Interest—Amount of \$1.00 table on page 797.
= 1.12649

STEP 4: Find the amount.

$$\begin{array}{l} \text{Original Principal} \times \text{Amount of \$1.00} \\ \$3,000.00 \times 1.12649 = \$3,379.47 \end{array}$$

Continued on next page

Need Help? Go to...

- ▶ **Workshop 7:**
Dividing Decimals,
page 16
- ▶ **Workshop 6:**
Multiplying
Decimals, page 14
- ▶ **Application C:**
Tables and Charts,
page 762

SECTION 5-6 PRACTICE

Use **Compound Interest—Amount of \$1.00 table** on page 797 to solve Problems 4 to 8. Round answers to the nearest cent.

| | Principal | Annual Interest Rate | Interest Periods per Year | Total Time | Amount | Compound Interest |
|----|-----------|----------------------|---------------------------|------------|--------|-------------------|
| 4. | \$ 900.00 | 5.50% | 4 | 2 years | a. | b. |
| 5. | 640.00 | 6.00% | 2 | 1 year | a. | b. |
| 6. | 1,340.00 | 5.00% | 4 | 3 years | a. | b. |
| 7. | 6,231.40 | 5.75% | 2 | 5 years | a. | b. |
| 8. | 3,871.67 | 4.00% | 4 | 10 years | a. | b. |

9. State Bank pays 5.5 percent interest compounded semiannually on regular savings accounts. Iva Howe deposited \$2,800 in a regular savings account for 2 years. She made no other deposits or withdrawals during the period. How much interest did her money earn?
10. Currito Zermeno deposited \$900 in a savings plan with her credit union. The credit union savings plan pays 6 percent interest compounded quarterly. If she makes no other deposits or withdrawals, how much interest will her money earn in 1 year?
11. National Credit Union pays 6.25 percent interest compounded semiannually on special notice savings accounts. Jessie McKenzie deposits \$3,438.70 in a special notice savings account for 2 years. At the end of 2 years, she deposits \$5,000 in the account. How much is in the account at the end of 5 more years?
12. University Bank pays 5 percent interest compounded quarterly on regular savings accounts. Rose and Bob Yung had \$4,000 on deposit for 1 year. At the end of the year, they withdrew all their money and deposited \$4,000 at National Bank, which pays 5.75 percent compounded semiannually. How much more did the \$4,000 earn at National Bank for 1 year?
13. Nathan Murphy opened a savings account at Savings and Loan on January 1 with a deposit of \$800. Savings and Loan pays 6 percent interest compounded quarterly. What will the \$800 be worth on January 1 of the following year? How much interest will the \$800 have earned by January 1 of the following year?
14. Wilma Bracken opened a savings account at Dallas Trust Bank on March 1. Dallas Trust pays 4 percent interest compounded quarterly. Bracken opened her account with an initial deposit of \$10,000. She made \$1,000 deposits at the end of each quarter. How much is in the account at the end of 6 quarters?

MAINTAINING YOUR SKILLS

Convert the percent to a decimal and then divide.

- | | | |
|------------------|--------------------|--------------------|
| 15. $8\% \div 4$ | 16. $4\% \div 4$ | 17. $6\% \div 12$ |
| 18. $7\% \div 4$ | 19. $8.5\% \div 2$ | 20. $3.5\% \div 4$ |

Need Help? Go to...

▶ **Skill 11: Dividing**
 Decimals, page 738


SECTION 5-7 Daily Compounding

Section Objective

Find interest for daily compounding.

Usually the more frequently interest is compounded, the more interest you will earn. Many banks offer savings accounts with **daily compounding**. When interest is compounded daily, it is computed each day and added to the account balance. The account will earn interest from the day of deposit to the day of withdrawal. A table can be used to calculate the amount and interest for daily compounding.

Remember these formulas from previous sections:

$$\text{Amount} = \text{Original Principal} \times \text{Amount of \$1.00}$$

$$\text{Compound Interest} = \text{Amount} - \text{Original Principal}$$

Living in the Real World

Understanding the Williams Sisters

Growing Faster “The more often the bank adds interest to your account and recalculates the compound interest, the faster your account will grow,” Mr. Gleason says. “If the bank compounds daily, you will earn interest on your interest almost immediately.”

Draw Conclusions What are the benefits of compound interest over simple interest?

Continued on page 217

Need Help? Go to...

- ▶ **Workshop 6:**
Multiplying Decimals, page 14
- ▶ **Workshop 17:**
Elapsed Time, page 36
- ▶ **Skill 8:** Multiplying Decimals, page 735
- ▶ **Application G:** Elapsed Time (Days), page 765

Example 1

Suppose you deposit \$8,000 in an account that pays 5.5 percent interest compounded daily. How much interest will you earn in 31 days?

STEP 1: Find the amount of \$1.00 for 31 days using Figure 5.6.
= 1.00468

Figure 5.6

| Amount of \$1.00 at 5.5% Compounded Daily (365-Day Year)* | | | |
|---|---------|-----|---------|
| Day | Amount | Day | Amount |
| 21 | 1.00316 | 31 | 1.00468 |
| 22 | 1.00331 | 32 | 1.00483 |
| 23 | 1.00347 | 33 | 1.00498 |
| 24 | 1.00362 | 34 | 1.00513 |
| 25 | 1.00377 | 35 | 1.00528 |

*See the table on page 796 for more values.

STEP 2: Find the amount.

$$\begin{array}{r} \text{Original Principal} \times \text{Amount of \$1.00} \\ \$8,000.00 \quad \times \quad 1.00468 \quad = \$8,037.44 \end{array}$$

STEP 3: Find the compound interest.

$$\begin{array}{r} \text{Amount} - \text{Original Principal} \\ \$8,037.44 - \$8,000.00 \quad = \$37.44 \text{ compound interest} \end{array}$$

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter.

- Six thousand dollars deposited at 5.5 percent interest compounded daily for 25 days.
 - Find the amount.
 - Find the compound interest.
- Six thousand dollars deposited at 5.5 percent interest compounded daily for 31 days.
 - Find the amount.
 - Find the compound interest.

Example 2

On May 31 Deloris Zelms deposited \$1,000 in a savings account that pays 5.5 percent interest compounded daily. On July 1 how much interest had been earned on the principal in her account?

STEP 1: Find the number of days from May 31 to July 1. Use the Elapsed Time table on page 796.

$$\begin{array}{l} \text{July 1 is day 182. May 31 is day 151.} \\ 182 - 151 = 31 \text{ days} \end{array}$$

STEP 2: Find the amount of \$1.00 for 31 days using the Amount of \$1.00 at 5.5 Percent, Compounded Daily (365-Day Year) table on page 796.
 $= 1.00468$

STEP 3: Find the amount.

$$\begin{array}{r} \text{Original Principal} \times \text{Amount of \$1.00} \\ \$1,000.00 \quad \times \quad 1.00468 \quad = \$1,004.68 \end{array}$$

STEP 4: Find the compound interest.

$$\begin{array}{r} \text{Amount} - \text{Original Principal} \\ \$1,004.68 - \$1,000.00 \quad = \$4.68 \text{ compound interest} \end{array}$$

CONCEPT CHECK

SELF-CHECK

Complete the problem, then check your answer at the end of the chapter.

- On February 1 (in a non-leap year) Raul Avila deposited \$10,000 in a savings account that pays 5.5 percent interest compounded daily. On June 21 how much interest had been earned on the principal in the account?

Need Help? Go to...

Workshop 17:
Elapsed Time,
page 36

SECTION 5-7 PRACTICE

Use the Amount of \$1.00 at 5.5 Percent, Compounded Daily (365-Day Year) table on page 796 to solve. Round answers to the nearest cent. Interest is 5.5 percent compounded daily.

| | Principal | Number of Days | Amount | Compound Interest |
|----|-----------|----------------|--------|-------------------|
| 4. | \$80,000 | 25 | a. | b. |
| 5. | 900 | 31 | a. | b. |
| 6. | 6,500 | 50 | a. | b. |
| 7. | 3,800 | 90 | a. | b. |
| 8. | 15,321 | 120 | a. | b. |

9. On June 10 Bertha Polanski deposited \$8,241.78 in a savings account that pays 5.5 percent interest compounded daily. How much interest will the money earn in 31 days?
10. Oprah Eglund has a savings account that earns 5.5 percent interest compounded daily. On May 5 the amount in the account was \$28,214.35. How much interest will the money earn in 90 days?
11. On April 11 Ramona Jimerson had \$6,521.37 in his savings account. The account pays 5.5 percent interest compounded daily. How much interest will the money earn by June 30?
12. On August 23 Diego Quiroz had \$1,432.19 in his savings account at Camden Savings and Trust. The account earns 5.5 percent interest compounded daily. What will be the amount in his savings account when he closes it on October 1?
13. Debra Goforth's savings account shows a balance of \$904.31 on March 1. The same day, she made a deposit of \$375.00 to the account. She also made deposits of \$500.00 on April 1 and May 1. The bank pays interest at a rate of 5.5 percent compounded daily. What will be the amount in her account on May 29?

MAINTAINING YOUR SKILLS

Need Help? Go to...

- ▶ **Skill 2: Rounding Numbers**, page 729
- ▶ **Skill 8: Multiplying Decimals**, page 735

Multiply and round to the nearest hundredth.

- | | |
|--|--|
| <ol style="list-style-type: none"> 14. $\\$4,000 \times 1.02131$ 16. $\\$550 \times 1.00907$ 18. $\\$950 \times 1.00392$ 20. $\\$7,370 \times 1.00347$ 22. $\\$94 \times 1.00196$ 24. $\\$7,925.14 \times 1.01670$ | <ol style="list-style-type: none"> 15. $\\$9,000 \times 1.00135$ 17. $\\$1,437 \times 1.00392$ 19. $\\$1,416 \times 1.01059$ 21. $\\$41,520 \times 1.00407$ 23. $\\$389 \times 1.00301$ 25. $\\$327.78 \times 1.00015$ |
|--|--|

SECTION 5-8 Annuities

Section Objective

Compute the future value of an ordinary annuity and an annuity due.

Financial advisors recommend that their clients make regular deposits in a savings plan, such as an Individual Retirement Account (IRA). When an equal amount of money is deposited into an account at equal periods of time, this is called an **annuity**. There are two categories of annuities:

1. **Ordinary annuity** occurs when equal deposits are made at the *end* of each interest period (such as salaries).
2. **Annuity due** occurs when you have regular deposits at the *beginning* of the period (such as rent). The money immediately starts earning interest because it is deposited at the beginning of the interest period.

So how do you calculate the interest on a series of equal payments over regular intervals of time? Easy. Both annuity groups use the *future value*. This is the amount of money in the annuity account at the *end* of a specific period of time. To find the future value of an ordinary annuity, follow the steps in Example 1 below. (Throughout this section you might also refer to the expanded Future Value of an Ordinary Annuity for \$1.00 per Period table on page 798.) For now familiarize yourself with the formula:

$$\text{Future Value} = \text{Amount of Deposit} \times \text{Future Value of \$1.00}$$

$$\text{Future Value of an Annuity Due} = \text{Future Value of an Ordinary Annuity} \times (\$1.00 + \text{Rate per Period})$$

Living in the Real World

Understanding the Williams Sisters

Get Proof “When you’re done opening your account,” Jaydene says to Aisha, “I’d like to start an annuity account. I received a raise at work. I want to make sure I make regular deposits into my annuity account.”

Draw Conclusions How often can you add deposits to your annuity account?

Continued on page 221

Example 1

Aiko Murakami deposits \$500 in an ordinary annuity at the end of each quarter in an account earning 6 percent interest compounded quarterly. What is the future value of the account in 2 years?

STEP 1: Find the total number of periods.

$$\begin{array}{ccccccc} \text{Periods per Year} & \times & \text{Number of Years} & & & & \\ 4 & \times & 2 & & & & = 8 \end{array}$$

STEP 2: Find the interest rate per period.

$$\frac{\text{Annual Rate}}{\text{Number of Periods per Year}} = \frac{6\%}{4} = 1.5\%$$

Continued on next page

Need Help? Go to...

- **Workshop 18:**
Reading Tables and Charts, page 38
- **Workshop 6:**
Multiplying Decimals, page 14
- **Skill 8: Multiplying Decimals,** page 735
- **Application C:**
Tables and Charts, page 762

STEP 3: Find the future value of \$1.00 for 8 periods at 1.5 percent per period using the Future Value of an Ordinary Annuity for \$1.00 per Period table on page 798.

$$= 8.43284$$

STEP 4: Find the future value.

Amount of Deposit \times Future Value of \$1.00

$$\$500 \quad \times \quad 8.43284 \quad = \quad \$4,216.42 \text{ future value}$$

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter.

1. One thousand dollars is deposited into an ordinary annuity after each 6-month period for 2 years. The account pays 4 percent interest compounded semiannually. What is the future value of the account in 2 years?
2. Five thousand dollars is deposited into an ordinary annuity after each quarter for 3 years. The account pays 6 percent interest compounded quarterly. What is the future value of the account in 3 years?

ANNUITY DUE Now that you know how to calculate an ordinary annuity, it's time to learn how to calculate the other kind of annuity—the *annuity due*. An annuity due occurs when you have regular deposits at the *beginning* of the period. In an annuity due, the money starts earning interest immediately since it is deposited at the beginning of the interest period. The future value of an annuity due is found by multiplying the future value of an ordinary annuity by \$1.00 plus the rate per period. It looks like this:

$$\text{Future Value of an Annuity Due} = \text{Future Value of an Ordinary Annuity} \times (\$1.00 + \text{Rate per Period})$$

Example 2

Suppose that Aiko Murakami (from Example 1) had made \$500 deposits in an annuity due at the beginning of each quarter in an account earning 6 percent interest compounded quarterly. What is the future value of the account in 2 years?

STEP 1: You know from Example 1 that the future value of the ordinary annuity is \$4,216.42.

STEP 2: You also know that the rate per period is 1.5 percent.
= 0.015

STEP 3: Use the calculation for future value of an annuity due.

Future Value of an Ordinary Annuity \times (\$1.00 + Rate per Period)

$$= \quad \$4,216.42 \quad \times \quad (1.00 + \quad 0.015)$$

$$= \quad \$4,216.42 \quad \times \quad 1.015$$

$$= \quad \$4,279.67 \text{ future value of an annuity due}$$

CONCEPT CHECK

SELF-CHECK

Complete the problems, then check your answers at the end of the chapter.

3. See Self-Check Problem 1. Suppose \$1,000 is deposited into an annuity due at the beginning of each 6-month period for 2 years. The account pays 4 percent interest compounded semiannually. What is the future value of the account in 2 years?

4. See Self-Check Problem 2. Suppose \$5,000 is deposited into an annuity due at the beginning of each quarter for 3 years. The account pays 6 percent interest compounded quarterly. What is the future value of the account in 3 years?

SECTION 5-8 PRACTICE

Use the Future Value of an Ordinary Annuity for \$1.00 per Period table on page 798 to solve Problems 5–15.

| | End of Period Deposit | Compounded | Rate | Years | Rate per Period | Number of Periods | Amount of \$1.00 | Future Value of Ordinary Annuity | \$1.00 + Rate per Period | Future Value of Annuity Due |
|----|-----------------------|--------------|------|-------|-----------------|-------------------|------------------|----------------------------------|--------------------------|-----------------------------|
| 5. | \$5,000 | quarterly | 6% | 2 | a. | b. | c. | d. | e. | f. |
| 6. | 800 | semiannually | 4% | 6 | a. | b. | c. | d. | e. | f. |
| 7. | 2,000 | annually | 4% | 10 | a. | b. | c. | d. | e. | f. |
| 8. | 1,000 | monthly | 6% | 3 | a. | b. | c. | d. | e. | f. |
| 9. | 525 | quarterly | 8% | 10 | a. | b. | c. | d. | e. | f. |

10. Regina Aguirre deposits \$2,000 into an ordinary annuity after each 6-month period for 4 years. The account pays 6 percent interest compounded semiannually. What is the future value of the account in 4 years?
11. Vernon Taber deposits \$600 into an ordinary annuity after each quarter for 4 years. The account pays 4 percent interest compounded quarterly. What is the future value of the account in 4 years?
12. Rob Walthall deposits \$4,000 in an annuity due at the beginning of each 6-month period for 4 years. The account pays 6 percent interest compounded semiannually. What is the future value of the account in 4 years?
13. Suppose Kimi Matsumoto deposits \$2,000 at the beginning of each year into an Individual Retirement Account at Boise Bank. The account pays 7 percent compounded annually. How much will be in the account in 25 years?
14. Jane Martin-Smith and her husband deposited \$500 in an account on their wedding day and each subsequent anniversary. The money was deposited in an account that pays 7 percent compounded annually. How much will they have on their 25th anniversary?
15. Richard and Elaine McCormick would like to have \$20,000 in 5 years to make a down payment on a home. They decide to save \$350 at the beginning of each month for the next 4 years. The money is in an account that pays 6 percent compounded monthly. How much will they need to save the fifth year?

MAINTAINING YOUR SKILLS

Need Help? Go to...

► Skill 8: Multiplying Decimals, page 735

Multiply.

16. $\$2,000 \times 1.05000$ 17. $\$8,000 \times 1.45210$ 18. $\$6,250 \times 2.01500$
 19. $\$3,698 \times 4.12161$ 20. $\$1,100 \times 5.10101$ 21. $\$1,587 \times 6.07550$
 22. $\$8,520 \times 3.01502$ 23. $\$45,620 \times 7.10588$ 24. $\$980 \times 9.18212$

SECTION 5-1

CONCEPT CHECK (p. 196, 197)

- $(\$160.00 + \$10.95 + \$114.35) - \$25.00 = \$285.30 - \$25.00 = \$260.30$
- $(\$125.60 + \$180.00 + \$22.21) - \$20.00 = \$327.81 - \$20.00 = \$307.81$
- $\$152.54 + \$147.46 = \$300.00$; $\$54.00 + (12 \times \$5) + (6 \times \$10) = \$54 + \$60 + \$60 = \$174$; $(35 \times \$0.25) + (18 \times \$0.10) + (40 \times \$0.05) + \$0.75 = \$8.75 + \$1.80 + \$2.00 + \$0.75 = \$13.30$; $\$300 + \$174 + \$13.30 = \$487.30 - \$50 = \437.30

SECTION 5-2

CONCEPT CHECK (p. 199, 200)

- Sixty and $\frac{00}{100}$ dollars
- Two hundred eighty and $\frac{50}{100}$ dollars
- \$98.75
- \$6,586.95
- a. January 10, 20-- b. 559821 c. yes d. Tyrone Shumpert

SECTION 5-3

CONCEPT CHECK (p. 202, 203)

- \$979.75
- \$1,902.00
- $\$700.00 + \$1.50 + (\$100.00 + \$250.00) - (\$80.00 + \$110.00) =$
 $\$701.50 + \$350.00 - \$190.00 = \861.50

SECTION 5-4

CONCEPT CHECK (p. 206)

- $\$400 \times 6\% \times \frac{3}{12}$; $\$400 \times 0.06 \times 0.25 = \6.00
- $\$1,500 \times 0.025 \times \frac{6}{12} = \18.75
- a. \$1.97 b. \$1.97 c. \$1.03 d. \$0.99 e. \$5.96 f. \$2,005.96
- a. \$18.98 b. \$11,618.98

SECTION 5-5

CONCEPT CHECK (p. 209)

- $\$2,000 \times 0.08 \times \frac{1}{2} = \80 ; $\$2,080 \times 0.08 \times \frac{1}{2} = \83.20 ; **\$2,163.20**
- $\$2,163.20 - \$2,000 = \$163.20$

SECTION 5-6

CONCEPT CHECK (p. 212)

- $1.11544 \times \$2,000 = \$2,230.88$ 2. $1.06136 \times \$4,500 = \$4,776.12$
- $1.05614 \times \$2,000 = \$2,112.28$; $(\$2,112.28 + \$4,000.00) \times 1.11544 = \$6,817.88$

SECTION 5-7

CONCEPT CHECK (p. 215)

- a. $1.00377 \times \$6,000 = \$6,022.62$ b. \$22.62
- a. $1.00468 \times \$6,000 = \$6,028.08$ b. \$28.08
- $1.02131 \times \$10,000 = \$10,213.10$; $\$10,213.10 - \$10,000 = \$213.10$

SECTION 5-8

CONCEPT CHECK (p. 218, 219)

- $\$1,000 \times 4.12161 = \$4,121.61$ 2. $\$5,000 \times 13.04121 = \$65,206.05$
- You know from Self-Check Problem 1 that the future value of the ordinary annuity is \$4,121.61. You also know that the rate per period is 2 percent = 0.02. Therefore, $\$4,121.61 \times (\$1.00 + 0.02) = \$4,121.61 \times 1.02 = \$4,204.04$
- You know from Self-Check Problem 2 that the future value of the ordinary annuity is \$65,206.05. You also know that the rate per period is 1.5 percent = 0.015. Therefore, $\$65,206.05 \times (\$1.00 + 0.015) = \$65,206.05 \times 1.015 = \$66,184.14$

Living in the Real World

Understanding the Williams Sisters

Assessment A savings account is a good way to ease into financial independence. The golden rule is to put money aside each month for unexpected expenses (such as your car breaking down) and long-term goals, such as purchasing a car or taking a trip to Jamaica. As your savings account balance grows, you should consider other investments that can earn a potentially higher return. If inflation increases at a higher rate than your savings account return, you can lose purchasing power. Consider that a loaf of bread that cost \$.50 twenty years ago now costs about \$2.00, an increase of 400 percent. Money you set aside for long-term goals, such as retirement, will need to earn more than the rates usually paid on savings accounts to stay ahead of the inflation and taxes.

Now that you've read about Aisha and Jaydene, answer these questions as they pertain to your life.

1. **Analyzing.** Looking at your family's financial situation, what unexpected expenses has your family had? Name them. How did your family react and deal with it?
2. **Communicating.** Long-term financial security starts with saving. How does your family view saving, spending, and borrowing money?
3. **Predicting.** When you strike out on your own, what will be your personal financial strategy for saving money? Explain how your experiences have shaped your outlook.

After YOU READ

REVIEW OF KEY WORDS

Write your own definition for each of the terms below.

1. savings account (p. 196)
2. deposit (p. 196)
3. withdrawal (p. 199)
4. account statement (p. 202)
5. interest (p. 205)
6. principal (p. 205)
7. annual interest rate (p. 205)
8. simple interest (p. 205)
9. compound interest (p. 208)
10. daily compounding (p. 214)
11. annuity (p. 217)
12. ordinary annuity (p. 217)
13. annuity due (p. 217)

Skills and Concepts

SECTION OBJECTIVE 5-1 AND EXAMPLES

Complete a savings account deposit slip, and compute the total deposit.

Fredie Enberg has 34 one-dollar bills in currency, \$8.74 in coins, and a check for \$102.35 to deposit into his savings account. He wants to receive a ten-dollar bill in cash. How much will he deposit?

STEP: Compute the total deposit.

$$(\text{Currency} + \text{Coins} + \text{Checks}) - \text{Cash Received}$$

$$(\$34.00 + \$8.74 + \$102.35) - \$10.00 = \$135.09 \text{ total deposit}$$

REVIEW EXERCISES

Find the subtotal and total deposit.

| | Deposits | Subtotal | Less Cash Received | Total Deposit |
|-----|----------------------------|----------|--------------------|---------------|
| 14. | \$ 38.90 34.28 21.01 | a. | \$ 0.00 | b. |
| 15. | 93.44 12.58 102.66 | a. | 35.50 | b. |
| 16. | 184.66 54.76 96.44 | a. | 50.98 | b. |
| 17. | 13.49 122.34 77.45 | a. | 115.00 | b. |
| 18. | 33.28 45.98 67.98 | a. | 15.50 | b. |
| 19. | 101.95 10.29 75.65 | a. | 75.00 | b. |

Complete the deposit slip on a separate sheet of paper.

20. Hazel Bruot fills out the savings deposit form shown. What is her total deposit?

| | | | | | | |
|---|--|----------------------|----|-------|--|--------------------------------|
| DEPOSITED FOR ACCOUNT OF <u>Hazel Bruot</u> | | DOLLARS | | CENTS | BE SURE EACH ITEM IS PROPERLY ENDORSED | SAVINGS ACCOUNT DEPOSIT TICKET |
| Address <u>412 E. Broadway</u> | | CASH | 31 | 17 | | |
| <u>Milton, NC 22020</u> | | LIST EACH SEPARATELY | 92 | 12 | | |
| Date <u>October 11</u> , 20 <u> </u> | | | 77 | 13 | | |
| | | | 26 | 41 | | |
| | | | | | | |
| | | | | | | |
| FEDERAL SAVINGS TRENTON HEIGHTS | | CHECKS | | | | |
| All items are received by this Bank for purposes of collection and all credits for items are provisional. Use REGISTERED MAIL when mailing cash or coupons. | | TOTAL | | | | |

SECTION OBJECTIVE 5-2 AND EXAMPLES

Fill out a savings account withdrawal slip.

Serita Escobar would like to withdraw \$85.34 from her savings account. Her account number is 00–170–14. Write (a) the account number, (b) the amount as a numeral, and (c) the amount in words.

- a. 00–170–14 b. \$85.34 c. *Eighty-five and $\frac{34}{100}$ dollars*

REVIEW EXERCISES

Write each amount in words as it would appear on a withdrawal slip.

21. \$21.44 22. \$396.00

For Problems 23–25, write (a) the account number, (b) the amount as a numeral, and (c) the amount in words.

23.

| Farmer's Mercantile | | |
|---|-----------------------|---------|
| Date | Savings Acct. No. | |
| 11/8/20-- | 06029175 | \$76.60 |
| Pay to Myself or to Damone Bashier | | |
| Dollars | | |
| And Charge to the above Numbered Account | | |
| Sign Here | <i>Damone Bashier</i> | |
| Withdrawal | | |

24. Murphie Wohler has been saving to buy a big-screen TV. The total purchase price is \$2,359.04. She fills out a withdrawal slip for the amount. Her savings account number is 8642–00–908.

25. Ruben LaChorrera loves baseball. He has been saving to buy season tickets for the Atlanta Braves. The total purchase price is \$985.40. He fills out a withdrawal slip for the amount. His savings account number is 045–8996.

SECTION OBJECTIVE 5-3 AND EXAMPLES

Compute the new balance on a savings account statement.

Your savings account statement shows a previous balance of \$543.92 and \$1.23 in interest. You made deposits of \$100, \$50, and \$300.86. You had withdrawals of \$35.46 and \$128.44. What is your new balance?

STEP: Compute the new balance.

$$\begin{array}{r} \text{Previous Balance} + \text{Interest} + \text{Deposits} - \text{Withdrawals} \\ \$543.92 + \$1.23 + (\$100 + \$50 + \$300.86) - (\$35.46 + \$128.44) = \$832.11 \end{array}$$

REVIEW EXERCISES

26. Previous balance, \$650.25; interest, \$4.02; deposit, \$125.44; withdrawal, \$50. What is the new balance?
27. Previous balance, \$2,349.95; interest, \$21.34; deposit, \$125.00; withdrawal, \$409.86. What is the new balance?
28. Sergio Santiago's savings account statement showed a previous balance of \$234.95 and interest of \$1.06. The statement also showed deposits of \$123.42 and \$50.66 and withdrawals of \$323.09. What is his new balance?
29. Tasi Sun's savings account statement showed a previous balance of \$21,395.65 and interest of \$14.39. The statement also showed deposits of \$498.88 and \$98.10 and withdrawals of \$8,498.23. What is her new balance?

SECTION OBJECTIVE 5-4 AND EXAMPLES

Calculate simple interest.

Your principal is \$800. The annual rate of interest is $5\frac{1}{2}$ percent. What is the interest after 6 months?

STEP: Find the interest at $5\frac{1}{2}$ percent.

Principal \times **Rate** \times **Time**

$$\begin{aligned} \$800.00 &\times 5\frac{1}{2}\% \times \frac{6}{12} \\ \$800.00 &\times 0.055 \times 0.5 = \$22.00 \text{ in interest} \end{aligned}$$

REVIEW EXERCISES

| | Principal | Rate | Time | Interest |
|-----|-----------|------|----------|----------|
| 30. | \$328.00 | 5% | 3 months | |
| 31. | 635.85 | 7% | 6 months | |
| 32. | 175.00 | 8% | 9 months | |

33. Craig Deloy's bank computes $4\frac{1}{4}$ percent interest on a daily basis. He had \$1,250 in the account for 20 days. He makes a deposit of \$450 and it is in the account for 10 days. He withdraws \$300 and the balance earns interest for 8 days. How much interest does he earn? What is the amount in the account at the end of the month?

SECTION OBJECTIVE 5-5 AND EXAMPLES

Figure out the compound interest and the amount.

Pat Villone deposited \$3,000 into a savings account that earns 4 percent interest compounded quarterly. She made no deposits or withdrawals. What was the amount in the account at the end of the second quarter?

STEP: Find the amount for each quarter.

1st quarter **Principal** \times **Rate** \times **Time** = **Interest**

$$\$3,000.00 \times 4\% \times \frac{1}{4} = \$30.00$$

Principal + **Interest** = **Amount**

$$\$3,000.00 + \$30.00 = \$3,030.00$$

2nd quarter $\$3,030.00 \times 4\% \times \frac{1}{4} = \30.30

Principal + **Interest** = **Amount**

$$\$3,030.00 + \$30.30 = \$3,060.30 \text{ amount at end of second quarter}$$

REVIEW EXERCISES

34. Dak Nardo deposited \$350 into a new regular savings account that earns 6.5 percent interest compounded semiannually. He made no other deposits or withdrawals. What was his amount in the account at the end of 1 year?

| | Principal | Annual Interest Rate | Interest Period | First Period Interest | Amount | Second Period Interest | Amount |
|-----|------------|----------------------|-----------------|-----------------------|--------|------------------------|--------|
| 35. | \$1,200.00 | 6.0% | quarterly | a. | b. | c. | d. |
| 36. | 3,500.00 | 5.5% | monthly | a. | b. | c. | d. |
| 37. | 965.00 | $3\frac{1}{4}\%$ | quarterly | a. | b. | c. | d. |

SECTION OBJECTIVE 5-6 AND EXAMPLES

Find compound interest using tables.

First Central Bank pays 6 percent interest compounded quarterly on a regular savings accounts. Shawn Green deposited \$6,500 for 3 years. He made no other deposits or withdrawals. How much interest did he earn during the 3 years?

STEP 1: Find the total interest periods.

$$\begin{array}{l} \text{Periods per Year} \times \text{Number of Years} \\ 4 \text{ quarters per year} \times 3 \text{ years} = 12 \text{ total interest periods} \end{array}$$

STEP 2: Find the interest rate per period.

$$\begin{array}{l} \frac{\text{Annual Rate}}{\text{Number of Periods per Year}} \\ \frac{6\%}{4} = 1.5\% \end{array}$$

STEP 3: Find the amount of \$1.00 for 8 periods at 1.5 percent per period using the Compound Interest—Amount of \$1.00 table on page 797.

$$= 1.12649$$

STEP 4: Find the amount.

$$\begin{array}{l} \text{Original Principal} \times \text{Amount of \$1.00} \\ \$6,500 \times 1.19562 = \$7,771.53 \end{array}$$

STEP 5: Find the compound interest.

$$\begin{array}{l} \text{Amount} - \text{Original Principal} \\ \$7,771.53 - \$6,500 = \$1,271.53 \text{ compound interest} \end{array}$$

Continued on next page

REVIEW EXERCISES

Use **Compound Interest—Amount of \$1.00 table on page 797** to solve. Round answers to the nearest cent.

38. Kathy Cole deposited \$875 in a savings plan with her employer's credit union. The credit union savings plan pays $5\frac{1}{2}$ percent interest compounded semiannually. If she makes no other deposits or withdrawals, how much interest will her money earn in 2 years?

| | Principal | Annual Interest Rate | Interest Periods per Year | Total Time | Amount | Compound Interest |
|-----|------------|----------------------|---------------------------|------------|--------|-------------------|
| 39. | \$1,200.00 | 6.0% | semiannually | 1 year | a. | b. |
| 40. | 750.00 | 5.5% | quarterly | 3 years | a. | b. |
| 41. | 1,230.00 | 5.0% | quarterly | 2 years | a. | b. |

SECTION OBJECTIVE 5-7 AND EXAMPLES

Find interest for daily compounding.

Imagine you deposit \$4,500 into an account that pays 5.5 percent interest compounded daily. How much interest will you earn in 30 days? (Note: Use the **Amount of \$1.00 at 5.5 Percent Compounded Daily (365-Day Year) table on page 796.**)

STEP 1: Find the amount of \$1.00 using the Amount of \$1.00 at 5.5 Percent Compounded Daily (365-Day Year) table on page 796 for 30 days.
 $= 1.00452$

STEP 2: Find the amount.

$$\text{Original Principal} \times \text{Amount of \$1.00} \\ \$4,500 \times 1.00452 = \$4,520.34$$

STEP 3: Find the compound interest.

$$\text{Amount} - \text{Original Principal} \\ \$4,520.34 - \$4,500 = \$20.34$$

REVIEW EXERCISES

Use the **Amount of \$1.00 at 5.5 Percent Compounded Daily (365-Day Year) table on page 796** to solve. Round answers to the nearest cent.

| | Principal | Number of Days | Amount | Compound Interest |
|-----|-----------|----------------|--------|-------------------|
| 42. | \$120,000 | 30 | a. | b. |
| 43. | 8,500 | 40 | a. | b. |
| 44. | 1,730 | 60 | a. | b. |

45. On June 30 Ed Klempel deposited \$1,500 into a savings account that pays 5.5 percent interest compounded daily. On August 1 how much interest had been earned on the principal in his account?

SECTION OBJECTIVE 5-8 AND EXAMPLES

Compute the future value of an ordinary annuity and an annuity due.

Suppose you deposited \$750 into an ordinary annuity at the end of each quarter in an account earning 6 percent interest compounded quarterly. What is the future value of the account in 3 years? Suppose it had been an annuity due instead. What would be the future value of the account in 3 years?

STEP 1: Find the total number of periods.

$$\begin{array}{ccccccc} \text{Periods per Year} & \times & \text{Number of Years} & & & & \\ 4 & \times & 3 & = & 12 & & \end{array}$$

STEP 2: Find the interest rate per period.

$$\frac{\text{Annual Rate}}{\text{Number of Periods per Year}} = \frac{6\%}{4} = 1.5\%$$

STEP 3: Find the future value of \$1.00 for 12 periods at 1.5 percent from the Future Value of an Ordinary Annuity for \$1.00 per Period table on page 798.

$$= \$13.04121$$

STEP 4: Find the future value.

$$\begin{array}{ccccccc} \text{Amount of Deposit} & \times & \text{Future Value of \$1.00} & & & & \\ \$750 & \times & \$13.04121 & = & \$9,780.91 & & \end{array}$$

(Note: This is the rounded number of \$9,780.908.)

STEP 5: Find the future value of an annuity due.

$$\begin{array}{l} \$9,780.91 \times (\$1.00 + 0.015) \\ \$9,780.91 \times 1.015 = \$9,927.62 \text{ future value of an annuity due} \end{array}$$

(Note: This is the rounded number of \$9,927.624.)

REVIEW EXERCISES

46. Walton Clark deposited \$1,750 into an ordinary annuity at the end of each quarter in an account earning 8 percent interest compounded quarterly. What is the future value of the account in 3 years?

Use the Future Value of an Ordinary Annuity for \$1.00 per Period table on page 798 to solve the following.

| | End of Period Deposit | Compounded | Rate | Years | Rate per Period | Number of Periods | Amount of \$1.00 | Future Value of Ordinary Annuity |
|-----|-----------------------|--------------|------|-------|-----------------|-------------------|------------------|----------------------------------|
| 47. | \$3,000 | quarterly | 4% | 2 | a. | b. | c. | d. |
| 48. | 900 | semiannually | 4% | 4 | a. | b. | c. | d. |
| 49. | 2,500 | quarterly | 8% | 3 | a. | b. | c. | d. |

50. Elmer Pasture deposits \$2,000 at the end of each year into an Individual Retirement Account at Boise Bank. The account pays 7 percent compounded annually. How much will be in the account in 25 years?

A Cool Savings Strategy

You may not realize it, but glaciers have a lot in common with your approach to saving money. Both you and a glacier transport, erode, and deposit. Both try to move ahead. And both can dwindle if not enough is added to them.

The marketing director of a new savings and loan company in Alaska has asked your advertising firm to put together a marketing campaign to draw new customers. You have decided to use an advertising theme that draws on Alaska's natural beauty.

Purpose

Alaska is a land of many glaciers, including the renowned Mendenhall Glacier, a favorite tourist spot near the state's capital, Juneau. You will develop an ad campaign for Mendenhall Savings & Loan that uses the famous glacier as a metaphor for a typical savings account owner.

Supplies Needed

- Pen, paper
- Colored pencils, markers
- Poster board
- Computer

Your Activity

Step 1: You'll be preparing a "pitch" for the executives of Mendenhall Savings & Loan to persuade them that your ad campaign will encourage more customers to invest in savings accounts in their bank. The materials you prepare must persuade the savings and loan company (your client) that your ad theme and visual presentation will be successful in bringing them more business. In other words, your presentation needs to persuade your clients that you can persuade their customers!

Successful advertising executives know how to develop campaigns that are appropriate for their clients and attractive

and convincing to consumers. You'll need to create a catchy, memorable slogan (for example, Nike's "Just Do It"; Chevrolet trucks' "Like a Rock").

Step 2: Even if you don't own a savings account, you probably understand how one works. Before you begin designing your ad campaign, however, you also will need to understand something about glaciers.

Think about areas of high elevation such as the tops of high mountains (or high latitude like the land near the Arctic Circle, where snow that falls during the winter never completely melts even in the summer). Eventually, a large *snowfield* develops, and as the years pass, this thick layer may turn into a *glacier*. Glaciers exhibit the following characteristics:

- They are large and permanent.
- They move.
- They consist of thick layers of ice with snow on top.

Glaciers are powerful, natural forces. Like natural bulldozers, glaciers *erode* (or *withdraw*) tons of material from the land as they move. They later *deposit* this material—much of it huge boulders. When the glacier melts, these deposits remain behind as large hills, or *moraines*.

Now that you know something about glaciers, try to create an ad campaign using at least one of the features of glaciers as a metaphor (a symbol) for a savings account owner. You probably won't want to include all the features of glaciers, but, rather, focus on one. For instance, glaciers deposit boulders that grow into moraines; people deposit money into savings accounts that grow through interest.

Stretch your imagination and try to find interesting parallels between the actions of glaciers and the actions of savings account depositors.

Step 3: Create a description of how the theme will be used in words and graphics. This should require at least several paragraphs. The description should:

- explain why the glacier theme has been chosen,
- show why you think it will influence customers, and
- offer several examples of how it can be used verbally and visually.

Step 4: Use a visual aid to present how a magazine or television ad might convey your client's message. Consider developing a logo (such as the Nike "swoosh," which is one of the most widely recognized and effective logos ever created). In addition, prepare a mockup of a magazine ad that incorporates the slogan, the logo, photographs, and other graphics, as well as some words.

Step 5: Break into small groups and present your proposed ad campaign. Use the written material, a poster, and your oral powers of persuasion to convince Mendenhall Savings & Loan's clients that your ad campaign will be so eye-catching and memorable that it will bring in new customers.

Critique It

You've just compared math to glaciers. How did this Math Studio allow you to understand math in a different way other than working out problems and performing calculations?