CHAPTER

1

The Stock Market

The safe way to double your money is to fold it over once and put it in your pocket.

Frank Hubbard, Journalist

What do you think Frank Hubbard meant in this quote?

What do you think?

Answers might include that gambling and the stock market can increase or decrease wealth significantly. Bank accounts do increase wealth, and are safe, but interest earned will not make you rich.

TEACHING RESOURCES

Instructor's Resource CD

ExamView® CD, Ch. 1

eHomework, Ch. 1

www.cengage.com/school/math/financialalgebra

In the future, you will incur many expenses, such as a home, automobile, insurance, food, clothing, and health care. Some are major expenses and some are minor, but each costs money. To have money for major expenses, it helps to have your savings grow in value. Investing can help money grow in value.

You need to find a personal balance between risk and reward when you make choices about investments. Investments are never without questions. Did you miss the chance to make more money because you were being overly cautious? Was the investment too risky? Did you risk losing too much money by investing in something that may not have had a sound foundation?

Investors struggle with these questions every day. The stock market is a forum in which the investment risk/reward balance is put to the test. Will the market advance? Will the market decline? No one can be certain. With a strong knowledge of the stock market, you as an investor can make decisions that are based on experience, data, trends, and mathematics.

Really?

Corporations sometimes choose names that are personal, humorous, historical, or psychological. Below are some well-known corporations and how their names were established.

AMAZON.com was originally known as Cadabra.com. The name was changed by its founder Jeff Bezos. He selected Amazon as a corporate name because the Amazon River is known as the biggest volume river in the world. He also wanted a name that began with A so that alphabetically it would appear at the top of a list of similar corporations.

COCA-COLA is a name that has its origins in the flavoring used to make the product—coca leaves and kola nuts. The founder, John Pemberton, changed the "K" in kola to a "C" for appearance purposes.

ADIDAS is taken from the name of the company's founder Adolph (Adi) Dassler.

eBay was created by Pierre Omidyar, who originally wanted to use the name Echo Bay. The name was already taken by a gold mining company, so he shortened it to eBay.

XEROX comes from a Greek expression for "dry writing." The Xerox process was invented in 1937 by law student Chester Carlson.

CHAPTER OVERVIEW

The course begins with an indepth study of the stock market. Most students are familiar with the existence of the market, but are unfamiliar with how it works. The concept of risk and reward is a constant presence. In this chapter, students use mathematics to understand market events and make wise decisions about personal investments.

REALLY? REALLY!

Students are introduced to some of the types of corporations they will be reading about in the chapter. Interesting facts are given about the etymology of a corporate name. As a first night's assignment, have students pick three different companies and research how the company names were developed.

Really!

Genius is 1% inspiration and 99% perspiration. Accordingly a genius is often merely a talented person who has done all of his or her homework.

Thomas Edison, Inventor

1-1 Business Organization

Objectives

- Learn the basic vocabulary of business organizations.
- Compute financial responsibility of business ownership based on ratios and percents.

Key Terms

- capital
- sole proprietorship
- profit
- personally liable
- partnership
- corporation
- shares of stock
- shareholders
- limited liability
- public corporation

EXAMINE THE QUESTION

One major decision that business owners have to make is about the form of the business. The decision to be a sole proprietorship, partnership, or corporation is based on many aspects, such as profit, liability, and shares of stock.

CLASS DISCUSSION

What are common everyday products that you think sell millions each year?

In which type of business do you think an owner's personal possessions may potentially be taken in the event of a lawsuit or a financial crisis?

If you owned shares of stock in a public corporation, what would that mean to you in terms of profit and personal liability?

How do businesses start?

Think of everything you use on a daily basis, from complex electronic devices to simple items like straws, paper clips, and toothbrushes. Have you ever wondered who invented them, or how each has been improved upon? Some inventions provide an opportunity to build a business, but not all. It takes imagination, money, and effort to create a successful business. The money used to start or expand a business is **capital**.

A business owned by one person is a **sole proprietorship**. The owner, or proprietor, can hire people to help run the business, but these employees are not owners. The owner is responsible for all expenses, including labor and raw materials used in manufacturing a product or providing a service. The money left after all expenses are paid is **profit**. The owner of a sole proprietorship is entitled to all of the profits. However, the owner is responsible, or **personally liable**, for any losses. Even if the business does not make a profit, the owner must still pay all of the bills of the business.

A business that is owned by a group of people, called *partners,* is a **partnership**. Partners share the profits and the responsibility for any losses. The partners are *personally liable* for any losses. Personal liability may require risking personal property. Sole proprietors and partners must consider this possibility when creating a business.

A **corporation** is a business organization that can be owned by one person or a group of people. Each owner who invests money in the corporation receives **shares of stock** in the corporation. The owners are called **shareholders**. *Stock certificates* are used as proof of ownership. Unlike sole proprietorships and partnerships, the shareholders in a corporation have **limited liability**—each owner cannot lose more than the value of his or her share of the business. The number of shareholders in a corporation depends on the structure of the business. When anyone can purchase stock in a corporation, the corporation is a **public corporation**. You might already be familiar with public corporations, such as NIKE, McDonald's, Xerox, and Apple. The prices of shares of stock in public corporations can be found in newspapers, on television business channels, and on the Internet.

Skills and Strategies

When a business is owned by more than one person, the owners do not necessarily own equivalent portions of the business. Ratios and percents can be used to represent the financial responsibility of owners and partners. Recall the relationship between decimals and percents.

To convert a decimal to a percent, multiply the decimal by 100.

To convert a percent to a decimal, divide the percent by 100.

EXAMPLE 1

Michelle invests $15,000 in a partnership that has four other partners. The total investment of all partners is $240,000. What percent of the business does Michelle own?

SOLUTION Represent Michelle's investment as a fraction of the total investment. Convert the fraction to a decimal and write as a percent.

Write as a fraction. $$\frac{\text{Michelle's investment}}{\text{Total investment}} = \frac{15{,}000}{240{,}000}$$

Divide. $$15{,}000 \div 240{,}000 = 0.0625$$

Multiply by 100. Write a percent sign. $$0.0625 \times 100 = 6.25\%$$

Michelle owns 6.25% of the partnership.

CHECK YOUR UNDERSTANDING

Kyle invests $20,000 in a partnership that has five other partners. The total investment of the partners is $160,000. What percent of the business is owned by the five other partners?

EXAMPLE 2

The total number of shares of stock in the Bulls Corporation is 650,000. Mike owns 12% of the shares. How many shares of Bulls Corporation stock does he own?

SOLUTION Let x represent the number of shares Mike owns.

Express 12% as a fraction. $$12\% = \frac{12}{100}$$

Write a proportion. $$\frac{12}{100} = \frac{x}{650{,}000}$$

Cross multiply. $$100x = (12)(650{,}000)$$

Find the product. $$100x = 7{,}800{,}000$$

Divide both sides by 100. $$\frac{100x}{100} = \frac{7{,}800{,}000}{100}$$

$$x = 78{,}000$$

Mike owns 78,000 shares of Bulls Corporation.

TEACH

In the study of types of businesses, personal liability, and profit, students use ratios, proportions, and percents to calculate appropriations of ownership, costs, and profits.

EXAMPLE 1

Review percent to decimal conversions using a few examples on the board. Reteach students how to convert fractions with a denominator of 100 to percents and decimals.

CHECK YOUR UNDERSTANDING

Answer 87.5%

Subtract Kyle's $20,000 from the total investment of $160,000. Divide 140,000 by 160,000 and convert to an equivalent decimal. Then multiply the decimal by 100 and insert a percent sign.

EXAMPLE 2

Students can use a proportion or an equation to solve this percent problem. The equation to use is $0.12(650{,}000) = x$.

CHECK YOUR UNDERSTANDING

Answer 720

Find 60% of 1,200 using any method.

EXAMPLE 3

Point out the importance of writing "Let" statements, as students will be using them frequently. Students need to understand that defining the variables and variable expressions, will help them understand better what is given in the problem and what is being asked. Given that you are provided with a ratio, you can think of this problem as looking for the common factor in the amounts that were invested, which in this case is x.

CHECK YOUR UNDERSTANDING

Answer $20,000 and $25,000

EXTEND YOUR UNDERSTANDING

Answer 30%; 7:7:6

CHECK YOUR UNDERSTANDING

Jillian owns 60% of the stock in a private catering corporation. There are 1,200 shares in the entire corporation. How many shares does Jillian own?

EXAMPLE 3

Three partners are investing a total of $900,000 to open a garden and landscaping store. Their investments are in the ratio 2:3:5. How much does the partner that invested the least contribute?

SOLUTION Use the ratio 2:3:5 to write an expression for the amount each partner invested.

Let $2x$ represent the amount invested by the first partner.

Let $3x$ represent the amount invested by the second partner.

Let $5x$ represent the amount invested by the third partner.

Write an equation showing the three investments total $900,000.

$$2x + 3x + 5x = 900{,}000$$

Combine like terms. $10x = 900{,}000$

Divide each side of the equation by 10. $x = 90{,}000$

The partner that invested the least is represented by the expression $2x$.

Substitute $90,000 into the expression. $2(90{,}000) = 180{,}000$

The partner who invested the least amount contributed $180,000.

CHECK YOUR UNDERSTANDING

Two partners are starting a wedding planning business. The total investment is $45,000. Their investments are in the ratio 4:5. How much does each investor contribute?

EXTEND YOUR UNDERSTANDING

Two partners each invest 35% in a startup business. They need to find another investor for the rest of the money. What percent of the business will that person own? Write a ratio to represent the investments in the business.

Applications

Genius is 1% inspiration and 99% perspiration. Accordingly a genius is often merely a talented person who has done all of his or her homework.

Thomas Edison, Inventor

1. What do you think Thomas Edison meant by the word *perspiration*? How do those words apply to what you've learned in this lesson? See margin.

2. Tomika owns $\frac{3}{5}$ of a law partnership. What percent of the partnership does she own? 60%

3. Ryan owns three-eighths of a florist shop worth $76,000. What is the value of Ryan's share of the business? $28,500

4. A corporation issues 1,200,000 shares of stock at its beginning to shareholders. How many shares must a shareholder own to have a majority of the shares? 600,001

5. Elisa owns 28% of the Grudman Corporation. The rest of the shares are owned equally by the remaining six shareholders. What percent of the corporation does each of the other shareholders own? 12%

6. Julie and Kristen are the partners in a local sporting goods shop. They needed $51,000 to start the business. They invested in the ratio 5:12, respectively.
- **a.** How much money did each invest? Julie, $15,000; Kristen, $36,000
- **b.** What percent of the business was owned by Kristin? Round to the nearest tenth of a percent. 70.6%
- **c.** If the business grows to $3,000,000, what percent of it will Julie own? Round to the nearest tenth of a percent. 29.4%

7. Joe, Thea, and Taylor invested in a partnership in the ratio 1:4:7, respectively. Years later, when the partnership was worth $1.6 million, Thea decides to go to graduate school and sells her part of the partnership to Joe.
- **a.** How much would Joe need to pay Thea to buy her share of the business? Round to the nearest dollar. $533,333
- **b.** What percent of the business will Joe own after he buys Thea's portion? Round to the nearest tenth of a percent. 41.7%

8. Seventy-two percent of the shareholders in a service corporation are women. If the corporation is owned by 45,600 people, how many of the shareholders are women? 32,832

9. The 120 shareholders of a corporation are voting for a new Board of Directors. Shareholders receive one vote for each share they own. Would it be possible for one shareholder's votes to choose the new Board of Directors? Explain. Yes, if that shareholder has more than 50% of the shares, he can outvote the other 119 shareholders.

10. The top x shareholders in a corporation each own y shares of a certain stock. The corporation's ownership is represented by a total of w shares of stock. Express the percent of the corporation owned by the top x shareholders. $100\frac{xy}{w}$

TEACH

Fractional Parts
Throughout the applications, students will be examining fractional parts of a whole. They will be using percents primarily, and fractions less frequently.

Percents
Because percents always compare a number to the number 100, it is easier to get an intuitive feel for a percent. For example, if a student scored 17 out of 25 on a quiz, he would immediately convert $\frac{17}{25}$ to a percent to see how well he did. You could argue that the equivalent form, $\frac{68}{100}$, is simpler than $\frac{17}{25}$, even though $\frac{17}{25}$ is simplest form.

Exercise 6
Point out to students that if the ratio is 5:12, then Julie owns $\frac{5}{17}$ of the business.

Exercise 8
This can be done using a proportion or an equation.

Exercise 10
Students will frequently need to multiply by 100 to convert decimals to equivalent percents. Look out for students who forget to do this.

ANSWERS

1. Edison is stressing that good ideas are not enough. A strong work ethic is necessary to achieve. The word *perspiration* represents that effort is required.

TEACH

Exercise 15
As the section closes, review the important difference between a corporation and a partnership—the concept of limited liability.

11. A corporation is having a shareholders meeting. Not all shareholders are able to attend. In fact, most usually do not. The ownership of the corporation is represented by 2,351,000 shares of stock owned by 111,273 shareholders.
- **a.** Must all of the shareholders own more than one share of stock? no
- **b.** If 3,411 shareholders attend the meeting, what percent of the shareholders are represented? Round to the nearest percent. 3%
- **c.** If the shareholders who do attend own a combined 1.8 million shares of the corporation, what percent of the shares are represented at the meeting? Round to the nearest percent. 77%

12. A private corporation owned by 35 shareholders is worth $1.7 million. The corporation loses a lawsuit worth $3 million. What is the value of any personal property of the shareholders that can be taken to pay the settlement? Explain. Due to limited liability, the shareholders forfeit $0 in personal property, but would forfeit the shares of stock in the company.

13. A partnership owned equally by 13 partners is worth $1.3 million. The partnership loses a lawsuit worth $3 million. What is the value of any personal property each partner must forfeit to pay the settlement? Explain. $130,769.23 because partners are personally liable.

14. A sole proprietorship is worth w dollars. The owner loses a lawsuit against him for y dollars where y is greater than w. Express algebraically the value of the personal property the owner must forfeit to pay the settlement. $y - w$

15. Six equal partners own a local pizzeria. The partners have made a tremendous profit and bought many personal items such as cars, boats, new homes, and so on. In order to protect their personal possessions, they decide to incorporate the pizzeria, so that the six partners own shares in the corporation and have limited liability. The business is worth $675,000. After an accident, the partners lose a lawsuit and have to pay $1.2 million in damages. How much money will each partner personally lose to pay this lawsuit? Explain.
They will only lose their shares of the business. They are not personally liable.

16. Three people invest in a business. The first two invest in the ratio 2:3, and the third person invests twice as much as the other two combined. The total invested is $30 million.
- **a.** How much did the major investor contribute? $20 million
- **b.** Does the major investor own more than half the business? yes
- **c.** What fraction of the business does the major investor own? $\frac{2}{3}$

17. Ten years ago, Lisa bought a hair salon for x dollars. She built up the business and it is now worth nine times what she paid for it. She decides to sell half of the business to a friend, and they become partners. Express the amount Lisa's friend must pay Lisa to buy half the business. $\frac{9x}{2}$

18. Four people invested in a restaurant. One person invested $100,000. Two others invested in the ratio x:2x, and the fourth person invested an amount equal to the other three investors combined. The total investment was $1,100,000.
- **a.** Write an expression for the amount invested by the fourth person. $100{,}000 + x + 2x$
- **b.** Write an equation that allows you to find the amount invested by each person. $2(100{,}000 + x + 2x) = 1{,}100{,}000$
- **c.** How much did each person invest? $100,000; $150,000; $300,000; $550,000

One of the funny things about the stock market is that every time one person buys, another sells, and both think they are astute.

William Feather, Publisher and Author

Stock Market Data 1-2

Key Terms

- stock market
- trades
- NYSE
- NASDAQ
- last
- close
- high
- low
- volume
- sales in 100s
- 52-week high
- 52-week low
- net change
- after-hours trading
- spreadsheet
- cell

Objectives

- Use stock data to follow the daily progress of a corporate stock.
- Write spreadsheet formulas.

What stock market data is available on a daily basis?

Stock market is a general term for an institution through which stocks are bought and sold. Stock market transactions are known as **trades**. The two most well known stock markets are the **New York Stock Exchange (NYSE)** and the **National Association of Securities Dealers Automated Quotation System (NASDAQ)**. A wise investor in stocks makes data-driven decisions by examining short and long term trends, changes, fluctuations, and consistencies. Investors intend to profit from their investments. You don't need to be a professional stockbroker or a financial analyst to follow the market. What you need is an understanding of trading data. This data can be found in newspapers, online, or on television financial channels. The best source for information is the Internet because it is current and accurate within minutes of a market event. However, you want to be certain that you are using a credible source.

In order to interpret stock market data, you need to know the meaning of the categories used in stock market international charts.

- **Last** is the price per share of the last trade that was made for a particular stock. In a newspaper, the last amount is usually the closing price for the trading day. Online, it is usually the price of the last trade made for one share of the stock.
- **Close** or *closing price* is the last price at which a stock was traded during a regular day's trading session. For most stock markets across the country, the daily sessions run from 9:30 A.M. to 4:00 P.M. Eastern Standard Time.
- **High** is the highest price at which one share of the stock was traded on a given day.
- **Low** is the lowest price at which one share of the stock was traded on a given day.

EXAMINE THE QUESTION

To get basic information of volume trades and benchmark prices, you can check financial Internet sites, news websites, television, and newspapers. Obviously, the Internet has a capacity to deliver up-to-the minute data about the day's trading.

CLASS DISCUSSION

Where have you heard the word *trend* used before? How might trends be important when following the stock market?

What makes an Internet site a credible Internet source? Name credible Internet sources that offer financial information.

AT&T 37.70 ↑0.11 (29%) as of 2:11 P.M.	
Last Trade:	37.59
Trade Time:	↑2:03 P.M. ET
Change:	0.08(0.21%)
Prev Close:	37.51
Open:	37.46
Bid:	N/A

- **Volume** is the number of shares that was traded in a given time period. In a newspaper, the volume is usually the day's volume. Online, the volume represents the total number of shares traded within a few minutes of the last trade. Sometimes the volume is listed as **Sales in 100s**. This represents the number of groups of 100 shares that were traded on a given day. Some websites may post the exact volume, while other websites state the volume in hundreds, thousands, or even millions.
- **52-week high** is the highest price at which one share was traded over the last year.
- **52-week low** is the lowest price at which one share was traded over the last year.
- **Chg** or **net change** shows the change between the previous day's closing price and the current day's closing price. This can be a monetary amount or it can be expressed as a percent. The change is positive if the current day's close is greater than the previous day's close and negative if the current day's close is less than the previous day's close.
- **After-hours trading** means that some trades are made after the market closes. A difference between one day's closing price and the next morning's opening price means after-hours trades on that stock occurred.

CLASS DISCUSSION

What is a stock trade? What data is collected when accounting for the number of trades made in a day?

Why do you think that net change is such an important stock statistic?

TEACH

As students examine changes in stock prices over time, they use computations involving subtraction and percents to understand the impact of the price changes.

EXAMPLE 1

Students need to have an understanding of high and low prices as they pertain to the 52-week period and for any given day. The more trades studied, the more likely students will see how the magnitude of the differences in highs and lows can indicate the volatility in price during the trading day.

CHECK YOUR UNDERSTANDING

Answer $0.80

To obtain the difference, subtract the day's low price from the day's high price.
51.40 − 50.60 = 0.80

Skills and Strategies

Examine the data for XYZ Corporation published at the close of two trading days. These categories are used when analyzing data about stock.

XYZ Corporation		XYZ Corporation	
May 5		May 12	
Last	52.20	Last	49.98
Trade Time	4:00PM ET	Trade Time	4:00PM ET
Chg	2.61	Chg	–1.55
Open	50.10	Open	49.90
52-week High	60.45	52-week High	60.45
52-week Low	43.60	52-week Low	43.60
Sales in 100s	28000	Sales in 100s	32000
High	52.60	High	51.40
Low	49.00	Low	50.60

EXAMPLE 1

What was the difference between the high and the low prices on May 5?

SOLUTION The day's high price was $52.60 and the low was $49.00.

Subtract the low from the high. $52.60 – $49.00 = $3.60

The difference in the high and low prices on May 5 was $3.60.

CHECK YOUR UNDERSTANDING

What was the difference between the high and low prices on May 12?

EXAMPLE 2

On May 12, what was the actual volume of XYZ shares posted? Write the volume in thousands.

SOLUTION The data for May 12 does not use the category name volume. Sales in 100s indicates volume. Because volume in 100s is the number of groups of 100 shares traded, 32,000 hundreds is written

$$32{,}000 \times 100, \text{ or } 3{,}200{,}000$$

Sales in 1,000s represent the number of groups of 1,000 shares traded.

Divide by 1,000. $3{,}200{,}000 \div 1{,}000 = 3{,}200$

On May 12, there were 3,200 thousands of shares traded.

CHECK YOUR UNDERSTANDING

On May 5, what was the actual volume of XYZ shares posted? Write the volume in thousands.

EXAMPLE 3

At what price did XYZ Corporation close on May 4?

SOLUTION XYZ Corporation ended the trading day on May 5 with a closing price of \$52.20. This reflected a change of \$2.61 from the previous day's close. Let x represent the closing price on May 4. Write an equation for the current day's closing price as the previous day's closing price plus the change.

Substitute values from the chart. $x + 2.61 = 52.20$

Subtract 2.61 from each side of the equation.

$$\begin{array}{r} -2.61 = -2.61 \\ \hline x = 49.59 \end{array}$$

XYZ Corporation closed at \$49.59 on May 4.

CHECK YOUR UNDERSTANDING

At what price did XYZ Corporation close on May 11?

EXAMPLE 4

Use the May 4 closing price from Example 3 and the May 5 opening price to find the difference in prices as a percent increase. Round to the nearest hundredth percent.

SOLUTION The percent increase of one share of stock for these two prices can be calculated by using the following formula.

$$\text{Percent increase} = \frac{\text{Open} - \text{Close}}{\text{Close}} \times 100$$

Substitute values from the chart. $\dfrac{50.10 - 49.59}{49.59} \times 100$

Simplify the fraction. 0.010284×100

Multiply. Then round. 1.03

There was approximately a 1.03% increase in the price per share of XYZ Corporation due to after-hours trading.

EXAMPLE 2

Volume or sales is often quoted in units other than one. Calculate an actual volume by first converting the stated unit into numbers. The volume is quoted in 100s. Therefore, the sales numbers must be multiplied by 100 in order to report the actual number of sales.

CHECK YOUR UNDERSTANDING

Answer 2,800 thousands

May 5 sales were 28,000 hundreds of shares. This can be reported as 28,000 × 100 or 2,800,000. The question asks students to report the number of sales in thousands. Divide 2,800,000 by 1,000.

EXAMPLE 3

Net change is often counter-intuitive for students. It relies on the working backwards approach for solving the problem. Students need to understand that a positive net change means an increase in the closing price from the previous day's close and a negative net change means a decrease in the closing price from the previous day's close. Students should set up an equation so that they can see how the inverse operations work in the solution.

CHECK YOUR UNDERSTANDING

Answer \$51.53

Set up and solve the equation $x - 1.55 = 49.98$, where x represents the closing price on May 11.

EXAMPLE 4

For a percent increase/decrease problem, the numerator is the difference in the before and after amounts. The denominator is the before amount, closing price on May 4. Therefore, this ratio needs to be converted to a percent.

CHECK YOUR UNDERSTANDING

Answer –3.16%

Since this situation represents a decrease in price from May 11 to May 12, the numerator of the fraction is negative.

EXAMPLE 5

Have students identify the numbers to subtract for the numerator and the number to use in the denominator. Students need to understand that the percent change is a change in the May 5 closing price, so the closing price for May 5 is the denominator of the fraction.

CHECK YOUR UNDERSTANDING

Answer –8.5%

Use the percent change formula and the correct substitutions.

$$\frac{45.72 - 49.98}{49.98} \times 100$$

CHECK YOUR UNDERSTANDING

Use the May 11 closing price from the previous Check Your Understanding and the May 12 opening price to represent the difference as a percent decrease. Round to the nearest hundredth percent.

EXAMPLE 5

On May 6, the XYZ Corporation announced a decrease in earnings. This news caused the price of their stock to drop. It closed at $44.37. Express the net change from May 5 to May 6 as a percent.

SOLUTION You can find the net change using the following formula.

Net change	$\frac{\text{May 6 close} - \text{May 5 close}}{\text{May 5 close}} \times 100$
Substitute values from the chart.	$\frac{44.37 - 52.20}{52.20} \times 100$
Simplify the fraction.	-0.15×100
Multiply.	-15%

The net change expressed as a percent is –15%. This means the closing price on May 6 reflects a 15% decrease from the closing price on May 5.

CHECK YOUR UNDERSTANDING

On May 13, the XYZ Corporation announced another decrease in earnings. The price of their stock dropped to close at $45.72. Express the net change from May 12 to May 13 as a percent, to the nearest tenth.

Spreadsheets

A **spreadsheet** is an electronic worksheet that can be used to keep track of stock information. Spreadsheets allow you to enter data into columns and rows. The intersection of a column and a row is a **cell**. Cells can contain numbers, words, or formulas. While the structure of a formula may differ based on the software, formulas have a fundamental algebraic basis. In spreadsheet formulas you use an * (asterisk) for the multiplication symbol and a / (forward slash) for the division symbol. Do not use spaces around symbols.

Examine the spreadsheet below that contains information on the XYZ Corporation for May 4–May 6. Columns are named using letters of the alphabet, while rows are numbered. Because a cell is the intersection of a column and a row, a cell is named with its column letter and row number.

cell D4

	A	B	C	D	E	F
1	XYZ CORP					
2						
3	Date	High	Low	Close	Change	% Change
4	4-May	50.23	49.34	49.59		
5	5-May	52.60	49.00	52.20		
6	6-May	52.20	40.78	44.37		

The closing price for May 4 is in cell D4. A formula can be stored in cell E5 to calculate the net change. Think of each cell name as a variable. If E5 represents the net change of the closing price from May 4 to May 5, the equation needed is E5 = D5 – D4. You enter the right side of the equation in cell E5 beginning with the = symbol. The formula uses the values in cells D5 and D4 to calculate the net change for May 5 and stores it in cell E5.

	A	B	C	D	E	F
1	XYZ CORP					
2						
3	Date	High	Low	Close	Change	% Change
4	4-May	50.23	49.34	49.59		
5	5-May	52.60	49.00	52.20	2.61	
6	6-May	52.20	40.78	44.37		

=D5–D4

EXAMPLE 6

Write a formula for cell F6 to calculate the percent net change for May 6.

SOLUTION The percent net change from May 5 to May 6 was calculated in Example 5. The formula uses the May 5 and May 6 closing prices. These prices are in cells D5 and D6, respectively. Use the cell names as the variables and multiply by 100 to get a percent.

Substitute cell names into formula. $\dfrac{D6 - D5}{D5} \times 100$

Convert to a spreadsheet formula. =(D6–D5)/D5*100

	A	B	C	D	E	F
1	XYZ CORP					
2						
3	Date	High	Low	Close	Change	% Change
4	4-May	50.23	49.34	49.59		
5	5-May	52.60	49.00	52.20	2.61	
6	6-May	52.20	40.78	44.37		–15

=(D6–D5)/D5*100

Order of Operations Notice there is only one set of parentheses in the formula. Following the order of operations, division by D5 occurs before multiplication by 100. However, it is necessary to enclose the numerator in parentheses so the difference D6 – D5 is divided by D5. Without those parentheses, the spreadsheet first divides D5 by D5, then multiplies that quotient by 100, and finally subtracts that answer from D6, which results in an incorrect value.

Rounding You can set the number of rounding places for each cell according to the degree of accuracy needed in your calculations. Be aware that the computer retains the entire calculation to many decimal places. In this case, it just shows the value to two decimal places.

CHECK YOUR UNDERSTANDING

Write formulas for cells E6 and F5 in the spreadsheet above.

EXAMPLE 6

Have students identify the cell names that contain the numbers needed to calculate the percent change for May 6. After students have written the formula, discuss the order of operations. Students can then determine if there is a need for parenthesis in the formula =D6−D5/D5*100.

As is, the D5/D5 will be calculated first, which is not what is needed. For the subtraction to be computed first, parenthesis must be inserted.

CHECK YOUR UNDERSTANDING

Answer for E6: =D6−D5; for F5: =E5/D4*100

Use the change and percent change formulas.

Applications

One of the funny things about the stock market is that every time one person buys, another sells, and both think they are astute.

William Feather, Publisher and Author

1. Why might the buyer and seller of the same stock both think that their trading price was an "astute" decision? How might those words apply to what you have learned? See margin.

Use the following information posted at the end of the trading day on April 22 to answer Exercises 2–7.

52-week High	52-week Low	Symbol	Stock	Last	Change	Sales of 100s	High	Low
151,650	107,200	BRK/A	Berkshire Hathaway Inc	127,200	–1000	4.11	128,600	127,000
120.2	66.39	FCX	Freeport-McMoRan Copper & Gold Inc	118.65	3.51	147,540	120.06	116.64
63.69	46.64	MCD	McDonald's Corporation	58.35	–0.55	106,077	58.77	57.42
266.81	112.11	PTR	PetroChina Company Ltd	137.19	+2.16	16,266	140.92	136.09
39.63	27.51	TXN	Texas Instruments Inc	28.85	–1.74	288,012	29.64	28.38
144.04	92.18	WBK	Westpac Banking Corporation	113.62	2.45	332.7	115.35	113.50

2. What was the difference between the 52-week high and 52-week low price for one share of PetroChina Company Ltd? $154.70

3. What is the difference between the day's high and low prices for McDonald's Corporation? $1.35

4. Determine the volume for each of the following stocks.
- **a.** Berkshire Hathaway Inc 411
- **b.** McDonald's Corporation 10,607,700
- **c.** Texas Instruments Inc 28,801,200
- **d.** Westpac Banking Corporation 33,270

5. Determine the closing price on April 21 for each of the following stocks.
- **a.** Texas Instruments Inc $30.59
- **b.** Freeport-McMoRan Copper & Gold Inc $115.14

6. Use the information from Exercise 5 to determine the percent of net change from April 21 to April 22 for each of the corporations listed in that question. Round answers to the nearest tenth of a percent. a. –5.7% b. 3%

7. On April 22, which stock(s) had a daily high that was approximately 50% lower than the 52-week high? PetroChina Company Ltd

8. If the April net change for Westpac Banking Corporation was –3.03, what was the closing price for that day? $110.59

TEACH

Exercise 5
Remind students that a positive net change means that the day's closing price was higher than the previous day's closing price and a negative net change means that the day's closing price was lower than the previous day's closing price. To find the previous day's price, add the opposite of the day's net change to the close, or last price.

ANSWERS

1. Both the buyer and the seller think that their trade has been made at a price which is acceptable. For example, a buyer may want in on a hot stock and sees its growth potential. A seller may want to cash in on the current success of a stock and "take the money and run". Both the buyer and the seller think they have made a smart choice.

9. Which of the following is a true statement? Explain your reasoning. See margin.
The 52-week high can never be higher than the day's high.
The day's high can never be higher than the 52-week high.

10. At the end of the trading day on April 25, Texas Instruments Inc closed at $28.84, which was a +5.22% net change from the previous day's close. What was the approximate close on the previous day? $27.41

11. On April 25, Berkshire Hathaway Inc closed at $126,875 per share. One year earlier, one share closed at $108,750. What was an approximate one-year percent change? 16.7%

Use the spreadsheet below to answer Exercises 12–16.

	A	B	C	D	E	F	G	H
1	**Symbol**	**Stock**	**April 25 Last**	**Change**	**% Change**	**April 24 Close**	**Volume in 1,000s**	**Volume in 100s**
2	AAPL	Apple Inc	169.73	0.79		168.94	35,445	
3	BBW	Build-A-Bear Workshop Inc	10.15	1.15	12.78%		616	
4	CTB	Cooper Tire & Rubber Co	14.7	–1.82		16.52	2,671	
5	F	Ford Motor Co	7.5	–0.9			227,269	
6	INTC	Intel Corp	22.56		–0.57%		47,604	
7	MSFT	Microsoft Corp	29.83		–6.19%	31.80	145,194	
8	NTGR	NETGEAR Inc	16.76	–3.37	–16.74%		8,085	
9	YHOO	Yahoo! Inc	26.8		–1.83%		50,523	

12. Write a formula that will convert the volume given in 1,000s into a volume given in 100s. Use the left side of the equation to indicate in which cell to store the formula.
a. Intel Corp
H6=1000*G6/100, or H6=10*G6
b. Yahoo! Inc
H9=1000*G9/100, or H9=10*G9

13. Write a formula that will store the exact volume for each stock in column I. Use the left side of the equation to indicate in which cell to store the formula.
a. Build-A-Bear Workshop Inc
I3=1000*G3
b. NETGEAR Inc
I8=1000*G8

14. Write a formula to determine the close on April 24 for each of the following. Use the left side of the equation to indicate in which cell to store the formula.
a. NETGEAR Inc
F8=C8–D8
b. Ford Motor Co
F5=C5–D5

15. Write a formula to determine the percent change for each of the following. Use the left side of the equation to indicate in which cell to store the formula.
a. Apple Inc
E2=(C2–F2)/F2*100 or E2=D2/F2*100
b. Cooper Tire & Rubber Co
E4=(C4–F4)/F4*100 or E4=D4/F4*100

16. Write a formula to determine the net change for each. Use the left side of the equation to indicate in which cell to store the formula.
a. Microsoft Corp
D7=C7–F7
b. Cooper Tire & Rubber Co
D4=C4–F4

TEACH

Exercise 10
The information given in the chart for BBW and NTGR contains both the change and the percent change amounts. You might want to show students how to verify that the two amounts are equivalent.

ANSWERS

9. The 52-week high is the highest price for a stock over a 52-week period. Therefore, the day's high could be equal to the 52-week high, but can never be greater than it.

Although it's easy to forget sometimes, a share is not a lottery ticket . . . it's part-ownership of a business.
Peter Lynch, American businessman, Investment strategist, and Philanthropist

1-3 Stock Market Data Charts

Objectives

- Interpret a stock bar chart.
- Create a stock bar chart.
- Interpret a stock candlestick chart.
- Create a stock candlestick chart.

Key Terms

- **stock chart**
- **stock bar chart**
- **candlestick chart**

EXAMINE THE QUESTION

As students think of the numerous types of data displays they have studied, they will likely come to the conclusion that none are a good fit for stock market data. Thus, there is a need to learn how to create and interpret a new type of data display.

CLASS DISCUSSION

Why might an investor be interested in historical information about the trading prices and volumes of a particular stock?

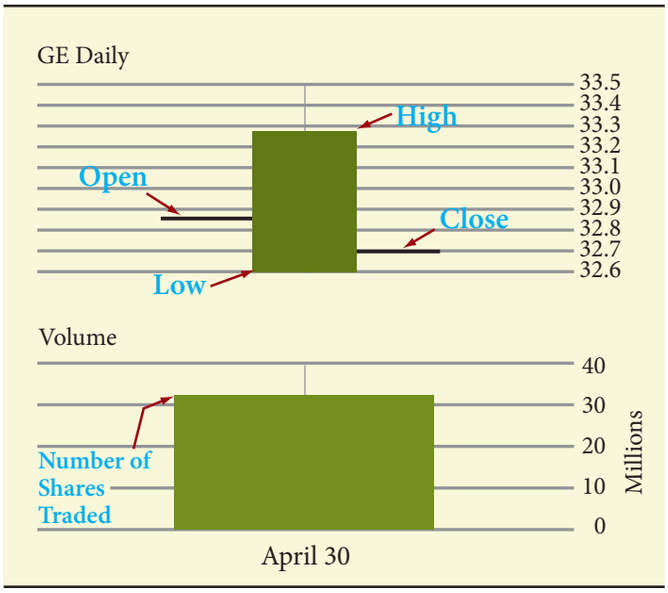
How can stock data be displayed?

Data can be presented in list form or in graphical form. The graphical form is known as a **stock chart**. These charts offer pictorial information on anything from a day's worth of data to multiyear data trends. Most stock charts present historical information about the trading prices and volumes of a particular stock.

A common stock chart format is the **stock bar chart**. The chart below shows price and volume information for General Electric on April 30.

Notice the chart consists of two graphs. The top portion shows daily information about the day's high, low, open, and close prices. The bottom portion shows the daily volume for that stock.

The top shaded bar is a rectangle formed between the day's low and high. The line segment on the left side of the rectangle is positioned at the day's opening price and the line segment on the right side is positioned at the day's closing price.



The bottom shaded bar starts at 0 and rises to the approximate number of shares traded on that date. Notice that the scale for this particular portion of the chart is in millions, although it could be in hundreds or thousands depending upon the range in the volume. Stock bar charts can also be used to show the market action on multiple days.

Skills and Strategies

Here you will learn how to interpret and create stock charts. The stock bar chart below presents trading information for the week of April 28 for Ford Motor Company.

EXAMPLE 1

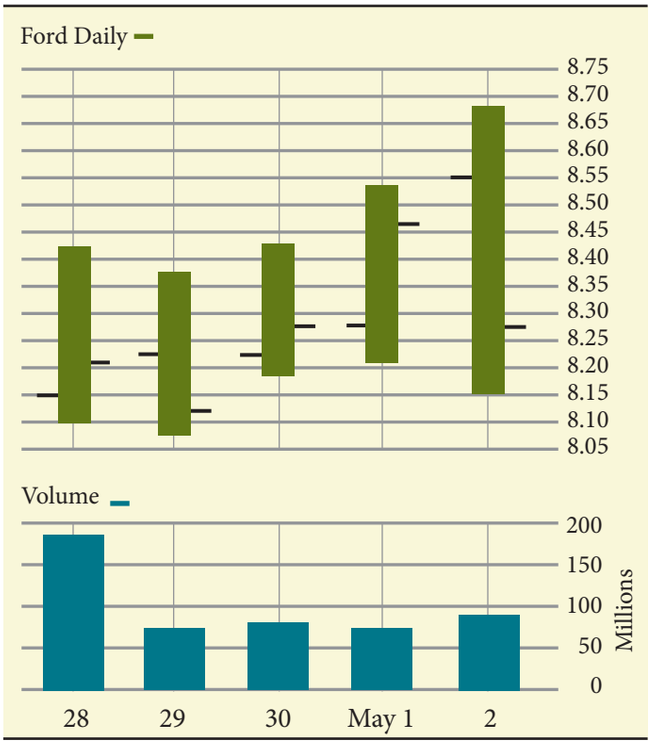
Which day had the greatest high price? Which day had the least low price?

SOLUTION The top portion of the chart shows the day's trading prices. Because the top of each bar represents the day's high price, the greatest high for the week was on May 2.

The bottom of each bar represents the day's low price, so the lowest low for the week occurred on April 29.

CHECK YOUR UNDERSTANDING

Between which two days did after-hours trading appear to have the biggest impact on the difference between the closing price and the following day's opening price?



EXAMPLE 2

Approximately how many shares of Ford Motor Company were traded over the five-day period?

SOLUTION The bottom portion of the chart shows the daily volume of shares traded. The scale is in millions of shares. While it is not possible to give an exact accounting of each day's volume, you can determine approximations of these amounts.

For April 28, the top of the volume bar reaches at a point slightly higher than half the distance between the 150 million and 200 million lines. An approximation of the day's volume is 185 million shares.

For April 29, the volume appears to be slightly above the 50 million line. So an approximation is 60 million shares.

Approximations for the rest of the week's trading volumes are 65 million, 60 million, and 90 million.

Add the five approximations. $185 + 60 + 65 + 60 + 90 = 460$

About 460,000,000 shares of Ford Motor Company were traded during the week of April 28.

TEACH

Distribute graph paper and rulers.

EXAMPLE 1

Guide students to realize that a lot of information is available on a stock trend graph. Students can begin to understand the at-a-glance advantage of this type of graph when identifying the greatest high and the least low price for the period of time covered by the graph.

CHECK YOUR UNDERSTANDING

Answer 4/29 and 4/30

EXAMPLE 2

Point out that two different units are used in the graph. The bottom portion of the graph charts amounts in millions of shares traded.

CHECK YOUR UNDERSTANDING

Answer On April 28, one share of Ford Motor Company opened at $8.15. During the day, the shares reached a high of approximately $8.42 per share and a low of $8.10 per share. Ford closed at approximately $8.21 per share. On April 29, one share of Ford Motor Company opened at approximately $8.23. During the day, the shares reached a high of approximately $8.37 per share and a low of $8.07 per share. Ford closed at approximately $8.12 per share on that date.

EXAMPLE 3

Students need to identify the intervals that will be used for the top portion and the units that will be used for the bottom portion. While there are many correct answers, students should make sure that the graph captures all of the necessary price amounts in an easy-to-read display.

CHECK YOUR UNDERSTANDING

Answer If trading is suspended, there are no prices to chart and no volume to report. Therefore, the chart could either show a blank space on that trading day, or a horizontal line (bar with no height) for each portion of the chart.

CHECK YOUR UNDERSTANDING

Use the stock bar chart to write a brief financial story of the trading action that occurred for Ford Motor Company on April 28 and April 29. Begin your story with "On April 28, one share of Ford Motor Company opened at $8.15. During the day . . . "

EXAMPLE 3

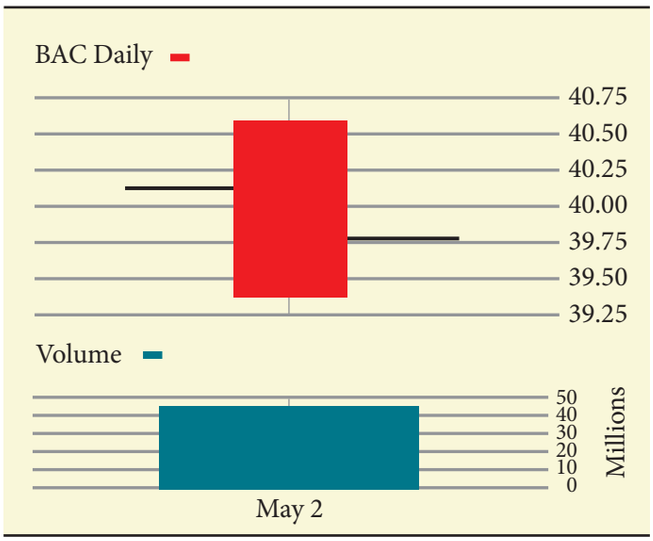
Use the information below to construct a one-day stock bar chart.

Open: $40.10 Close: $39.79

High: $40.65 Low: $39.39 Volume: 44,500,000

SOLUTION Determine an appropriate interval to use to display the information. The range of the daily prices is from $39.39 to $40.65. Therefore, choose a value to begin the interval that is less than the lowest price and a value to end the interval that is greater than the highest price. Use $39.25 to $40.75. Next, establish interval amounts that are easy to read. Use intervals of $0.25.

Draw a rectangle whose bottom is positioned at the low for the day and top at the high for the day. Draw a line to the left of the rectangle that is approximately at the opening price and a line to the right of the rectangle that is approximately at the closing price.



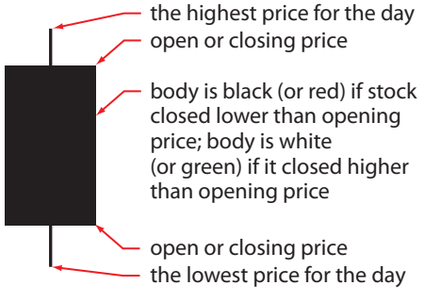
Next construct the volume portion of the chart. Select a suitable interval in millions, in this case 0 to 50. Beginning at 0, construct a bar that rises to the approximate volume for the day.

These two portions form a one-day stock bar chart.

CHECK YOUR UNDERSTANDING

Suppose that trading was suspended for one entire day for a corporation. What might the stock bar chart look like?

Candlestick Charts



Another type of chart that is similar to a stock bar chart is a **candlestick chart**. A candlestick chart may be easier to read and contains more information at a glance. The top and bottom of the vertical line indicate the high and low prices over the given time period. The rectangular region is known as the *real body* and is displayed in two different colors depending upon the action for the day on that stock.

The colors used to indicate the changes in the day's prices can be customized. The candlestick chart for Sept. 7–11 depicts market action for a particular stock for five days in September. The green candlestick indicates that the closing price is greater than the opening price. The red candlestick indicates the opposite; the closing price is less than the opening price.

EXAMPLE 4

Explain the difference between the market action on September 8 compared to September 9 shown in the candlestick chart for Sept. 7–11.

SOLUTION The candlestick is green on September 8, which means the closing price for the day was higher than the opening price. The red candlestick on September 9 indicates that the opening price for the day was higher than the closing price.

CHECK YOUR UNDERSTANDING

Interpret a green candlestick that is shown as only a rectangle with no lines at the top or bottom.

EXAMPLE 5

What was the approximate difference between the highest price and the lowest price for the week shown in the candlestick chart for Sept. 7–11?

SOLUTION The highest price for the week, approximately \$39.90, occurred on September 7 as indicated by the highest portion of any of the candlesticks.

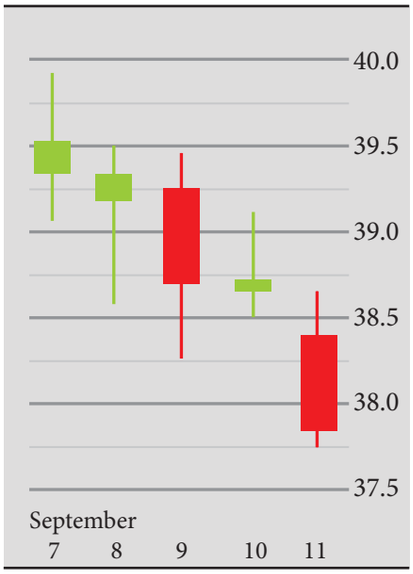
The lowest price for the week, approximately \$37.75, occurred on September 11 as indicated by the lowest portion of any of the candlesticks.

The difference between the week's high and low prices is approximately \$39.90 – \$37.75, or \$2.15.

CHECK YOUR UNDERSTANDING

The lengths of the candlesticks for September 8 and 11 are approximately the same. What does this mean about the trading prices on both of those days?

Candlestick Chart, Sept. 7–11



EXAMPLE 4

Candlestick charts depend on color for interpretation.

CHECK YOUR UNDERSTANDING

Answer The close was higher than the open. Without any lines at the top or bottom, the graph indicates that the closing price was the high for the day and the opening price was the low for the day.

EXAMPLE 5

Have students identify the highs and lows for each of the days.

CHECK YOUR UNDERSTANDING

Answer The differences between each day's high price and low price are about equivalent.

Applications

Although it's easy to forget sometimes, a share is not a lottery ticket . . . it's part-ownership of a business.
Peter Lynch, American businessman, Investment strategist, and Philanthropist

TEACH

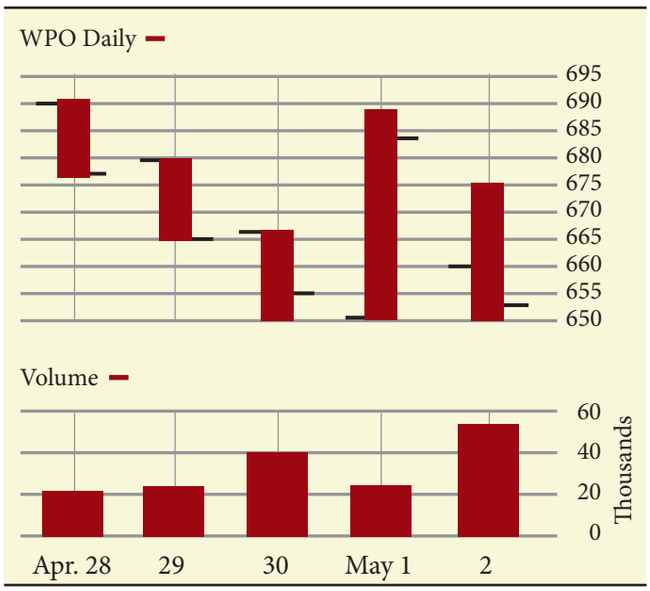
Exercises 2–12
When reviewing these problems with the students, you should display the graph using some type of projection device. Have students come to the front of the room to identify the locations that indicate the correct answers to the questions.

ANSWERS

1. The writer indicates that playing the market is not a game. It is not a quick way to make money like a lottery. Rather, it is a way to invest in a corporation by becoming a part owner of the business.

1. How might those words apply to what you have learned? Why is the author warning readers that a share is not a lottery ticket? See margin.

The following stock bar chart depicts the market action for The Washington Post Company during the week of April 28. Use the chart to answer Exercises 2–11.



2. On what date did the stock close at a price higher than it opened? May 1

3. What was the day's opening price on the following days?

April 28 approx. 690
April 29 approx. 679
April 30 approx. 667
May 1 approx. 651
May 2 approx. 660

4. What was the day's high price on April 29? $680

5. What was the day's low price on May 1? $650

6. What was the day's close on May 2? approx. $653

7. What was the approximate net change from April 29 to April 30? Express that net change as a monetary amount and as a percent to the nearest tenth. $655 – $665 = –$10; approx. –1.5%

8. What was the approximate net change from April 30 to May 1? Express that net change as a monetary amount and as a percent to the nearest tenth. $684 – $655 = $29; approx. 4.4%

9. Approximately how many shares were traded on April 30? approx. 40,000 shares

10. Approximately how many fewer shares were traded on April 28 than on May 2? approx. 52,000 – 20,000 = 32,000

11. Suppose that the volume numbers had been listed in hundreds on the table. How would that have changed the labels? 0, 200, 400, 600

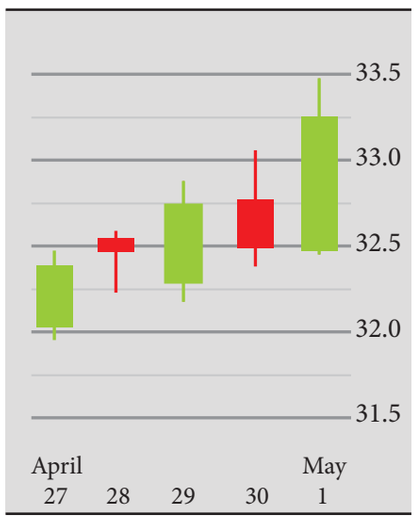
12. Use the following data to construct a stock bar chart for the 5-day period. See additional answers.

Day	Open	Close	High	Low	Volume
1	20.48	20.24	20.50	20.20	58,000,000
2	20.21	20.25	20.30	20.00	52,000,000
3	20.30	20.10	20.34	20.02	42,000,000
4	20.17	20.44	20.45	20.10	50,000,000
5	20.48	20.61	20.65	20.36	50,000,000

13. Use the following data to construct a stock bar chart for the 5-day period. See additional answers.

Day	Open	Close	High	Low	Volume
1	59.75	59.60	60.00	59.22	7,900,000
2	59.15	60.20	60.50	59.15	8,000,000
3	60.00	59.58	60.61	59.55	8,200,000
4	59.55	60.90	60.90	59.37	7,000,000
5	60.87	60.93	61.25	60.79	7,750,000

14. Use the candlestick chart to answer the questions.



a. On which days were opening prices higher than the closing prices? April 28 and 30

b. On which days were the closing prices higher than the opening prices? April 27, April 29, and May 1

c. What was the approximate closing price on April 28? $32.45

d. What was the approximate high price on May 1? $33.45

e. What was the difference between the lowest price and the highest price recorded for this time period? $33.45 – $31.95 = $1.50

f. What does the very short line at the bottom of the May 1 candlestick indicate? See margin.

g. Had the chart used white and black candlesticks, which days would be white and which days would be black? white: 4/27, 4/29, 5/1; black: 4/28, 4/30

h. On which consecutive days was the closing price of the first day higher than the opening price of the second day? 4/28 and 4/29; 4/30 and 5/1

15. Construct a candlestick chart for the information presented in Exercise 12. See additional answers.

16. Construct a candlestick chart for the information presented in Exercise 13. See additional answers.

TEACH

Exercise 11
Alert students to the variety of ways that numbers can be written using numerals and words.

ANSWERS
14f. The opening price for the day was close to the low for the day.

Never try to walk across a river just because it has an average depth of four feet.

Milton Friedman, American economist

1-4 Simple Moving Averages

Objectives

- Understand how data is smoothed.
- Calculate simple moving averages using the arithmetic average formula.
- Calculate simple moving averages using the subtraction and addition method.
- Graph simple moving averages using a spreadsheet.

Key Terms

- **smoothing techniques**
- **simple moving average (SMA)**
- **arithmetic average (mean)**
- **lagging indicators**
- **fast moving average**
- **slow moving average**
- **crossover**

EXAMINE THE QUESTION

Stock market professionals and statisticians needed to find a technique that brought prices into a more central range, while still representing the data that is true to the numbers.

The smoothing technique is used to calculate SMA over a variety of time periods. Students will learn to calculate these moving averages and interpret their meanings to the stock market data.

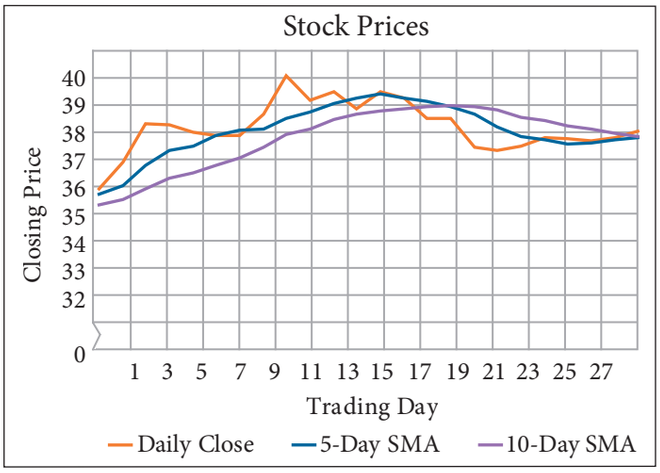
CLASS DISCUSSION

What factors might contribute to the fluctuation of stock market prices?

How can stock data be smoothed?

Stock market prices can fluctuate greatly from trade to trade based upon a variety of external factors. You have already seen that the high and low for a day may not necessarily be near the day's opening or closing prices. Those differences often make it difficult to spot trends that are occurring over time. **Smoothing techniques** are statistical tools that allow an investor to reduce the impact of price fluctuations and to focus on patterns and trends. One such technique is known as a **simple moving average (SMA)**. Simple moving averages are calculated by determining the **arithmetic average (mean)** closing price over a given period of time.

The graph shows the daily stock closing prices, 5-day SMA and 10-day SMA over a period of 30 trading days. Notice how the closing prices fluctuated from day to day and the moving average graphs smoothed out that data. The longer the moving average time interval, the smoother the graph appears to be.



Moving averages are known as **lagging indicators** because they use past data. Investors use simple moving averages when they want to identify and follow a trend in prices.

Skills and Strategies

Recall that the average of a set of numerical data is the sum of the items in that set divided by the number of items. You can determine the average of any number of closing prices, but this gives you little information about trends because you would have nothing to compare the averages to. A better comparison method to use is a simple moving average.

Simple Moving Averages Using the Arithmetic Average Formula

Although simple moving averages can span any length of time, in Example 1 you will find averages by taking closing prices 5 days at a time. Find an average of the prices for each of the 5-day time spans: days 1–5, days 2–6, days 3–7, days 4–8, days 5–9, and days 6–10. Graph the six averages. The graph has a smoother appearance compared to the graph of the closing prices of days 5–10. A moving average graph appears to smooth the fluctuations in closing prices.

TEACH

Review the concept of an average. Be sure students understand what the average is in relation to the numbers in the data set.

EXAMPLE 1

Students use the basic arithmetic average formula repeatedly using closing prices for five consecutive days at a time. Show students that the move occurs by deleting the first day's average and adding the next day's average.

EXAMPLE 1

The closing prices for 10 consecutive trading days for a particular stock are shown. Calculate the 5-day SMA and plot both the closing prices and the averages on a graph.

Day	Closing Price
1	35.02
2	35.01
3	34.65
4	36.09
5	35.32
6	35.50
7	35.03
8	35.79
9	37.07
10	36.05

SOLUTION Find the average of the closing prices in groups of five.

Find the SMA using the closing prices from days 1–5.

$$\frac{35.02 + 35.01 + 34.65 + 36.09 + 35.32}{5} = 35.218 \approx 35.22$$

Days 2–6 $$\frac{35.01 + 34.65 + 36.09 + 35.32 + 35.50}{5} = 35.314 \approx 35.31$$

Days 3–7 $$\frac{34.65 + 36.09 + 35.32 + 35.50 + 35.03}{5} = 35.318 \approx 35.32$$

Days 4–8 $$\frac{36.09 + 35.32 + 35.50 + 35.03 + 35.79}{5} = 35.546 \approx 35.55$$

Days 5–9 $$\frac{35.32 + 35.50 + 35.03 + 35.79 + 37.07}{5}$$

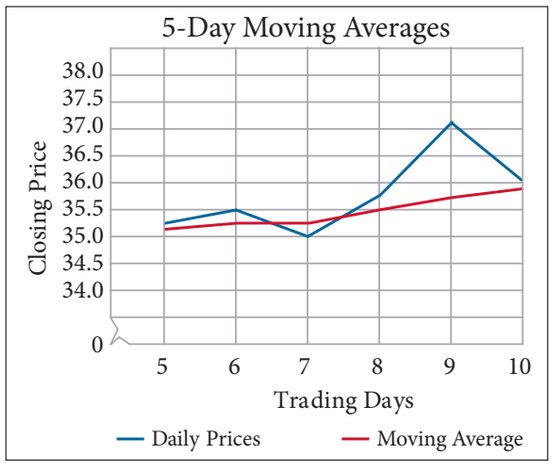
$$= 35.742 \approx 35.74$$

Days 6–10 $$\frac{35.50 + 35.03 + 35.79 + 37.07 + 36.05}{5}$$

$$= 35.888 \approx 35.89$$

The five consecutive 5-day SMA are \$35.22, \$35.31, \$35.32, \$35.55, \$35.74, and \$35.89.

The graph of the closing prices and the simple moving averages for days 5 through 10 are shown. Notice how the moving averages smooth out the data.



CHECK YOUR UNDERSTANDING

Answer 5-day moving averages are \$53, \$50.40, \$47.40, \$44.20, \$43.20, \$45.

Graph should have a line that connects the points of closing prices and a line that connects the points of the 5-day moving averages.

CHECK YOUR UNDERSTANDING

Closing prices for 10 consecutive trading days were \$55, \$60, \$62, \$48, \$40, \$42, \$45, \$46, \$43, and \$49. Calculate the 5-day SMA. Plot both the closing prices and the averages on a graph.

Simple Moving Averages Using the Subtraction and Addition Method

The calculation of a simple moving average can be tedious because you have to find the average for each time interval. There is an alternate way to compute the moving average that is simpler.

Suppose you want to determine a 3-day simple moving average for 6 trading days. Let the trading prices for the days be represented by A, B, C, D, E, and F. The trading prices for the first three days are A, B, and C. The average of those prices is

$$\frac{A + B + C}{3} = \frac{A}{3} + \frac{B}{3} + \frac{C}{3}$$

Using the method in Example 1, find the average of days 2–4 using B, C, and D. This is the same as subtracting price A and adding price D, or

$$\frac{A}{3} + \frac{B}{3} + \frac{C}{3} - \frac{A}{3} + \frac{D}{3}$$

Rearranging the terms and simplifying, this process is the same as finding the average for days 2–4.

$$\frac{A}{3} - \frac{A}{3} + \frac{B}{3} + \frac{C}{3} + \frac{D}{3} = \frac{B}{3} + \frac{C}{3} + \frac{D}{3} = \frac{B + C + D}{3}$$

EXAMPLE 2

Use the subtraction and addition method to determine the 4-day SMA for the following closing prices.

\$121, \$122, \$120, \$119, \$124, \$128, \$126

SOLUTION Calculate the average closing prices of days 1–4.

Add the first 4 prices. Divide by 4. $\frac{121 + 122 + 120 + 119}{4} = 120.50$

Use subtraction and addition to determine the averages for days 2–5.

Use previous average, $\frac{A}{4}$, and $\frac{E}{4}$. $120.50 - \frac{121}{4} + \frac{124}{4} = 121.25$

Find the averages for days 3–6 and days 4–7.

Use previous average, $\frac{B}{4}$, and $\frac{F}{4}$. $121.25 - \frac{122}{4} + \frac{128}{4} = 122.75$

Use previous average, $\frac{C}{4}$, and $\frac{G}{4}$. $122.75 - \frac{120}{4} + \frac{126}{4} = 124.25$

The simple moving averages are \$120.50, \$121.25, \$122.75, and \$124.25.

CHECK YOUR UNDERSTANDING

Use the subtraction and addition method to determine the 3-day SMA for the closing prices \$28, \$31, \$37, \$38, and \$35.

EXTEND YOUR UNDERSTANDING

In Example 2, what would the eighth trading day's closing price have to be so that the next moving average remains the same at \$124.25?

CHECK YOUR UNDERSTANDING

Answer \$32, \$35.33, \$36.66

EXTEND YOUR UNDERSTANDING

Answer \$119

In order that the next cycle of 4 consecutive days has the same SMA as the last cycle, the number subtracted (the 4th day's price) and the number added (the 8th day's price) need to be the same.

Graph Simple Moving Averages Using a Spreadsheet

Simple moving averages are more informative when they are determined over a longer period of time. Often, financial websites and newspapers report long moving average time intervals. These calculations are time consuming if done by hand or even using a calculator. However, if you use a spreadsheet you can get results easily and quickly. The spreadsheet shown lists the closing prices of 30 consecutive days of trading for a particular stock. The 10-day moving averages are calculated in column C and begin on day 10. Cell C11 equals the average of the closing prices on days 1–10.

Most spreadsheets have a sum function, which is used to calculate the sum of amounts in a group of cells. The format for using a sum function varies depending on the spreadsheet software you are using. The format used here is =sum(starting cell:ending cell). The formula in cell C11 that yields the correct average is =sum(B2:B11)/10. The cells have been formatted to show all decimals rounded to two places.

The formula in cell C12 is =sum(B3:B12)/10. Notice that the starting and ending cells in the formula have each shifted down by one cell. Rather than typing this formula repeatedly and changing the cell names used, most spreadsheets have a fill command that recognizes the pattern. To use this command in this spreadsheet select the cells that you want to fill with the formula and apply the fill command. Most spreadsheets allow the user to *fill up, fill down, fill left*, or *fill right*. In this case, you *fill down*. The formula is placed in each selected cell with the cell names automatically adjusted for each row.

	A	B	C
1	**Day**	**Closing Price**	**10-day Moving Average**
2	1	35.02	
3	2	35.01	
4	3	34.65	
5	4	36.09	
6	5	35.32	
7	6	35.5	
8	7	35.03	
9	8	35.79	
10	9	37.07	
11	10	36.05	35.55
12	11	36.85	35.74
13	12	38.03	36.04
14	13	38	36.37
15	14	37.76	36.54
16	15	37.66	36.77
17	16	37.66	36.99
18	17	38.3	37.32
19	18	39.48	37.69
20	19	38.72	37.85
21	20	39.01	38.15
22	21	38.48	38.31
23	22	39.01	38.41
24	23	38.8	38.49
25	24	38.19	38.53
26	25	38.2	38.59
27	26	37.3	38.55
28	27	37.2	38.44
29	28	37.33	38.22
30	29	37.61	38.11
31	30	37.57	37.97

=sum(C2:C11)/10

=sum(C3:C12)/10

CHECK YOUR UNDERSTANDING

Answer D4; =sum(B2:B4)/3

CLASS DISCUSSION

Why is the graph with the shorter time interval "faster" than the graph with the longer time interval?

EXAMPLE 4

Identify the three important portions to the graph: Days 1–26, Day 27, Days 28–29.

CHECK YOUR UNDERSTANDING

Answer Sell; the slow moving graph has overtaken the fast moving graph indicating a reversal of the trend. The buyer might consider selling the stock.

CLASS DISCUSSION

What prices might you see when a crossover is about to occur?

EXAMPLE 3

Use a spreadsheet to calculate the 5-day SMA of the closing prices for 10 consecutive trading days.

SOLUTION Moving averages lag behind the closing prices, so in cell C6 calculate the average of the closing prices for April 28, 29, 30, May 1 and 2. The formula is =sum(B2:B6)/5.

Next, highlight cells C6 through C11 and apply the fill down command to have the 5-day moving averages appear in the appropriate cells as shown in blue.

	A	B	C
1	**Day**	**Close**	**Moving Average**
2	28-Apr	29.39	
3	29-Apr	29.27	
4	30-Apr	29.21	
5	1-May	29.70	
6	2-May	29.08	29.33
7	5-May	29.24	29.30
8	6-May	29.40	29.33
9	7-May	28.52	29.19
10	8-May	28.64	28.98
11	9-May	28.99	28.96

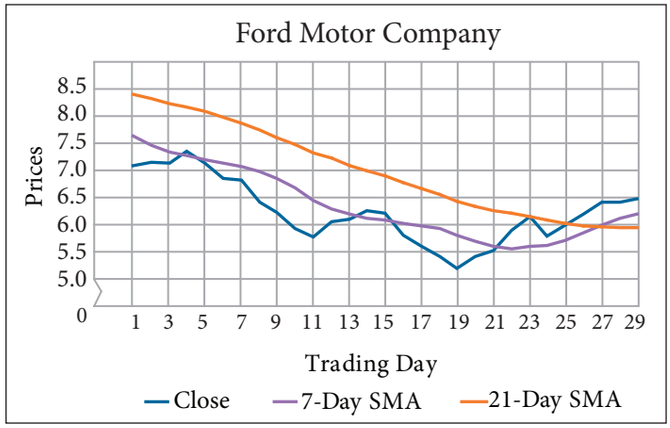
CHECK YOUR UNDERSTANDING

Add column D to the spreadsheet to calculate the 3-day SMA. In what cell do you start? What formula do you use?

Crossovers

Sometimes, investors construct stock charts that depict moving averages for two different intervals. The graph with the shorter time interval is known as the **fast moving average** and the graph with the longer time interval is known as the **slow moving average**. As changes in closing prices occur on a day-to-day basis, the fast moving average will reflect those changes quicker than the slow moving average will.

A **crossover** occurs when a one-time interval moving average graph overtakes another. Crossovers signal that a stock trend reversal might be near. Some say that an investor should consider buying when the fast moving average graph overtakes (rises above) the slow moving average graph. Likewise, an investor might consider selling when the fast moving average graph crosses below the slow moving average graph.



EXAMPLE 4

The graph shows the closing prices for 29 consecutive trading days. It also charts the 7-day and 21-day simple moving averages. What signal might the graphs give an investor?

SOLUTION A crossover occurs on the 27th day. The fast moving average graph rises above the slow moving average graph giving a signal to consider buying the stock.

CHECK YOUR UNDERSTANDING

Suppose that on the 35th trading day, the 21-day SMA graph rises above the 7-day graph. What might that indicate?

Applications

Never try to walk across a river just because it has an average depth of four feet.

Milton Friedman, American economist

1. Why might the author be warning readers to be cautious of averages? How might these words apply to what you have learned? See margin.

In Exercises 2–5, use the method illustrated in Example 1 to determine the simple moving averages by repeatedly finding sums. See margin.

2. Determine the 3-day SMA for the ten consecutive day closing prices of Sprint Nextel Corp listed below.
$7.78, $8.08, $7.99, $8.02, $7.89, $8.72, $9.19, $9.16, $8.98, $9.38

3. Determine the 5-day SMA for the ten consecutive day closing prices for MasterCard Inc listed below.
$242.50, $273.98, $278.16, $293.94, $285.04
$290.80, $296.02, $291.01, $293.41, $286.85

4. Determine the 4-day SMA for the ten consecutive day closing prices for Wal-Mart Stores Inc listed below.
$57.35, $58.61, $57.98, $58.07, $57.50
$56.97, $56.35, $56.83, $57.16, $57.18

5. Determine the 6-day SMA for the twelve consecutive day closing prices for Exxon Mobil Corp listed below.
$92.60, $92.46, $92.45, $91.79, $93.07, $89.70
$89.61, $89.51, $90.07, $88.82, $89.93, $88.82

In Exercises 6–9, use the method illustrated in Example 2 to determine moving averages by subtraction and addition. See margin.

6. Determine the 2-day SMA for the ten consecutive day closing prices for Toyota Motor Corp listed below.
$101.96, $101.80, $101.50, $103.07, $104.94
$105.12, $105.66, $104.76, $100.56, $101.31

7. Determine the 3-day SMA for the ten consecutive day closing prices for Procter & Gamble Co listed below.
$66.21, $65.90, $67.05, $67.03, $66.80
$66.65, $66.65, $65.80, $65.92, $65.21

8. Determine the 4-day SMA for the ten consecutive trading day closing prices for International Business Machines Corp listed below.
$121.69, $122.85, $120.70, $123.61, $123.18
$122.03, $122.82, $124.14, $124.92, $124.06

9. Determine the 6-day SMA for the ten consecutive trading day closing prices for Rite Aid Corp listed below.
$2.65, $2.63, $2.70, $2.63, $2.50, $2.65, $2.66, $2.56, $2.52, $2.37

TEACH

Moving Averages
When calculating moving averages, alert students that a calculator error of even a single digit can cause the entire answer to be incorrect.

ANSWERS

1. Conceivably, a river could have an average depth of 4 ft but be 20 ft deep at some point. The writer warns the reader to be careful about averages since they smooth out the data and may cause the reader to lose sight of specific data.
2. $7.95, $8.03, $7.97, $8.21, $8.60, $9.02, $9.11, $9.17
3. $274.72, $284.38, $288.79, $291.36, $291.26, $291.62
4. $58.00, $58.04, $57.63, $57.22, $56.91, $56.83, $56.88
5. $92.01, $91.51, $91.02, $90.63, $90.13, $89.61, $89.46
6. $101.88, $101.65, $102.29, $104.01, $105.03, $105.39, $105.21, $102.66, $100.94
7. $66.39, $66.66, $66.96, $66.83, $66.70, $66.37, $66.12, $65.64
8. $122.21, $122.59, $122.38, $122.91, $123.04, $123.48, $123.99
9. $2.63, $2.63, $2.62, $2.59, $2.54

TEACH

Exercises 10–12

Before assigning these problems show students how to read this chart. They should be reading down columns rather than across rows.

10. Use a spreadsheet to determine the 7-day SMA for Citigroup Inc.
See additional answers.

7-Apr	24.60	14-Apr	22.51	21-Apr	25.03	28-Apr	26.81	5-May	25.75
8-Apr	23.76	15-Apr	22.80	22-Apr	25.12	29-Apr	26.32	6-May	25.87
9-Apr	23.58	16-Apr	23.44	23-Apr	24.63	30-Apr	25.27	7-May	24.48
10-Apr	23.71	17-Apr	24.03	24-Apr	25.76	1-May	25.99	8-May	24.30
11-Apr	23.36	18-Apr	25.11	25-Apr	26.60	2-May	26.39	9-May	23.63

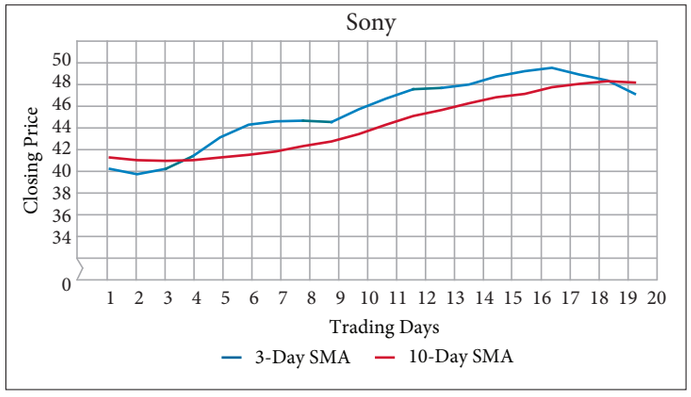
11. Use a spreadsheet to determine the 10-day SMA for Dell Inc.
See additional answers.

31-Mar	19.92	8-Apr	19.00	16-Apr	18.72	24-Apr	19.14	2-May	19.32
1-Apr	20.33	9-Apr	18.69	17-Apr	19.05	25-Apr	19.11	5-May	19.10
2-Apr	19.95	10-Apr	18.77	18-Apr	19.47	28-Apr	18.87	6-May	19.19
3-Apr	20.12	11-Apr	18.50	21-Apr	19.56	29-Apr	18.97	7-May	18.90
4-Apr	19.53	14-Apr	18.24	22-Apr	19.05	30-Apr	18.63	8-May	18.84
7-Apr	19.23	15-Apr	18.28	23-Apr	19.05	1-May	19.08	9-May	19.03

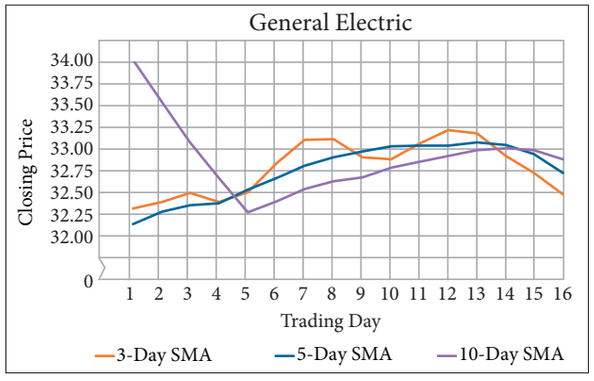
12. Use a spreadsheet to determine the 2-day, 3-day, and 5-day SMA.
See additional answers.

31-Mar	440.47	8-Apr	467.81	16-Apr	455.03	24-Apr	543.04	2-May	581.29
1-Apr	465.71	9-Apr	464.19	17-Apr	449.54	25-Apr	544.06	5-May	594.90
2-Apr	465.70	10-Apr	469.08	18-Apr	539.41	28-Apr	552.12	6-May	586.36
3-Apr	455.12	11-Apr	457.45	21-Apr	537.79	29-Apr	558.47	7-May	579.00
4-Apr	471.09	14-Apr	451.66	22-Apr	555.00	30-Apr	574.29	8-May	583.01
7-Apr	476.82	15-Apr	446.84	23-Apr	546.49	1-May	593.08	9-May	573.20

13. The stock chart shows the 3-day and 10-day SMA for 20 consecutive trading days of Sony Corp stock. Identify the crossovers and discuss the implications. See additional answers.



14. The stock chart shows the 3-day, 5-day, and 10-day SMA for 16 consecutive trading days of General Electric Co stock. Examine days 6–16. Identify the crossovers and discuss the implications.
See additional answers.



15. Use a spreadsheet to calculate the 2-day and 5-day SMA for ten consecutive day closing prices of Yahoo! Inc. Graph the closing prices and averages. See additional answers.

21-Apr	28.55	1-May	26.81
22-Apr	28.54	2-May	28.67
23-Apr	28.08	5-May	24.37
24-Apr	27.30	6-May	25.72
25-Apr	26.80	7-May	25.64
28-Apr	26.43	8-May	26.22
29-Apr	27.36	9-May	25.93
30-Apr	27.41		

The average trade of an individual is in the thousands of shares, whereas the institutional trade can be in the millions of shares. Clearly, the bigger the order, the bigger the move in the stock.
Maria Bartiromo, Business news anchor

Stock Market Ticker 1-5

Key Terms

- Dow Jones Industrial Average (DJIA)
- ticker
- stock symbol
- ticker symbol
- trading volume
- trading price
- directional arrow
- total value of a trade
- uptick
- downtick
- money flow
- positive money flow
- negative money flow
- daily money flow
- net money flow

Objectives

- Understand stock market ticker information.
- Determine the total value of a trade from ticker information.
- Determine trade volumes from ticker information.

How is stock market data transmitted to the investor?

Investors are always interested in how the market is doing. You can refer to a variety of published information systems to track the performance of certain types of stocks. Perhaps the most well-known of these systems is the **Dow Jones Industrial Average (DJIA)**, also known as the Dow. The Dow follows the daily trading action of 30 large public companies. Historically, these were industrial companies, but the corporations included in the Dow have grown to include those in telecommunications, pharmaceuticals, broadcasting, retail, insurance, and more. The Dow is a well-respected average that offers a broad picture of how the market is performing from day to day.

Investors wanting specific information often turn to another source. One of the first stock information transmission machines was invented by Thomas Edison in 1869. It was known as the Universal Stock Ticker and had a printing speed of about one character per second. The machine was known as a **ticker** because of the ticking sound that it made as printed tape came out of it. This *ticker tape machine* replaced the need for handwritten and hand-delivered messages about stock trades. Stock tickers in different buildings were connected by telegraph machines. The printed tape would contain a ticker symbol that was unique to a given company. Once the company was identified by the symbol, the ticker would print information about the number of shares traded, the price of that trade, and any change in the direction of the price of a share of the stock. While actual stock ticker machines are now a thing of the past, the idea of transmitting this important information is not. Ticker machines have been replaced by electronic scrolling information that appears on electronic billboards, computers, and TV screens. Many financial TV programs have stock information scrolling across the bottom of the screen during the trading day.

EXAMINE THE QUESTION

For traders that want basic stock market data and in a timely manner, the stock market ticker is available. If you have seen financial buildings in New York City on television, you may have noticed a ticker scrolling on the face of the building.

Today with the wise spread use of the Internet on laptop computers, cell phones, and PDAs, stock market tickers can easily be located.

For the ticker to have meaning, you need to learn how to interpret the information and how to use that data to calculate trading prices, changes, and volume.

CLASS DISCUSSION

Why might an investor be interested in a ticker?

Stock tickers let you know that a stock transaction (trade) has occurred. The ticker offers the following information in coded format.

- **Stock Symbol** or **Ticker Symbol** The letter or letters used to identify a corporation whose shares are traded on a stock market are *stock symbols* or *ticker symbols*. Stocks that trade on the New York Stock Exchange have 1-, 2-, or 3-letter symbols. Stocks that trade on the NASDAQ had only 4-letter symbols until recently when stocks that transferred to the NASDAQ from the NYSE were allowed to keep their symbols even if fewer than 4 letters.
- **Trading Volume** The *trading volume* is the number of shares traded in a single transaction. Trading volumes are listed on the ticker using a shorthand information system. For example, 10K indicates that 10,000 shares traded, 10M indicates that 10,000,000 shares traded, and 10B means that 10,000,000,000 shares traded (rarely seen).
- **Trading Price** The trading price per share may be displayed on the ticker preceded by the @ symbol, meaning that each share was traded at the specified price. The @ symbol is not always used.
- **Directional Arrows** Arrows indicate whether the traded price of a single share is greater than the previous day's closing price (▲) or less than the previous day's closing price (▼).

Skills and Strategies

The following examples show how to interpret stock ticker information.

EXAMPLE 1

Marcy is following the stock market ticker scrolling across the bottom of her TV screen on cable business station. She had purchased some shares of Visa, Inc. last week and is interested in seeing if there are any current trades. She knows that Visa, Inc. has the ticker symbol V. She saw the following information: V 12K@87.37 ▲ 0.12. What can Marcy learn from this line of symbols?

SOLUTION The letter V indicates that a trade has been made for a certain amount of Visa shares. The next piece of information, 12K, indicates that the volume of the most recent trade was 12 thousand shares. Each of those shares was traded at $87.37. This price was up $0.12 from the previous day's closing price of one share of Visa, Inc.

CHECK YOUR UNDERSTANDING

Kevin knows that General Electric has the ticker symbol GE. What can Kevin learn from the following line of symbols: GE 12K@73.72 ▼ 0.55?

EXTEND YOUR UNDERSTANDING

Had the trading price of this transaction been at $87.35, what number would have appeared after the directional arrow? Explain your answer.

TEACH

The ticker offers stock market transaction information in an easy read-and-interpret format Students need to know how to convert large numbers expressed using alphabetical symbols into numerals. These numbers represent the size of the individual transaction. They also need to master how to use the net change in determining a previous day's closing price. The ticker requires only basic mathematical skills but yields a great deal of important information.

EXAMPLE 1

The ticker symbol has three important parts: the number of shares traded (usually expressed in condensed form using K, M, or B), the price of each share for that trade (the price is preceded by the symbol @ which translates as "each at"), and finally the change from the previous close (the up arrow indicates that the price per share of the trade is higher than the close, and the down arrow indicates that the price per share is less than the close).

CHECK YOUR UNDERSTANDING

Answer The ticker indicates that 12,000 shares of GE were traded at $73.72 per share which is down $0.55 from the previous closing price.

EXTEND YOUR UNDERSTANDING

Answer upward arrow followed by 13.08

The change indicates that the previous close was 55 cents higher than the price per share, or $74.27. Had the ticker indicated a price per share of $87.35, subtract 87.35 – 74.27 = 13.08. This means the price per share of this trade was $13.08 higher than the previous close.

EXAMPLE 2

Tom needed money for graduate school tuition. He called his broker and asked her to sell all 3,000 of his Coca-Cola (KO) shares on Wednesday as soon as the trading price hit $57 per share. Tom knew that Coca-Cola closed at $57.25 on Tuesday. How will his trade appear on the ticker?

SOLUTION Tom is selling 3,000 shares, so the volume is 3K. The sale price of $57 is down from the previous day's close by $0.25. This trade appears as KO 3K@57 ▼ 0.25.

CHECK YOUR UNDERSTANDING

What would be the previous day's close for a share of Coca-Cola if the ticker had read KO 3K@57 ▲ 0.25?

Total Value of a Trade

The **total value of a trade** is determined by multiplying the number of shares traded by the trading price. This value does not include any fees.

EXAMPLE 3

Toni purchased 15,000 shares of stock of Target Corporation at $54.88 per share. Her trade appeared on the stock ticker as TGT 15K@54.88 ▼ 0.17. What was the total value of her trade?

SOLUTION Each of the shares cost Toni $54.88. Multiply the number of shares by the price to find the total value of her trade.

Number of shares × price $\quad 15{,}000 \times 54.88 = 823{,}200$

The total value of her trade was $823,200.

CHECK YOUR UNDERSTANDING

Suppose Toni made her purchase at the previous day's closing price. What would have been the difference between the values of the trades?

Trade Volume

Trade volume can appear in decimal formats on the stock ticker. For example, 2.5K is 2.5 thousand, or 2.5 × 1,000, or 2,500. The volume of 3,890,000 shares can be expressed in ticker notation by using the symbol M to represent millions. To determine the number of millions in 3,890,000, divide by 1,000,000. Moving the decimal left 6 places, 3,890,000 is 3.89 million and is symbolized as 3.89M.

EXAMPLE 4

Grandpa Rich left his three grandchildren: Nicole, Jeff, and Kristen, 8,750 shares of Apple Inc (AAPL) in his will. The grandchildren sold all of the shares at a price of $190.30 on Friday. The closing price of Apple on Thursday was $187.83. How did this trade appear on the stock ticker?

SOLUTION Divide the total number of shares by 1,000. Moving the decimal point 3 places to the left, 8,750 equals 8.75 thousand. The

EXAMPLE 2

Assist students in converting the number of shares into compressed form. Once done, follow the structure of the ticker knowing that $57 is lower than the previous close by $0.25.

CHECK YOUR UNDERSTANDING

Answer $56.75

Had the ticker included a downward arrow before the 0.25, it would have indicated to add 25 cents to the trading price of $57.

EXAMPLE 3

The total value of the trade is the product of the number of shares traded by the price per share. Students can convert the compressed form of the number of shares and then multiply by the price per share. They can also multiply the number in front of the symbol, in this case 15, by the price per share, 54.88 to obtain 823.2. Then, multiply that product by the value that the symbol represents, 823.2 × 1,000 = $823,200.

CHECK YOUR UNDERSTANDING

Answer First, determine the previous day's close, $54.88 + 0.17 = $55.05. Had Toni purchased her 15,000 shares at $55.05, the total value of her trade would be $825,750. The difference between this trade and the one in Example 3 is $2,550.

EXAMPLE 4

There are multiple steps to be completed and students should understand the purpose of each. Write 8,750 in compressed form by dividing by 1,000, which equals 8.75K. Compare the selling price with the previous day's close. The grandchildren sold at a price that was $2.47 more than the previous close.

volume of 8,750 shares is 8.75K on the ticker. Because the shares were sold on Friday at a price that was $2.47 higher than the previous day's close, an upward directional arrow indicates the increase. The trade appeared on the ticker as follows: AAPL 8.75K@190.30 ▲ 2.47.

CHECK YOUR UNDERSTANDING

Express 0.15M shares traded using the K symbol.

CHECK YOUR UNDERSTANDING

Answer 150K

Students are asked to convert from one compressed form to another. It is easiest to convert the first compressed form and then write that in the second compressed form.

CLASS DISCUSSION

Does daily money flow represent an actual monetary occurrence in the market?

Customized Tickers

Some stock traders follow customized tickers that offer trade-to-trade information. The term *tick* is used whenever there is a change in the price of a share from one trade to the next. A trade is an **uptick** if the price is higher than the previous trade. A trade is a **downtick** if the price is lower. These tick changes contribute to a type of market analysis known as **money flow**. When a stock is purchased at an uptick, it is **positive money flow**. When it is purchased at a downtick, it is **negative money flow**.

Daily money flow is a calculated indicator that is the average of a day's high, low, and close, multiplied by the volume for the day. This calculation can be compared with that for the previous trading day and indicates whether there was a positive or negative money flow. If more shares were bought on the uptick than the downtick, **net money flow** is positive because more investors were willing to pay a price above the market price.

EXAMPLE 5

Laura is interested in trades of Microsoft (MSFT). She has been following the upticks and downticks for the past two days. She knows that MSFT closed on Tuesday at $20.68, with a high at $21.25 and a low at $20.50. There were 11,902,000 shares traded on that day. She found that Monday's closing price was $21.23. The high was $21.30 and the low was $19.95. The volume for Monday was 16,537,000 shares. Was the net money flow from Monday to Tuesday positive or negative?

SOLUTION Calculate the average of each day's high, low, and close, and then multiply that by the daily volume.

Find Monday's average. $\frac{21.30 + 19.95 + 21.23}{3} \approx 20.83$

Multiply price by volume. $20.83 \times 16{,}537{,}000 = \$344{,}465{,}710$

Find Tuesday's average. $\frac{21.25 + 20.50 + 20.68}{3} = 20.81$

Multiply price by volume. $20.81 \times 11{,}902{,}000 = \$247{,}680{,}620$

There is a negative net money flow from Monday to Tuesday.

EXAMPLE 5

Answer $\left(\frac{H + L + C}{3}\right) V$

The average of the high, low, and closing price on a particular day is used for comparison purposes when examining money flow. It does not represent the average of the day's trading prices. Multiplying that average by the volume for the day results in a monetary amount, which again can be used for comparison purposes. It indicates the total value of all of the trades during the day when calculating with the comparison average. In Example 5, the money flow for Monday is greater than that for Tuesday. This indicates a negative money flow from Monday to Tuesday.

CHECK YOUR UNDERSTANDING

Let H represent a day's High, L represent a day's Low, C represent a day's close, and V represent the day's volume. Write a formula that can be used to determine the day's money flow.

Applications

The average trade of an individual is in the thousands of shares, whereas the institutional trade can be in the millions of shares. Clearly, the bigger the order, the bigger the move in the stock.
Maria Bartiromo, Business news anchor

1. How might a large trade "move the market"? How might those words apply to what you have learned? See margin.

Use the following ticker information to answer Exercises 2–9. The stock symbols represent the following corporations: HD, Home Depot Inc; S, Sprint Nextel Corporation; VZ, Verizon Communications Inc; and XOM, Exxon Mobil Corp.

HD 32.3M@29.13▲1.13 S 1.1K@9.14▼0.78 VZ 3.32K@38.77▲2.27 XOM 0.66K@92.67▼1.58

2. Jessica put in an order for some shares of Exxon Mobil Corp.
- **a.** As shown on the ticker, how many shares did Jessica buy? 660
- **b.** How much did each share cost? $92.67
- **c.** What was the value of Jessica's trade? $61,162.20

3. Phil sold his shares of Verizon Communications Inc, as indicated on the above ticker.
- **a.** How many shares did he sell? 3,320
- **b.** How much did each share sell for? $38.77
- **c.** What was the total value of all the shares Phil sold? $128,716.40

4. How many shares of Home Depot are indicated on the ticker? 32,300,000

5. What is the total value of all of the Sprint Nextel Corporation shares traded? $10,054

6. How can @29.13 be interpreted? Each share of HD was traded at $29.13.

7. How can XOM .66K be interpreted? 660 shares of Exxon Mobil were traded.

8. How can ▼1.58 be interpreted? The traded price of XOM reflected a $1.58 drop from the previous day's closing price.

9. What was the previous day's closing price for each stock?
Home Depot $28; Sprint Nextel $9.92; Verizon $36.50; and Exxon Mobil $94.25

Use the following ticker to answer Exercises 10–17. The stock symbols represent the following corporations: PG, Procter & Gamble Co; BAC, Bank of America Corp; DIS, Walt Disney Co; and K, Kellogg Co.

PG 4.5K@66.75▼0.39 BAC 0.65M@36.17▲0.54 DIS 2.55K @34.90▼1.08 K 0.76K@51.49▲0.04

10. Michele is following the trades of Procter & Gamble Co on the business channel. The result of the latest trade is posted on the ticker above.
- **a.** How many shares of PG were traded? 4,500
- **b.** How much did each share cost? $66.75
- **c.** What was the value of the Procter & Gamble Co trade? $300,375
- **d.** Suppose that the next PG trade represents a sale of 23,600 shares at a price that is $0.18 higher than the last transaction. What will Michele see scrolling across her screen for this transaction?
PG 23.6K@66.93 ▼ 0.21

TEACH

Stock Market Ticker
The numbers presented in the stock market ticker are compressed as they would appear on an actual ticker. Some students may have difficulty separating the information given on one transaction from the next. Suggest they rewrite the information on the single transaction in question so that they can focus on only the data pertaining to that transaction.

ANSWERS

1. Large market trades, whether they are purchases or sales, can have an effect on market upticks and downticks since they carry a great deal of weight in determining future market action for a stock.

TEACH

Exercises 19 and 20
Make sure that you assign Exercise 19 with Exercise 20 because Exercise 19 offers a numerical example. Then, students will be able to apply the work from Exercise 19 to the algebra they will use in Exercise 20.

Exercises 21 and 22
Alert students to the importance of the correct use and placement of parentheses in the money flow formula. Show them how an incorrect placement yields a completely different and incorrect answer.

ANSWERS

21. 5/15 money flow = $2,190,938,750; 5/16 money flow = $1,474,805,466; There was a negative money flow from 5/15 to 5/16.
22. 6/6 money flow = $2,518,114,595; 6/7 money flow = $2,889,952,100; There was a positive money flow from 6/6 to 6/7.

11. Sarah sold her Disney shares as indicated on the ticker.
- **a.** How many shares did she sell? 2,550
- **b.** How much did each share sell for? $34.90
- **c.** What was the total value of all the shares Sarah sold? $88,995
- **d.** Suppose that the next DIS trade that comes across the ticker represents a sale of 7,600 shares at a price that is $0.98 higher than the last transaction. What will Sarah see scrolling across her screen for this transaction of DIS? DIS 7.6K@35.88 ▼ 0.10

12. How many shares of Kellogg Co. are indicated on the ticker? 760

13. What is the total value of all of the Bank of America shares traded? $23,510,500

14. How can @36.17 be interpreted? Each share of BAC traded at $36.17.

15. How can K 0.76K be interpreted? 760 shares of Kellogg Co. were traded.

16. How can ▲0.04 be interpreted? The trading price of Kellogg Co. was $0.04 higher than the previous day's closing price.

17. What was the previous day's closing price for each stock?
- **a.** Procter & Gamble Co $67.14
- **b.** Bank of America Corp $35.63
- **c.** Walt Disney Co $35.98
- **d.** Kellogg Co $51.45

18. Write the ticker symbols for each situation.
- **a.** 36,000 shares of ABC at a price of 37.15 which is $0.72 higher than the previous day's close ABC 36K@37.15 ▲ 0.72
- **b.** 1,240 shares of XYZ at a price of $9.17, which is $1.01 lower than the previous day's close XYZ 1.24K@9.17 ▼1.01

19. Maria is a stock broker and has been following transactions for Ford Motor Co (F). On Tuesday, the last trade of the day for Ford was posted on the ticker as $8.11. On Wednesday, the last trade of the day was $0.56 higher than Tuesday's close for a purchase of 5,600 shares of Ford. Write the stock ticker symbols that would appear on the scroll for the last trade of the day on Wednesday for Ford. F 5.6K@8.67▲0.56

20. Dorothy purchased x thousand shares of Macy's Inc (M) at y dollars per share. This purchase price reflected a decrease of z dollars from the previous day's close. Express the ticket symbols algebraically. M xK@y ▼z

21. Danielle is examining the change in the money flow for Yahoo! Inc shares on two consecutive dates. The information is given in the table. Do the May 16 numbers reflect a positive or negative money flow? Explain. See margin.

Date	High	Low	Close	Volume
16-May	27.95	27.40	27.66	53,299,800
15-May	27.90	26.85	27.75	79,670,500

22. Isaac follows the market action of Google Inc. He has watched the prices for two consecutive days. The information he collected is given in the table. Do the June 7 numbers reflect a positive or negative money flow? Explain. See margin.

Date	High	Low	Close	Volume
7-June	584.68	578.32	580	4,974,100
6-June	582.95	575.60	581	4,342,700

When somebody buys a stock it's because they think it's going to go up and the person who sold it to them thinks it's going to go down. Somebody's wrong.

George Ross, Television actor

Stock Transactions 1-6

Key Terms

- portfolio
- round lot
- odd lot
- trade
- gross capital gain
- gross capital loss

Objectives

- Learn the basic vocabulary of buying and selling shares of stock.
- Compute gains and losses from stock trades.

What is a stock portfolio?

A **portfolio** is a grouping of all the stocks a person currently owns. A portfolio changes whenever stocks are bought or sold. Stocks are best for long-term goals as over time good stocks tend to grow and become more valuable. There are many reasons that stockholders buy or sell shares.

Stocks can go up or down in value. Because some stocks do not perform as planned, it is best to have a diversified portfolio of stocks of different-sized companies in different industries.

When stock is bought and sold, a **trade** is made with another stockholder. If an investor is buying 600 shares of Xerox Corp, the investor is buying the shares from another shareholder who wants to sell them, not from Xerox Corp. Only the first purchaser of the stock actually bought it from Xerox Corp.

Most shareholders buy and sell stocks in multiples of 100 shares, which are called **round lots**. A purchase of less than 100 shares is called an **odd lot**. When you buy stock, even if its value increases, you will not make a profit until you actually *sell* the stock. If the shares are sold at a higher price than they were purchased for, you make a profit.

The difference between the selling price and the purchase price is a **gross capital gain**. If you sell a stock for less money than you paid for it, you have a **gross capital loss**. You must report capital gains and losses to the Internal Revenue Service because each affects the amount of income taxes owed.

EXAMINE THE QUESTION

Students will likely know the word "portfolio", but will associate it with an artist or a student's portfolio for college. Students should make connections between what they know about portfolios and stock portfolios.

TEACH

In this section, students will examine the difference between selling price and purchase price. Remind students that if the price of a stock they own goes up, they have not made any money until they sell it.

EXAMPLE 1

Remind students that the purchase price is the minuend, and the selling price is the subtrahend. Write the following displays on the board.

Minuend – Subtrahend = Difference
Purchase price – Selling price = Capital gain

The sign of the difference indicates whether there was a gain or a loss.

CHECK YOUR UNDERSTANDING

Answer –$1,567; loss

EXAMPLE 2

Show students that they will get the same result by computing the gain on one share, and then multiplying that result by 300.

$41 – $34.87 = $6.13
$6.13(300) = $1,839

CHECK YOUR UNDERSTANDING

Answer $2,206.25

EXTEND YOUR UNDERSTANDING

Answer $450y - 450x$

Skills and Strategies

Investors should keep careful track of the stock market and the stocks in their portfolio, so they know when to buy new stocks, add to what they already own, sell, or just hold on to what they own. Here you will learn how investors determine their capital gains and losses.

EXAMPLE 1

Several years ago, Marlene purchased stock for $7,241. Last week she sold the stock for $9,219. What was her gross capital gain?

SOLUTION Subtract the purchase price from the selling price to find her capital gain.

Selling price – Purchase price $\qquad 9{,}219 - 7{,}241 = 1{,}978$

Marlene has a gross capital gain of $1,978. She must report this as income on her income tax return for the year in which she sold the stock.

CHECK YOUR UNDERSTANDING

Brett used money he received as a gift for high school graduation to purchase $4,000 worth of shares of stock. After he graduated from college, he needed money to buy a car, so he sold the stock for $2,433. What was his capital gain or loss?

EXAMPLE 2

Five years ago, Jessica bought 300 shares of a cosmetics company's stock for $34.87 per share. Yesterday she sold all of the shares for $41 per share. What was her capital gain?

SOLUTION Multiply to find the purchase price of all 300 shares. Multiply to find the selling price of all 300 shares. Subtract to find the capital gain.

Multiply purchase price by 300. $\qquad 34.87 \times 300 = 10{,}461$

Multiply selling price by 300. $\qquad 41 \times 300 = 12{,}300$

Subtract. $\qquad 12{,}300 - 10{,}461 = 1{,}839$

Jessica's gross capital gain was $1,839.

CHECK YOUR UNDERSTANDING

Kelvin bought 125 shares of stock for $68.24 per share. He sold them nine months later for $85.89 per share. What was his capital gain?

EXTEND YOUR UNDERSTANDING

Three years ago, Maxine bought 450 shares of stock for x dollars per share. She sold them last week for y dollars per share. Express her capital gain algebraically in terms of x and y.

EXAMPLE 3

Randy paid $3,450 for shares of a corporation that manufactured cell phones. He sold it for $6,100. Express his capital gain as a percent of the original purchase price. Round to the nearest tenth of a percent.

SOLUTION Find the amount of capital gain from the sale.

$$\text{Capital gain} = \text{Selling price} - \text{Purchase price}$$

Substitute values. $\text{Capital gain} = 6{,}100 - 3{,}450 = 2{,}650$

Think of $2,650 as part of a whole. The whole is $3,450. You need to express "what percent of 3,450 is 2,650" as an equation. Let x represent the percent increase, expressed as a decimal.

Write the equation. $(x)(3{,}450) = 2{,}650$

Divide each side of equation by 3,450. $x = \dfrac{2{,}650}{3{,}450}$

Calculate. $x \approx 0.7681$

Randy earned a 76.8% capital gain on his investment.

CHECK YOUR UNDERSTANDING

Allison bought shares in Citigroup Corporation in early 2007 for $55 per share. She sold them later that year for $35 per share. Express her loss as a percent of the purchase price. Round to the nearest percent.

EXAMPLE 4

Andy paid w dollars for shares of a corporation that manufactured cell phones. He sold it for y dollars. Express his capital gain as a percent of the original purchase price. Round to the nearest tenth of a percent.

SOLUTION Find the capital gain using variables.

$$\text{Capital gain} = \text{Selling price} - \text{Purchase price}$$

Substitute values. $\text{Capital gain} = y - w$

Think of $y - w$ as part of a whole. The whole is w. Express "what percent of w is $y - w$" as an equation. Let x represent the percent increase, expressed as a decimal.

Write the equation. Solve for x. $(x)(w) = y - w$

Divide each side of equation by w. $x = \dfrac{y - w}{w}$

Andy earned a capital gain of $100\dfrac{(y - w)}{w}$ percent on his investment.

CHECK YOUR UNDERSTANDING

Linda bought $800 of stock in a garden equipment corporation. The selling price is x dollars. Express the percent increase of Linda's potential capital gain algebraically.

EXAMPLE 3

Discuss how the length of time of the investment is a factor in deciding if it was a good investment. In this case, if this gain was made over 5 years, it would have been a good investment. If this gain was made over 30 years, it would not have been as good an investment.

CHECK YOUR UNDERSTANDING

Answer 36%

Point out that these were actual prices in 2007, so this loss could have actually happened.

EXAMPLE 4

By not using numbers in this problem, students might forget that they need to convert to a percent. They must remember to multiply by 100.

CHECK YOUR UNDERSTANDING

Answer $\dfrac{x - 800}{800}(100)$

Advise students to write the fraction in stacked form. If they write it without using a stacked fraction, such as $[(x - 800)/800]100$, they need to enter parentheses correctly.

Applications

When somebody buys a stock it's because they think it's going to go up and the person who sold it to them thinks it's going to go down. Somebody's wrong.

George Ross, Television actor

1. Is it always true that someone sells a stock because they think it is going to go down in price? How do those words apply to what you've learned in this lesson? See margin.

2. Zach bought 200 shares of Goshen stock years ago for $21.35 per share. He sold all 200 shares today for $43 per share. What was his gross capital gain? $4,330

3. Mitchell bought 600 shares of Centerco two years ago for $34.50 per share. He sold them yesterday for $38.64 per share.
- **a.** What was the percent increase in the price per share? 12%
- **b.** What was the total purchase price for the 600 shares? $20,700
- **c.** What was the total selling price for the 600 shares? $23,184
- **d.** What was the percent capital gain for the 600 shares? 12%
- **e.** How does the percent increase in the price of one share compare to the percent capital gain for all 600 shares? It is the same.

4. Tori bought x shares of Mattel stock for m dollars per share. She sold all of the shares months later for y dollars per share. Express her capital gain or loss algebraically. $|xy - xm|$

5. Ramon bought x shares of Xerox stock for a total of $40,000. Express the price he paid per share algebraically. $\frac{40{,}000}{x}$

6. In 2004, Joe bought 200 shares in the Nikon corporation for $12.25 per share. In 2007 he sold the shares for $31.27 each.
- **a.** What was Joe's capital gain? $3,804
- **b.** Express Joe's capital gain as a percent, rounded to the nearest percent. 155%

7. General Motors stock fell from $32 per share in 2006 to $20 per share during 2008.
- **a.** If you bought and then sold 300 shares at these prices, what was your loss? $3,600
- **b.** Express your loss as a percent of the purchase price. Round to the nearest tenth of a percent. 37.5%

8. Elliott purchased shares of Microsoft in 2008 for $28 per share. He plans to sell them as soon as the price rises 20%. At what price will he sell his shares? $33.60

9. Maria purchased 1,000 shares of stock for $35.50 per share in 2003. She sold them in 2007 for $55.10 per share. Express her capital gain as a percent, rounded to the nearest tenth of a percent. 55.2%

TEACH

Percent Increase and Decrease

Throughout the applications, students will be computing gains and losses as raw differences and as percents. Make sure that when students calculate percent increase or decrease, that they are always basing it on the purchase price. The purchase price will be the denominator in these cases.

Exercise 3

After students complete 3e, discuss the example intuitively—if each item increases 12%, the total costs increases 12%. Pose this question: If you bought 3 items and each increased in value by 20%, did the total value of the three items increase by 60%?

Exercise 4

Point out the equivalent form of the answer, which is $(y - x)m$, and ask students to interpret this version. It finds the gain per share, and then multiplies it by m.

ANSWERS

1. People who do research on stocks could come to different conclusions as to what is going to happen to the price of a share. Sometimes people sell stock purely because they want the money for some other purpose; they do not necessarily have to feel that the price is going to go down.

10. Austin purchased shares of stock for x dollars in 2004. He sold them in 2010 for y dollars per share.
- **a.** Express his capital gain algebraically. $y - x$
- **b.** Express his capital gain as a percent of the purchase price. $\frac{y - x}{x}$

11. During 2003, a share of stock in the Coca-Cola Company sold for $39. During 2008, the price hit $56 per share. Express the increase in price as a percent of the price in 2003. Round to the nearest tenth of a percent. 43.6%

12. Alexa purchased 700 shares of Campagna Corporation stock for x dollars per share in 2005. She sold them in 2010 for y dollars per share, where $y < x$.
- **a.** Did Alexa have a gross capital gain or a gross capital loss? Explain. She had a gross capital loss because $y < x$.
- **b.** Alexa used the formula $\frac{700y - 700x}{700x}$ to compute the percent of the loss. Her husband Tom used the formula $\frac{y - x}{x}$ to compute the percent of the loss. She told him he was incorrect because he didn't take into account that she bought 700 shares. He says that his formula is correct, and so is hers. Who is correct, Alexa or Tom? Explain. Tom is correct because both formulas can be used to find percent increase.

13. Zeke bought g shares of stock for w dollars per share. His broker called him and told him to sell the shares when they earn a 40% capital gain.
- **a.** Express the total purchase price of all the shares algebraically. gw
- **b.** Express the capital gain algebraically. $0.4gw$
- **c.** Zeke decides to sell his shares. Express the total selling price of all the shares algebraically. $gw + 0.4gw$, which is equal to $1.4gw$.

14. Jake bought d shares of stock for x dollars per share years ago. His stock rose in price and eventually hit a price that would earn him a 140% capital gain. He decided to sell half of his d shares.
- **a.** Represent half of the d shares algebraically. $0.5d$
- **b.** Represent the capital gain earned on each of the shares that were sold algebraically. $1.4x$
- **c.** Represent the capital gain earned on all of the shares that were sold algebraically. $1.4dx$
- **d.** Represent the total value of the shares that were sold algebraically. $0.5dx + 1.4(0.5)dx$, which is equal to $1.2dx$.
- **e.** Jake keeps the remaining half of the shares for several more years. The company goes bankrupt and those shares become worthless. Jake had a large gain on the shares he sold earlier—and took a loss on the shares that became worthless. Did investing in the d shares result in a capital gain or loss for Jake? Explain using the algebraic expressions you created in parts a–d. See margin.

15. Ahmad sold 125 shares of stock for x dollars that he had purchased for $32.75 per share.
- **a.** How much did he originally pay for the shares of stock? $4,093.75
- **b.** Write an inequality that represents an amount such that Ahmad made money from the sale of the stocks. $x > 4,093.75$
- **c.** Suppose Ahmad lost money on the stocks. Write an inequality that represents an amount such that Ahmad lost no more than $1,000 from the sale of the stocks. $3,093.75 \leq x < 4,093.75$

TEACH

Exercise 10
You could compare this actual gain in Coca-Cola stock to investing $39 in a savings account for 5 years.

Exercise 14
In certain multistep problems, answers to certain parts depend on answers to previous parts. If a student has an incorrect answer, see if it is correct based on the previous answer so you can isolate the part that the student did incorrectly.

ANSWERS

14e. There was a gain, because the selling price of the first half of the shares was $1.2dx$, and the original purchase price of all d shares was dx. $1.2dx - dx = 0.2dx$, which represents a capital gain.

The bad news is time flies. The good news is you're the pilot.
Michael Althsuler, Businessman

1-7 Stock Transaction Fees

Objectives

- Compute the fees involved in buying and selling stocks.
- Become familiar with the basic vocabulary of stock trading.

Key Terms

- **stockbroker**
- **broker fee**
- **commission**
- **discount broker**
- **at the market**
- **limit order**
- **net proceeds**

EXAMINE THE QUESTION

Since the first shares of stock were traded on Wall Street in the 1700s, stock trades took place by stockbrokers meeting face to face. The Internet has drastically changed this.

How do you buy and sell stock?

You don't buy stock at a store. Shares of stock can only be purchased through a licensed **stockbroker**. If you decided to sell your shares, you couldn't bring them to school and sell them to someone in the cafeteria. You also cannot walk into a stock exchange to sell your shares. Only stockbrokers buy and sell stocks. They also give advice to investors. For their services, stockbrokers charge a broker fee. The **broker fee** can be a flat fee, which does not depend on the value of the transaction, or a commission, which does depend on the value of the transaction. A **commission** is a percentage of the value of the stock trade.

Some people make their own investment decisions. They read the financial newspapers and websites to learn about new developments in the stock market. They still must buy and sell through brokers, but they may decide to use a discount broker. **Discount brokers** charge low fees. They do not give investment advice. They only make stock transactions. Discount brokers are available online, by phone, and in person. An online trading account is convenient because the investor can access it 24 hours a day.

If you buy or sell **at the market**, you are instructing your broker to get the best available price. You can also place a **limit order**, which specifies the price you want to pay. If you put in a limit order to buy a stock only for a specific price, your broker will not make a purchase for any price higher than the price specified.

The fees you pay brokers when buying or selling stock affect the amount you gain or lose on the trade. Your **net proceeds** represent the amount of money you make after broker fees are subtracted. Make sure you are aware of the broker fees whenever you make a stock trade.

Skills and Strategies

To compute the actual gain or loss for a given stock trade, you need to include the broker fees in your calculations.

EXAMPLE 1

Lee made two trades through his online discount broker, We-Trade. We-Trade charges a fee of $12 per trade. Lee's first purchase was for $3,456 and his second purchase, later in the day, was for $2,000. How much did he spend on the day's purchases, including broker fees?

SOLUTION Lee made two trades. He paid two broker fees.

Fee × Number of trades $(2)(\$12) = 24$

Lee paid $24 in broker fees. Next, find the sum of his purchases.

Add amount of both trades. $3{,}456 + 2{,}000 = 5{,}456$

The purchase price of the stock was $5,456. Find the total spent.

Fee + Total purchase price $5{,}456 + 24 = 5{,}480$

Lee spent $5,480 on the trades using his online discount broker.

CHECK YOUR UNDERSTANDING

Garret made two trades in one day with his discount broker that charges $7 per trade. Garret's first purchase was for $1,790 and his second purchase was for $8,456. How much did he spend including broker fees?

EXAMPLE 2

Adriana purchased $7,000 worth of stock from a broker at Tenser Brokerage. The current value of Adriana's portfolio is $11,567. What broker fee must she pay?

Tenser Brokerage Fee Schedule	Online Trades	Automated Telephone Trades	Trades Using a Broker
Portfolio value less than $250,000	$15 per trade	Online fee plus $9.50	0.5% commission plus online fee
Portfolio value greater than $250,000	$12 per trade	Online fee plus $9.50	0.4% commission plus online fee

SOLUTION Adriana's fees are in the first row because her portfolio is under $250,000. She is using a broker, so use the fees in the last column. First, multiply the percent expressed as an equivalent decimal by the amount of stock and add $15.

$$(0.005)(7{,}000) + 15 = 50$$

The total broker fee is $50.

CHECK YOUR UNDERSTANDING

Jared has a portfolio worth $500,000. He made 10 telephone trades during the past year, buying and selling $50,000 worth of stock. What was his total broker fee for the year? Express his total broker fee algebraically if Jared had made b automated telephone trades.

EXAMPLE 1

An alternative method to calculate the total for the day's purchase is to add the broker fee to each purchase price before adding to find the total.

$\$3{,}456 + \$12 = \$3{,}468$
$\$2{,}000 + \$12 = \$2{,}012$
$\$3{,}468 + \$2{,}012 = \$5{,}480$

CHECK YOUR UNDERSTANDING

Answer $10,260

The total broker fee is $14 because there were two trades.

EXAMPLE 2

Students often experience difficulty when changing percents that are not whole numbers into decimals. Review this and give examples on the board.

Point out the percent given is a decimal percent. In this case, the percent has been changed to a decimal with three zeros between the decimal point and the non-zero digit. These zeros impact the placement of the decimal point in the product.

CHECK YOUR UNDERSTANDING

Answer $215 and 21.50b$

EXAMPLE 3

Erin purchased $23,510 worth of stock and paid her broker a 1% broker fee. She sold when the stock price increased to $27,300, and used a discount broker who charged $21 per trade. Compute her net proceeds.

SOLUTION Find the purchase cost.

$$\begin{aligned}\text{Purchase cost} &= \text{Cost of stock} + \text{Broker fee}\\ &= 23{,}510 + (0.01)(23{,}510) = 23{,}745.10\end{aligned}$$

When Erin sold the stock, the broker's fee was deducted from the sale price. Find Erin's sale proceeds.

$$\begin{aligned}\text{Sale proceeds} &= \text{Sale price of stock} - \text{Broker fee}\\ &= 27{,}300 - 21 = 27{,}279\end{aligned}$$

The net proceeds is the difference between the purchase cost and the amount she received from her broker.

$$\begin{aligned}\text{Net proceeds} &= \text{Sale proceeds} - \text{Purchase cost}\\ &= 27{,}279 - 23{,}745.10 = 3{,}533.90\end{aligned}$$

Erin's net proceeds were $3,533.90.

CHECK YOUR UNDERSTANDING

Yolanda purchased stock for $7,000 and paid a 1.5% broker fee. She sold it for $6,325 and paid a 0.5% broker fee. Compute her net proceeds.

EXAMPLE 4

Johan purchased stock six years ago for x dollars and paid a 2% broker fee. He sold that stock yesterday for y dollars and paid a discount broker $35 for the sale. Express his net proceeds algebraically.

SOLUTION The purchase cost is the sum of the cost and the broker fee.

$$\begin{aligned}\text{Purchase cost} &= \text{Cost of stock} + \text{Broker fee}\\ &= x + 0.02x\end{aligned}$$

When the stock was sold, the broker fee was $35. The sale proceeds is the difference of the sale price and the broker fee.

$$\begin{aligned}\text{Sale proceeds} &= \text{Sale price of stock} - \text{Broker fee}\\ &= y - 35\end{aligned}$$

The net proceeds is the difference between the purchase cost and the amount spent.

$$\begin{aligned}\text{Net proceeds} &= \text{Sale proceeds} - \text{Purchase cost}\\ &= (y - 35) - (x + 0.02x)\end{aligned}$$

Simplify. The net proceeds are $y - 35 - 1.02x$.

CHECK YOUR UNDERSTANDING

Rob purchased stock for p dollars and paid a flat $40 broker fee. Rob needed money for a home improvement so he sold it at a loss, for h dollars, plus a 1% broker fee. Express his net proceeds algebraically.

EXAMPLE 3

Remind students that you do not have to sell the stock through the same broker with whom you bought it.

CLASS DISSCUSSION

Why might an investor sell a stock using a different broker than the broker from whom it was purchased?

CHECK YOUR UNDERSTANDING

Answer –$811.63

The net proceeds are negative.

EXAMPLE 4

Students may have their answers in different forms. Have students offer different, but equivalent answers. The commutative property shows the following are all acceptable answers.

$y - 35 - 1.02x$
$y - 1.02x - 35$
$-1.02x + y - 35$
$-1.02x - 35 + y$
$-35 - 1.02x + y$
$-35 + y - 1.02x$

CHECK YOUR UNDERSTANDING

Answer $(h - 0.01h) - (p + 40)$
This is equivalent to $0.99h - p - 40$.

Applications

The bad news is time flies. The good news is you're the pilot.
Michael Althsuler, Businessman

1. How do those words apply to an investor? How do those words apply to a stockbroker? See margin.

2. Carlos does his online trading with Super Trade. Super Trade's rates are listed in the table below.

Fee Schedule for Super Trade Discount Broker	Online Trades	Automated Telephone Trades	Telephone to a Live Broker
less than 100 trades per year	\$17 per trade	Online fee plus \$11	$\frac{3}{4}$% commission plus online fee
100 or more trades per year	\$17 per trade for the first 100 trades, \$14 per trade for trades over 100	Online fee plus \$11	$\frac{1}{2}$% commission plus online fee

a. If Carlos makes three dozen online trades in a year, what is the total of his broker fees? \$612
b. What is the cost of 99 online trades? \$1,683
c. What is the cost of 120 online trades? \$1,980
d. If he makes t online trades in a year, and $t > 100$, express the total of his broker fees algebraically. $14(t - 100) + 1{,}700$
e. Suppose Carlos made q online trades and t automated telephone trades last year, where $q + t < 100$. Express the cost of all the trades algebraically. $17q + 28t$
f. Suppose Carlos makes 20 trades in a year. If Carlos purchased x shares of stock for y dollars each using a phone call to a live broker, express the total broker fee algebraically. $0.0075xy + 340$

3. The ticker shows trades of stock in Hewlett-Packard (HPQ), Exxon-Mobil (XOM), and Chevron (CVX).

HPQ 6K47.29 ▼ 0.23 XOM 3K92.67 ▲ 0.08 CVX 9K100.38 ▼ 0.22

a. How many shares of Hewlett-Packard were sold? 6,000
b. What was the total value of all the HPQ shares sold? \$283,740
c. Joan bought the shares at this price, and her broker charged her 1% commission. What was the total cost of her investment? \$286,577.40
d. Reggie sold the shares of Exxon-Mobil shown in the above trade, and his broker charged him 1.5% commission. How much money did the broker receive? Round to the nearest cent. \$4,170.15
e. Lisa sold the shares of Chevron indicated above through her discount broker, who charges \$28 per transaction. How much money did Lisa receive from the above sale after the broker took his fee? \$903,392

TEACH

Effect of Fees
Remind students that the fees associated with buying and selling stocks will always reduce the net gain, or increase the loss.

Fractions to Decimals
Look for students who might have difficulty changing fractional percents to equivalent decimals. A classic error is, for example, $\frac{3}{4}\% = 0.75$.

Exercise 2
This problem starts out numerically, and bridges to an algebraic representation. This is common throughout the book, and uses the strategy "solve a simpler, similar problem." It is important for students to realize that they can substitute numbers and think arithmetically to form algebraic expressions.

ANSWERS

1. The investor and the stockbroker are each in control of their decisions. Investors can make a decision to seek the investment advice of a stockbroker, or make their own decisions on which stocks to buy and sell.

TEACH

Exercise 8

Be alert for equivalent forms of the correct expression. You may want to have students put different equivalent forms on the board so students can compare them. Usually, the scenario of the problem is best exemplified by an expression that is not simplified. Often, the simplified version "masks" what actually happened step-by-step.

Exercise 9

You can have students put their answers on the board and show that they satisfy the problem.

ANSWERS

11. Sample answer: $x = 200$, $y = 1$, $p = 100$, $q = 3$; Ron's commission was 1% of \$200, or \$2. Dave's commission was 3% of \$100, or \$3.

4. Taylor bought 200 shares of stock for \$18.12 per share last year. He paid his broker a flat fee of \$30. He sold the stock this morning for \$21 per share, and paid his broker 0.5% commission.
   a. What were Taylor's net proceeds? \$525
   b. What was his capital gain? \$576

5. Laura bought 55 shares of stock for \$3.50 per share last year. She paid her broker a 1% commission. She sold the stock this week for \$2 per share, and paid her broker a \$10 flat fee.
   a. What were Laura's net proceeds? Round to the nearest cent. –\$94.43
   b. What was her capital gain or loss? –\$82.50, a loss

6. Lenny bought x shares of stock for \$$y$ per share last month. He paid his broker a flat fee of \$20. He sold the stock this month for \$$p$ per share, and paid his broker a 2% commission. Express Lenny's net proceeds algebraically. $(xp - 0.02xp) - (xy + 20)$

7. Mackin Investing charges its customers a 1% commission. The Ross Group, a discount broker, charges \$25 per trade. For what amount of stock would both brokers charge the same commission? \$2,500

8. Fierro Brothers, a discount broker, charges their customers a \$19 flat fee per trade. The Sondo Investment House charges a 2% commission. For what amount of stock would both brokers charge the same commission? \$950

9. Darlene purchases \$20,000 worth of stock on her broker's advice and pays her broker a 1.5% broker fee. She sells her stock when it increases to \$28,600 two years later, and uses a discount broker who charges \$21 per trade. Compute Darlene's net proceeds after the broker fees are taken out. \$8,279

10. Alex purchases x dollars worth of stock on his broker's advice and pays his broker a 1% broker fee. The value of the shares falls to y dollars years later, and Alex uses a broker who charges 1.25% commission to make the sale. Express his net proceeds algebraically. $(y - 0.0125y) - (x + 0.01x)$

11. Ron bought x dollars worth of stock and paid a y percent commission. Dave purchased p dollars worth of stock and paid a q percent commission, where $x > p$. Pick numbers for x, y, p, and q such that Ron's commission is less than Dave's. Answers vary. See margin.

12. Debbie buys 400 shares of stock for \$23 per share, and pays a 1% commission. She sells them six years later for \$23.25 per share, and pays a \$30 flat fee. Are her net proceeds positive or negative? Explain. The net proceeds are negative. The cost of both broker fees exceeded the small gain in price.

13. Sal bought x shares of a stock that sold for \$23.50 per share. He paid a 1% commission on the sale. The total cost of his investment, including the broker fee, was \$3,560.25. How many shares did Sal purchase? 150

Perception is strong and sight is weak. In strategy, it is important to see distant things as if they were close and to take a distanced view of close things.

Miyamoto Musashi, Japanese Samaurai, Artist, and Strategist

Stock Splits 1-8

Key Terms

- stock split
- outstanding shares
- market capitalization or market cap
- traditional stock split
- reverse stock split
- penny stock
- fractional part of a share

Objectives

- Calculate the post-split outstanding shares and share price for a traditional split.
- Calculate the post-split outstanding shares and share price for a reverse split.
- Calculate the fractional value amount that a shareholder receives after a split.

Why do corporations split stocks?

Suppose that someone approaches you to give you two ten-dollar bills in exchange for a twenty-dollar bill. That might appear to be a worthless transaction because the value of the exchanged monies is the same. Having two ten-dollar bills might better suit one party and having a single twenty dollar bill might better suit the other. This is exactly what happens when a corporation offers its shareholders a **stock split**. To understand what happens when stocks split, it is first necessary to understand two important and related terms, outstanding shares and market capitalization. **Outstanding shares** are the total number of all shares issued by a corporation that are in investors' hands. **Market capitalization**, or **market cap**, is the total value of all of a company's outstanding shares.

When a stock is split, a corporation changes the number of outstanding shares while at the same time adjusts the price per share so that the market cap remains unchanged. In the opening situation, the number of bills doubled, while the value of each bill was halved. The total value of twenty dollars remained unchanged.

Why would a corporation institute a split if it is a monetary non-event? Many say that the reason is *perception*. The psychology of a split depends on the type of split. In a **traditional stock split**, the value of a share and the number of shares are changed in such a proportional way that the value decreases as the number of shares increases while the market cap remains the same. These types of splits are announced in the form *a* for *b* where *a* is greater than *b*. For example, one of the most common traditional splits is the 2-for-1 split. The investor gets two shares for every one share held while the price per share is cut in half. Although nothing has changed in the market value of the shares, the perception is that the investor sees the stock as more affordable. Investors may be attracted to this stock because the market price per share has been lowered, and they can afford to buy more shares.

In a **reverse stock split**, the effect is just the opposite. The number of outstanding shares is reduced and the market price per share is increased. As the price per share increases, the investor perceives

EXAMINE THE QUESTION

Stock splits have been occurring for decades. IBM had its first split in 1926. Caterpillar had two splits in the same year, 1926. Disney has had seven splits in its history.

One reason for a split might be that the stock price has gotten too high and therefore out priced itself in the market. The other reason is that the stock price has gotten too low and appears to be a worthless investment.

CLASS DISCUSSION

How do you think the perception of change might lead to an increase in sales and market prices?

that the stock is worth more. This often happens to stocks known as **penny stocks**, whose value is less than $5 per share. To increase the perceived value, the corporation may increase the price per share while at the same time decreasing the number of shares outstanding. This type of split is also in the form *a* for *b* where *a* is less than *b*. For example, in a 1-for-2 split, the investor holding shares would now own one share for every two previously held. The price for that share would have doubled. The market capitalization remains the same.

The saying "perception is reality" holds true for the stock market. Although stock splits may not initially alter the value of shares held, the perception of change may lead to increases in sales and market prices.

Skills and Strategies

Here you will learn how to interpret and calculate stock splits.

EXAMPLE 1

On December 4, John Deere Corporation (DE) instituted a 2-for-1 stock split. Before the split, the market share price was $87.68 per share and the corporation had 1.2 billion shares outstanding. What was the pre-split market cap for John Deere?

SOLUTION The market cap before the split is determined by multiplying the number of outstanding shares by the market price at that time.

$$\begin{aligned}\text{Pre-split market cap} &= \text{Number of shares} \times \text{Market price}\\ &= 1{,}200{,}000{,}000 \times 87.68\\ &= 105{,}216{,}000{,}000\end{aligned}$$

The pre-split market cap is $105,216,000,000.

CHECK YOUR UNDERSTANDING

A corporation has a market capitalization of $24,000,000,000 with 250M outstanding shares. Calculate the price per share.

EXAMPLE 2

What was the post-split number of shares outstanding for John Deere?

SOLUTION Use a proportion to determine the number of outstanding shares available after the split. Let x be the post-split outstanding shares.

$\frac{\text{Post-split}}{\text{Pre-split}}$	$\frac{2}{1} = \frac{x}{1.2}$
Cross multiply.	$x = 2 \times 1.2$

After the split, there will be 2.4B shares outstanding.

CHECK YOUR UNDERSTANDING

QualComm, Inc. instituted a 4-for-1 split in November. After the split, Elena owned 12,800 shares. How many shares had she owned before the split?

TEACH

Students use fractions, ratios, and proportions to interpret and calculate the effect that stock splits have on the market and an individual's investment.

EXAMPLE 1

The pre-split market capitalization is the value of all of the shares at the time right before the split is enacted.

CHECK YOUR UNDERSTANDING

Answer $96

Let C represent pre-split market cap, N represent number of shares outstanding, and P represent market price at the time of split. The pre-split market cap formula is $C = NP$. Students are given $C = \$24\text{B}$ and $N = 250\text{M}$. Solving for P; $P = \frac{C}{N}$.

EXAMPLE 2

Use a proportion. Students can set up ratios in the form of post-split/pre-split to determine the number of shares in either situation. Knowing that the split ratio is 2 to 1, the proportion is $\frac{2}{1} = \frac{x}{1.2}$ where 1.2 represents 1.2 billion shares. Impress upon students that the answer must make sense in the context of the problem. Because every shareholder gets 2 shares for every one share held, it makes sense that the post-split number of shares should be twice the pre-split number of shares for individual holdings and for the number of shares.

CHECK YOUR UNDERSTANDING

Answer 3,200

Let x represent the number of shares Elena owned prior to the split. The proportion is $\frac{4}{1} = \frac{12.800}{x}$

EXAMPLE 3

What was the post-split market price per share for John Deere in Example 1? How many shares are outstanding? Did the market cap change after the split?

SOLUTION This was a 2-for-1 stock split, so the new share price is $\frac{1}{2}$ the old share price.

$$\frac{1}{2} \times 87.68 = \$43.84$$

In a 2-for-1 split the number of shares are doubled, so there are now

$$2 \times 1.2 = 2.4\text{B shares}$$

The post-split market cap is $\$43.84 \times 2.4\text{B} = \$105{,}216{,}000{,}000$, which is the same as it was before.

CHECK YOUR UNDERSTANDING

In October, Johnson Controls, Inc instituted a 3-for-1 split. After the split, the price of one share was $39.24. What was the pre-split price per share?

Post-Split Market Price and Number of Outstanding Shares

In general, in any *a*-for-*b* split, you can apply the following formulas.

$$\text{Post-split number of shares} = \frac{a}{b} \times \text{Pre-split number of shares}$$

$$\text{Post-split share price} = \frac{b}{a} \times \text{Pre-split share price}$$

EXAMPLE 4

On October 15, Palm, Inc. instituted a 1-for-20 reverse stock split. Before the split, the market share price was $0.64 and there were 580,000,000 shares. What was the post-split share price and number of shares?

SOLUTION Write the 1-for-20 reverse stock split as the ratio $\frac{1}{20}$.

$$\text{Post-split number of shares} = \frac{a}{b} \times \text{Pre-split number of shares}$$

$$= \frac{1}{20} \times 580{,}000{,}000 = 29{,}000{,}000$$

$$\text{Post-split share price} = \frac{b}{a} \times \text{Pre-split share price}$$

$$= \frac{20}{1} \times 0.64 = 12.80$$

After the split, there were 29M shares outstanding with each share having a value of $12.80. Notice that the pre-split market cap, $580\text{M} \times \$0.64$, and the post-split market cap, $29\text{M} \times \$12.80$, both equal $371,200,000.

EXAMPLE 3

The solution walks students through the process without using a proportion. In a 2-for-1 split, the number of shares is doubled and the price per share is cut in half. Find the product of twice the number of shares and half the pre-split price per share. This yields the post-split market cap. Notice the value of the shares outstanding remains exactly the same as before the split.

CHECK YOUR UNDERSTANDING

Answer $117.72

EXAMPLE 4

The formulas given before Example 4 are alternate forms of the following proportions.

$$\frac{\textit{Post-split number of shares}}{\textit{Pre-split number of shares}} = \frac{a}{b}$$

$$\frac{\textit{Post-split number of shares}}{\textit{Pre-split number of shares}} = \frac{b}{a}$$

Point out that in both proportions, multiplying both sides of the equation by the pre-split value in the denominator yields the formulas given.

CHECK YOUR UNDERSTANDING

A major drugstore chain whose stocks are traded on the New York Stock Exchange was considering a 2-for-5 reverse split. If the pre-split market cap was 1.71B, what would the post-split market cap be?

CHECK YOUR UNDERSTANDING

Answer $1.71B

Students might be tempted to use formulas here. They should be encouraged to read the question carefully. Understanding that a split is a monetary non-event means that the pre-split and the post-split market caps must be the same.

EXTEND YOUR UNDERSTANDING

Suppose that before a stock split, a share was selling for $2.35. After the stock split, the price was $7.05 per share. What was the stock-split ratio?

EXTEND YOUR UNDERSTANDING

Answer 1-for-3 split ratio

Students should be encouraged to use the proportion $\frac{\textit{Post-split number of shares}}{\textit{Pre-split number of shares}} = \frac{b}{a}$ where $\frac{7.05}{2.35} = \frac{b}{a}$. Simplifying the ratio on the left yields $\frac{3}{1} = \frac{b}{a}$. So, $a = 1$ and $b = 3$. Therefore, these prices represent a-for-b or a 1-for-3 split.

Fractional Part of a Share

The previous examples had shares that could be split into whole-number amounts. In reality, this may not be the case. Often the split would create a **fractional part of a share**. In other words, there is less than one share remaining. When this happens, the corporation buys the fractional share at the current market price.

EXAMPLE 5

Steve owned 942 shares of Graham Corporation. On January 3, a 5-for-4 split was announced. The stock was selling at $56 per share before the split. How was Steve financially affected by the split?

SOLUTION Write the split as a ratio. Use the pre-split information to find the post-split values.

$$\text{Post-split number of shares} = \frac{a}{b} \times \text{Pre-split number of shares}$$
$$= \frac{5}{4} \times 942 = 1{,}177.5$$

$$\text{Post-split share price} = \frac{b}{a} \times \text{Pre-split share price}$$
$$= \frac{4}{5} \times 56 = 44.80$$

Fractional shares are not traded, so the corporation paid him the market value of 0.5 shares.

Fractional part × Market price $\quad 0.5 \times 44.80 = 22.40$

Steve received $22.40 in cash and 1,177 shares worth $44.80 each.

EXAMPLE 6

First determine the post-split number of shares and the post-split share price using either the proportions or the formulas. Students should understand that all share amounts are rounded down to the nearest whole number of shares. The fractional part that remains is multiplied by the post-split price and that amount is refunded to the shareholder.

CHECK YOUR UNDERSTANDING

Gabriella owned 1,045 shares of Hollow Corporation at a price of $62.79. The stock split 3-for-2. How was Gabriella financially affected by the split?

CHECK YOUR UNDERSTANDING

Answer Gabriella will receive 1,567 shares and be refunded for the overage of 0.5 shares.

This is a multi-step problem. Students need to calculate the post-split price per share and the number of shares. Mathematically, the post-split number of shares is 1,567.5. In actuality, the refund is calculated by multiplying 0.5 by the post-split price per share ($0.5 \times 41.86 = \$20.93$).

Applications

Perception is strong and sight is weak. In strategy, it is important to see distant things as if they were close and to take a distanced view of close things.

Miyamoto Musashi, Japanese Samaurai, Artist, and Strategist

1. Why should investors be cautious when a split occurs? How might those words apply to what you have learned? See margin.

2. In February, Robbins and Myers, Inc. executed a 2-for-1 split. Janine had 470 shares before the split. Each share was worth $69.48.
- **a.** How many shares did she hold after the split? 940
- **b.** What was the post-split price per share? $34.74
- **c.** Show that the split was a monetary non-event for Janine. Pre-split and post-split shares were both worth $32,655.60.

3. On June 5, CIGNA instituted a 3-for-1 stock split. Before the split, CIGNA had 200 million shares with a price of $168 per share.
- **a.** How many shares were outstanding after the split? 600M
- **b.** What was the post-split price per share? $56
- **c.** Show that this split was a monetary non-event for the corporation. Pre-split and post-split market caps both were $33,600M.

4. Vilma owns 750 shares of Aeropostale. On August 22, the corporation instituted a 3-for-2 stock split. Before the split, each share was worth $34.89.
- **a.** How many shares did Vilma hold after the split? 1,125
- **b.** What was the post-price per share after the split? $23.26
- **c.** Show that the split was a monetary non-event for Vilma. Pre-split and post-split shares both were worth $26,167.50.

5. Mike owns 2,400 shares of JDS Uniphase Corp. The company instituted a 1-for-8 reverse stock split on October 17. The pre-split market price per share was $2.13.
- **a.** How many shares did Mike hold after the split? 300
- **b.** What was the post-split price per share? $17.04
- **c.** Show that the split was a monetary non-event for Mike. Pre-split and post-split shares both were worth $5,112.

6. Versant Corporation executed a 1-for-10 reverse split on August 22. At the time, the corporation had 35,608,800 shares outstanding and the pre-split price per share was $0.41.
- **a.** How many shares were outstanding after the split? 3,560,880
- **b.** What was the post-price per share after the split? $4.10
- **c.** Show that this split was a monetary non-event for the corporation. Pre-split and post-split market caps both were $14,599,608.

7. Kristy owns 200 shares of Nortel stock. On November 30 the company instituted a 1-for-10 reverse split. The pre-split price per share was $2.15. The number of shares outstanding before the split was 4.34B.
- **a.** How many shares did Kristy hold after the split? 20
- **b.** What was the post-split price per share? $21.50
- **c.** What was the post-split number of outstanding shares? 434M
- **d.** What was the post-split market cap? $9.331B

TEACH

Exercises 2 and 3

Some students may need to solve these problems using a proportion while others may be able to calculate the solution through simple multiplication. Both methods are valid and should be addressed when reviewing the solutions.

Exercise 4

Stock splits that do not contain a 1 in the denominator are often difficult for students to understand. In this case, the stock holder gets 3 shares for every two shares owned. In reviewing the problem, you might show the equivalence of this situation and the split of 1.5 to 1.

Exercises 5–7

Before assigning these problems, make sure that students have an understanding of the reverse split. In particular, what such a split does to the number of shares held and what it does to the price per share.

ANSWERS

1. Musashi urges people to "see distant things as if they are close and take a close view of distant things." In other words, be cautious because things may not always appear to be what they really are. Perception changes reality.

TEACH

Exercises 11 and 12
Encourage students to try both methods when solving these problems. You should address both methods when reviewing the assignment.

ANSWERS

8. Post-split price per share = $\frac{\$203.8}{4} = \$50.95$; post-split outstanding shares = $4 \times 22{,}676{,}800 = 90{,}707{,}200$

10a. Post-split share price = $\frac{5}{6} \times 18 = \$15$; post-split outstanding shares = $\frac{6}{5} \times 4{,}800{,}000 = 5{,}760{,}000$

Jon noticed that most traditional splits are in the form *x*-for-1. He says that in those cases, all you need do is multiply the number of shares held by *x* and divide the price per share by *x* to get the post-split numbers. Answer Exercises 8–9 based on Jon's method.

8. Verify that Jon's method works to determine the post-split price and shares outstanding for Hansen Natural Corporation which executed a 4-for-1 split on July 10 with 22,676,800 outstanding shares and a market price of $203.80 per share before the split. See margin.

9. Jon also noticed that *every* traditional split ratio can be written in the form *x*-for-1. Examine how the 3-for-2 traditional split can be expressed as 1.5-for-1.

$$\frac{3}{2} = \frac{x}{1} \rightarrow 3 = 2x \rightarrow x = 1.5$$

Express each of the following traditional split ratios as *x*-for-1.

a. 5-for-4 1.25-for-1
b. 6-for-5 1.2-for-1
c. 5-for-2 2.5-for-1
d. 8-for-5 1.6-for-1

10. Monarch Financial Holdings, Inc. executed a 6-for-5 traditional split on October 5. Before the split there were approximately 4,800,000 shares outstanding, each at a share price of $18.00.

a. Use the method outlined in Examples 2 and 3 on pages 46 and 47 to determine the post-split share price and number of shares outstanding. See margin.

b. Compare the results from part a. with that obtained by using Jon's method. Jon's method says that 6-for-5 is the same as 1.2-for-1. The post-split values are the same.

11. On June 19 California Pizza Kitchen, Inc. instituted a 3-for-2 split. At that time Krista owned 205 shares of that stock. The price per share was $33.99. After the split, Krista received a check for a fractional part of a share. What was the amount of that check? $11.33

12. On December 14, XTO Energy, Inc. executed a 5-for-4 split. At that time, Bill owned 325 shares of that stock. The price per share was $65.80. After the split he received a check for a fractional part of a share. What was the amount of that check? $13.16

Use the following spreadsheet to answer Exercises 13–15. The split-ratio is entered in cells B2 and C2. For example, the ratio of 2-for-1 would be entered as a 2 in B2 and a 1 in C2. The number of pre-split shares is entered in B3 and the pre-split price is entered in B4.

13. Write the spreadsheet formula that will calculate the post-split number of outstanding shares in C3. =B2/C2*B3

14. Write the spreadsheet formula that will calculate the post-split price per share in C4. =C2/B2*B4

15. Write the pre-split market cap formula in cell B5 and the post-split market cap formula in C5. =B4*B3; =C4*C3

	A	B	C
1		**Pre-split**	**Post-split**
2	Split ratio	2	1
3	Outstanding shares		
4	Price per share		
5	Market cap		

I believe non-dividend stocks aren't much more than baseball cards. They are worth what you can convince someone to pay for them.

Mark Cuban, Billionaire businessman

Dividend Income 1-9

Key Terms

- dividend
- dividend income
- income stock
- yield
- growth stock
- preferred stock
- common stock
- corporate bond
- face value
- matures

Objectives

- Understand the concept of shareowners splitting the profit of the corporation they own.
- Compute dividend income.
- Compute the yield for a given stock.
- Compute the interest earned on corporate bonds.

If shareholders own a corporation, are they entitled to some of the profits?

If you buy a stock and watch its price rise, it's exciting, but your profit is only realized when you actually sell it. Keep in mind that capital gains and net proceeds cannot be computed and are not assured until the stock is actually sold. However, your stock portfolio can earn income before you sell your shares. Remember, a shareholder is an owner of a corporation. As owners, shareholders are entitled to their portions of the corporation's profit. Profit split among shareholders is called a **dividend**. Money received from dividends is **dividend income**. Dividends are usually paid annually or quarterly. The board of directors of the corporation sets the dividend for one share of stock. For major public corporations this can be found under a column headed "Div" in newspaper or online stock tables. Your total dividend depends on the number of shares you own. Some corporations do not pay a dividend because the profit is being used to improve or grow the corporation. Some corporations do not pay a dividend because they have no profit. They are operating at a loss. Stocks that pay dividends are called **income stocks**, because they provide their owners with income.

Some people buy income stocks which pay dividends for the additional income. The **yield** of a stock is the percentage value of the dividend, compared to the current price per share. Investors use the yield to compare their dividend income to the interest they could have made if they put the money in the bank instead of buying the stock. Other investors are not concerned with dividend income. Instead, they want to buy low and sell high. Stocks that are bought for this reason are called **growth stocks**. A stock can be both an income and a growth stock.

Stocks are also classified as **preferred stock** or **common stock**. Preferred stockholders receive their dividends before common stockholders do, and they usually receive a set dividend which does not frequently change. Common stockholders receive dividends only when the board of directors elects to issue these dividends. Additionally, if a company goes out of business, preferred stockholders are entitled to assets and earnings of the company, ahead of common stockholders.

EXAMINE THE QUESTION

When you own shares of stock in a corporation you can receive a dividend check. That dividend check is your part of the profit, but depending on the corporation and the number of shares you own, the check may only be a few cents.

Have students research the history of dividend checks for major corporations. Some corporations issue quarterly dividends, some issue annual dividends, while some do not issue any dividends.

CLASS DISCUSSION

Corporations reinvest part of their profits into new products and services. Do you think this is a good business strategy?

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Dividend payments are mailed to shareholders or electronically transferred to their accounts. Dividend payments can range in value from a few cents to thousands of dollars, because they depend on how much the dividend is and how many shares are owned. Remember that dividends are not guaranteed and can be cut or eliminated if the company decides they need the money. Although, most companies do not like to cut dividends and disappoint shareholders.

Skills and Strategies

If your stock pays a dividend, you want to make sure the amount you are receiving is correct. You also want to be aware of how dividend income compares to the bank interest you could have made if you decided to put the money in the bank instead of buying the stock.

EXAMPLE 1

Roberta is considering purchasing a common stock that pays an annual dividend of $2.13 per share. If she purchases 700 shares for $45.16 per share, what would her annual income be from dividends?

SOLUTION The price paid per share is not needed to compute the annual dividend. To find the annual income from dividends, multiply the number of shares by the annual dividend per share.

$$\text{Income from dividends} = \text{Number of shares} \times \text{Dividend per share}$$
$$= 700 \times 2.13 = 1{,}491$$

The annual income from dividends is $1,491.

CHECK YOUR UNDERSTANDING

Jacques purchased x shares of a corporation that pays a y dollar annual dividend. What is his annual dividend income, expressed algebraically?

EXAMPLE 2

Elyse owns 2,000 shares of a corporation that pays a quarterly dividend of $0.51 per share. How much should she expect to receive in a year?

SOLUTION First, compute her quarterly dividend by multiplying the total number of shares by the quarterly dividend per share.

$$\text{Income from dividends} = \text{Number of shares} \times \text{Dividend per share}$$
$$= 2{,}000 \times 0.51 = 1{,}020$$

To find the amount she should expect to receive in a year, multiply by 4.

$$1{,}020 \times 4 = 4{,}080$$

Elyse should receive $4,080 in a year.

TEACH

When calculating the profit and yield of stocks, students use basic operations and percents to interpret how much, if any amount, an investor will receive in dividends.

EXAMPLE 1

The Div column reports the annual dividend per share. Students should understand that an annual report gives data from a previous year and does not guarantee that owning that stock will yield the results every year.

CHECK YOUR UNDERSTANDING

Answer xy

Point out the importance of the word *annually*. Throughout the lesson, students will have to deal with variations on annual and quarterly dividends, so reading carefully is important.

CHECK YOUR UNDERSTANDING

Monique owns x shares of stock. The quarterly dividend per share is y dollars. Express Monique's annual dividend amount algebraically.

Yield

To find the yield of a stock, write the ratio of the annual dividend per share to the current price of the stock per share and convert to a percent. A yield can change even when a dividend amount does not because the price of the stock changes frequently.

EXAMPLE 3

Kristen owns common stock in Max's Toy Den. The annual dividend is \$1.40. The current price is \$57.40 per share. What is the yield of the stock to the nearest tenth of a percent?

SOLUTION Write the yield as a fraction. Then convert the fraction to a decimal. Finally write the decimal as a percent.

$$\text{Yield} = \frac{\text{Annual dividend per share}}{\text{Current price of one share}}$$

$$= \frac{1.40}{57.40} \approx 0.0243902, \text{ or } 2.4390\%$$

The yield is about 2.4%.

CHECK YOUR UNDERSTANDING

You bought x shares of a stock for \$$y$ per share. The annual dividend per share is \$$d$. Express the percent yield algebraically.

EXAMPLE 4

One share of BeepCo preferred stock pays an annual dividend of \$1.20. Today BeepCo closed at \$34.50 with a net change of –\$0.50. What was the stock's yield at yesterday's closing price?

SOLUTION Use today's close and the net change to find yesterday's close.

Today's close + Opposite of net change $\quad 34.50 - (-0.50) = 35$

Yesterday's close was \$35.00.

$$\text{Yield} = \frac{1.20}{35}$$

$$\approx 0.03429, \text{ or } 3.4\%$$

At yesterday's close, the yield was about 3.4%.

CHECK YOUR UNDERSTANDING

One share of Skroy Corporation stock pays an annual dividend of \$1.55. Today Skroy closed at x dollars with a net change of +0.40. Express the yield at yesterday's close algebraically.

CHECK YOUR UNDERSTANDING

Answer $4xy$

EXAMPLE 3

In stock data reports, yield is usually rounded to 1 or 2 decimal places. Instruct students to convert to a percent and then round to the nearest tenth or hundredth of a percent.

CHECK YOUR UNDERSTANDING

Answer $100\frac{d}{y}$

Remind students about multiplication by 100 to convert the decimal to an equivalent percent.

EXAMPLE 4

This reviews how the net change is used to compute a previous day's close.

CHECK YOUR UNDERSTANDING

Answer $100\frac{1.55}{x - 0.4C}$

Make sure students notice they are asked for yesterday's yield. If a student has an error, check the denominator used.

EXAMPLE 2

Guide students to understand that fractions of a penny cannot be on a dividend check. Amounts are rounded down to the nearest cent.

EXAMPLE 5

Point out that when a stock splits, the yield does not change, because the price of a share and the dividend are both divided by the same number.

CHECK YOUR UNDERSTANDING

Answer $1.40

This problem reviews skills learned about stock splits.

EXAMPLE 6

Point out to students that Adam will be paid interest each year that the bond is held. This means that the Labate Corporation pays Adam $57 to use his $1,000 for one year. You can remind students that multiplying by a power of 10 can be more easily done by moving the decimal point. In this case multiplying by 1,000 is the same as moving the decimal point in the rate (written as a decimal) to the right 3 places.

CHECK YOUR UNDERSTANDING

Answer $627

EXAMPLE 5

A stock paid an annual dividend of $2.14. The stock split 2-for-1. What is the annual dividend after the split?

SOLUTION After a 2-for-1 split, there are twice as many shares outstanding, so divide the dividend by 2: $2.14 \div 2 = 1.07$. The new annual dividend per share is $1.07.

CHECK YOUR UNDERSTANDING

A corporation was paying a $2.10 annual dividend. The stock underwent a 3-for-2 split. What is the new annual dividend per share?

Corporate Bonds

Buying stock has risk and rewards. If you do not want to take a significant risk, you can invest in corporate bonds. A **corporate bond** is a loan to a corporation. The corporation agrees to pay the bondholder back with interest, much like a bank does to customer with money on deposit. The interest is usually paid annually or semiannually. Usually, corporate bonds are for $1,000 or $5,000. This amount is the **face value** and is the amount paid when the bond **matures**. Bondholders do not share in any profits, and they do not own part of the corporation. Investors that buy bonds enjoy less risk and have less potential rewards.

The maturity date of a bond is a date in the future when the principal invested will be repaid to the investor The time to maturity can be a short period or as long as 30 years. Upon maturity, an investor will receive the amount originally invested back from the corporation. Bonds that take longer to mature generally pay a higher interest rate.

EXAMPLE 6

Adam bought a $1,000 corporate bond in the Labate Corporation. The bond pays 5.7% interest per year. How much does Adam receive in interest each year from this bond?

SOLUTION To find the annual interest, first convert the percent to an equivalent decimal.

$$5.7\% = 0.057$$

Then, multiply the interest expressed as a decimal by the face value.

Multiply interest by 1,000 $0.057 \times 1{,}000 = 57$

Adam receives $57 in annual interest.

CHECK YOUR UNDERSTANDING

If Adam holds the bond from Example 6 for 11 years, how much will he receive in total interest?

Applications

I believe non-dividend stocks aren't much more than baseball cards. They are worth what you can convince someone to pay for them.

Mark Cuban, Billionaire businessman

1. Based on what you learned about dividends, why are non-dividend stocks compared to baseball cards? See margin.

2. Years ago, Home Depot had an annual dividend of \$0.90. If you owned 4,000 shares of Home Depot, how much did you receive annually in dividends? \$3,600

3. Barnes and Noble had a \$1.00 annual dividend during 2008. If you owned 500 shares of Barnes and Noble, how much did you receive on a quarterly dividend check? \$125

4. If you own r shares of a stock with an annual dividend of p dollars, express the amount of your quarterly dividends algebraically. $\frac{rp}{4}$

5. The quarterly dividend for Tiffany, a jewelry company, was \$0.17 during the second quarter of 2008. What was the annual dividend for 2,000 shares? \$1,360

6. Mike owned 3,000 shares of Merck Corporation and received a quarterly dividend check for \$1,140. What was the annual dividend for one share of Merck? \$1.52

7. Jean owned x shares of a corporation and received a quarterly dividend check for y dollars. Express the annual dividend for one share algebraically. $\frac{4y}{x}$

8. The Walt Disney Company paid a \$0.35 annual dividend on a day it closed at a price of \$33.86 per share.
- **a.** What was the annual dividend for 500 shares? \$175
- **b.** What was the quarterly dividend for 500 shares? \$43.75
- **c.** Express the yield as a fraction. See margin.
- **d.** What was the yield to the nearest tenth of a percent? 1.0%

9. You own k shares of a stock that is selling for x dollars per share. The quarterly dividend is y dollars per share.
- **a.** Express the annual dividend for one share algebraically. $4y$
- **b.** Express the annual dividend for all k shares algebraically. $4yk$
- **c.** Express the yield as an algebraic fraction. $\frac{4y}{x}$

10. The spreadsheet on the right can be used to compute the yield. Write the formula that can be used to compute the yield in cell C2. =(B2/A2)*100

	A	B	C
1	**Price per Share**	**Annual Dividend**	**Yield**
2	37.12	1.51	
3	44.55	1.77	
4	65.29	2.01	
5	14.35	0.48	

11. The Black Oyster Corporation is going out of business. All of the corporate assets are being sold. The money raised will be split by the stockholders. Which stockholders, the common or preferred, receive money first? preferred

TEACH

Exercise 9
Remind students that they can "solve a simpler, related problem" using numbers in place of the variables if it helps them sort out what operations to use. Then they can substitute the variables back into their answer.

ANSWERS

1. If a stock does not pay a dividend, you can only make money on it by selling it to someone else for more than you paid. The buyer must be convinced that it is worth what you want for it. This is much like two kids trading baseball cards—you are relying on what another person thinks your item is worth.

8c. $\frac{0.35}{33.86}$

Name	Last Price	Dividend
3M Co	76.90	2.00
Alcoa, Inc	41.57	0.68
American Express Co	46.15	0.72
American International Group, Inc	34.91	0.80
AT&T, Inc	39.51	1.60
Bank of America Corp	33.87	2.56
Boeing Co	82.13	1.60
Caterpillar, Inc.	83.19	1.44
Chevron Corp	100.42	2.60
Citigroup, Inc.	21.60	1.28
Coca-Cola Co/The	57.44	1.52
El Du Pont de Nemours & Co	47.63	1.64
Exxon Mobil Corp	90.43	1.60

For Exercises 12–15, round answers to the nearest tenth of a percent.

12. The table gives the last price and the annual dividend for 15 corporations. Compute the yield for each corporation. See margin.

13. The Revreg Corporation pays an annual dividend of $1.60 per share. On Friday it closed at $44 per share with a net change of +0.35. The dividend did not change.
- **a.** What was the yield on Friday? 3.6%
- **b.** At what price did Revreg close on Thursday? $43.65
- **c.** What was the yield at Thursday's close? 3.7%
- **d.** Thursday's net change was +1.22. At what price did Reverg close on Wednesday? $42.43
- **e.** If the dividend was $1.60 on Wednesday, what was the yield at Wednesday's close? 3.8%
- **f.** Look at the yields for Wednesday, Thursday, and Friday. They are decreasing. Explain why this decrease is not "bad news" to the investor who owns stock in Revreg. See margin.

14. The Zeescore Corporation pays an annual dividend of $2 per share. On Wednesday it closed at $61 per share with a net change of –0.85. The dividend remained at $2 for a year.
- **a.** What was the yield on Wednesday? 3.3%
- **b.** At what price did Zeescore close on Tuesday? $61.85
- **c.** What was the yield on Tuesday? 3.2%
- **d.** Tuesday's net change was –1.96. At what price did Zeescore close on Monday? $63.81
- **e.** What was Monday's yield? 3.1%
- **f.** Look at the yields for Monday, Tuesday, and Wednesday. They are increasing. Explain why this increase is not "good news" to the investor who owns stock in Zeescore. See margin.

15. Sascha owns stock in Lewis Corp and she bought a $1,000 corporate bond. The bond pays 6.34% annual interest.
- **a.** How much will Sascha receive in annual interest? $63.40
- **b.** How much will Sascha receive in interest if she holds the bond for 14 years? $887.60
- **c.** Sascha's stock is worth $46 per share, and it pays a $2 annual dividend. What is the yield? 4.3%
- **d.** Which is higher, the yield on the stock or the interest rate on the bond? bond
- **e.** How much does Lewis Corp. pay to Sascha when the bond matures? $1,000

16. Stock in Happy's Burger Chain was selling for $54.24 per share, and it was paying a $2.46 annual dividend. It underwent a 3-for-1 split.
- **a.** What was the new price of one share after the split? $18.08
- **b.** If you owned 200 shares before the split, how many shares did you own after the split? 600
- **c.** Following the same pattern, what was the annual dividend per share after the split? $0.82

TEACH

Exercise 13b
Look out for students who compute Thursday's closing price incorrectly due to an incorrect interpretation of the sign of the net change.

Exercise 14b
Look out for students who compute Tuesday's closing price incorrectly due to an incorrect interpretation of the sign of the net change.

ANSWERS

12. 3M, 2.6%; Alcoa, 1.6%; Am Ex, 1.6%; AIG, 2.3%; AT&T, 4.0%; Bank of Am, 7.6%; Boeing, 1.9%; Cat, 1.7%; Chev, 2.6%; Citi, 5.9%; Coca-Cola, 2.6%; E!, 3.4%; Exxon, 1.8%

13f. The dividend has not changed. The price of the stock is going up, and that increases the denominator of the yield formula, decreasing the yield. The corporation's stock is rising, and that is good news to the investor.

14f. The dividend has not changed. The price of the stock is going down, and that decreases the denominator of the yield formula, increasing the yield. The corporation's stock is falling, and that is not good news to the investor.

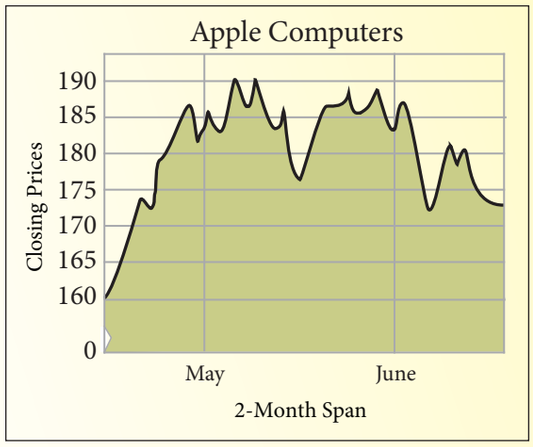
CHAPTER 1

Assessment

Real Numbers

You Write the Story!!

Examine the graph below. Write a short newspaper-type article, using facts obtained online or at the library, centered around this graph. You can find an electronic copy of the graph at www.cengage.com/school/math/financialalgebra. Copy and paste it into your article.



Reality Check

1. Choose a corporation that you are interested in following. Use the newspaper or Internet to find the daily low, high, close, and volume of your stock for the next three weeks. Set up a graph to record these prices and the volume. Discuss the trends for the three-week period. Check the corporation's website for major news about the corporation. Discuss the trend over the three-weeks and include any major corporate news that might have affected the trend.
2. Discuss stocks with your parents or guardians. Find out if they own any stocks currently, or ever did during their lives. If you earn money on your own, discuss with them the possibility of purchasing shares of stock for a corporation you are interested in following.
3. Survey your classmates and compile a list of questions your class has about stocks. Compile a list of the top five stocks they are interested in. Call a local stockbroker and request an appointment for a short meeting. Interview the broker. Ask the broker why these stocks may or may not be a good investment. Report your findings.
4. Visit a local bank and ask to speak to one of the representatives about United States Savings Bonds. Find out about the forms necessary to purchase a bond, the interest it pays, and how long the bonds take to reach their face value. Prepare a report and present your findings to the class.

CHAPTER 1 ASSESSMENT

REAL NUMBERS

You Write the Story

Make sure students interpret the graph correctly, and do not use fictional or hypothetical anecdotes. If they want more information than the graph gives to write their articles, they can do an Internet search to acquire more facts.

REALITY CHECK

Reality Check projects are a terrific form of alternative assessment. They give students an additional avenue to show what they've learned, so their grades are not solely based on tests.

Projects can be presented to the class on any schedule that works for your program. These projects have students taking little field trips, so they don't conduct everything online.

Remind students who personally visit local businesses or community members that they are representing the school, and need to be cordial.

REALLY? REALLY! REVISITED

The 6 by 5 grids that students draw should take up an entire page. In the corner of each box, have them put the date in June that the box refers to. Leave most of the room in the box for the dollar amounts.

Make sure students realize that they can just multiply the last calculator entry by 2 to get the next entry.

5. Contact a local stockbroker. Talk to your teacher about setting up a class session featuring the stockbroker as a guest speaker. During the broker's presentation, conduct a question-and-answer session.
6. Contact the New York Stock Exchange by mail or through its website. Request a list of publications that the Exchange offers.
7. Use the library or Internet to research a corporation. Prepare a poster board about the corporation. Include how and when the corporation was founded, where it got its name, major developments in its history, and why you may or may not want to invest in this company.
8. Work with a small group of classmates to select 5 to 10 stocks that will form a stock portfolio. Set up an online portfolio using any financial website such as yahoo.com or nyt.com with an initial investment of $10,000. Track the gains and losses of your entire portfolio for a month. Compare your total profit or loss with that of other groups.

Dollars and Sense — Your Financial News Update

Go to www.cengage.com/school/math/financialalgebra where you will find a link to a website containing current issues about the stock market.

Really? Really! REVISITED

The power of this activity is seeing the payment amounts increase slowly at first. Even after 2 weeks, the daily pay is relatively low. Students will see the power of exponents unfurl gradually as they complete this activity.

An extension of this activity is to have students fold a single sheet of paper in half several times. They can watch the thickness of the folded paper increase as they fold. After about 5 to 8 folds, they won't be able to physically fold the paper any longer. How many folds would it take to have the paper's thickness reach from the Earth to the Sun (about 93 million miles)? Although paper thicknesses vary, it is typically around 50 folds!

GOOGLE.COM® is derived from the number googol which is a 1 with 100 zeros following it. This is equivalent to 10^{100}. The change in spelling (but not pronunciation) still elicits the feel of something very large. How large is 10^{100}? There isn't a googol of anything on the planet!

Given that 1,000,000 pennies stacked one on top of another reaches about one mile high, how high will 1 googol pennies reach?

To get an idea of the "power" of exponents, investigate a famous problem in math. Imagine your teacher asks you to work at school for all of June. You can choose to be paid in one of two ways.

- One payment of $5,000, which you will receive on June 30.
- On the first day you get paid 1¢. On the second day you receive double that amount, which is 2¢. On the third day you receive 4¢, on the fourth day 8¢, and so on. Each day you get paid twice the amount you were paid the day before.

Draw a grid with six columns and five rows to represent the 30 days. Fill in the amount you are paid each day.

1. How much do you receive on June 14? June 27? June 30? $81.92; 671,088.64; 5,368,709.12
2. Another way to think of the payment on June 30 is 1 cent multiplied by 2 twenty-nine times. What is the product of 0.01 and 2^{29}? $5,368,709.12

Think about how much 29 multiplications by 2 inflated the original 1 cent! Imagine raising 10 to the 100th power! The stock market deals in billions and sometimes trillions of dollars, but remember that 1 billion = 10^9 and 1 trillion = 10^{12}. Nothing close to a googol. And that's reality!

Applications

1. Nick and Matt are the partners in a local health food store. They needed $73,000 to start the business. They invested in the ratio 3:7, Nick to Matt.
   a. How much money did each invest? Nick $21,900; Matt $51,100
   b. What percent of the business was owned by Matt? Round to the nearest tenth of a percent. 70%

2. Tom purchased shares of DuPont for $47.65 per share. He plans to sell the shares when the stock price rises 20%. At what price will he sell his shares? $57.18

3. The top three shareholders in a certain corporation each own s shares of a certain stock. The corporation's ownership is represented by a total of x shares of stock. Express the percent of the corporation owned by the top three shareholders algebraically. $\frac{3s}{x}100$

4. Marilyn purchased 2,000 shares of stock for $25.43 per share. She sold them for $44.10 per share. Express her capital gain to the nearest tenth of a percent. 73.4%

5. A local hairdresser bought 450 shares of a cosmetics corporation for $33.50 per share. He sold the shares for $39.01 per share.
   a. What was the percent increase in the price per share? Round to the nearest tenth of a percent. 16.4%
   b. What was the total purchase price for the 450 shares? $15,075
   c. What was the total selling price for the 450 shares? $17,554.50
   d. What was the percent capital gain for the 450 shares? Round to the nearest tenth of a percent. 16.4%

6. Deanna purchased $24,000 worth of stock and paid her broker a 1% broker fee. She sold the stock when it increased to $29,100 three years later and used a discount broker who charged $35 per trade. Compute her net proceeds after the broker fees were taken out. $4,825

7. The Bootle Corporation paid Leslie a quarterly dividend check for $828. Leslie owns 450 shares of Bootle. What was the quarterly dividend for one share of Bootle? $1.84

8. Aaron owned x shares of a corporation and received an annual dividend of y dollars. Express the quarterly dividend for one share algebraically. $\frac{y}{4}$

9. The Zyco Corporation pays an annual dividend of $2.10 per share. On Tuesday it closed at $72 per share with a net change of +0.95. The dividend remained at $2.10 for several months.
   a. What was the yield on Tuesday? Round to the nearest tenth of a percent. 2.9%
   b. At what price did Zyco close on Monday? $71.05
   c. What was the yield at Monday's close? Round to the nearest tenth of a percent. 3%

Market Data, Close on June 20								
52-week High	52-week Low	Symbol	Stock	Last	Change	Sales 100s	High	Low
143.25	73.25	PCU	Southern Copper Corp.	108.88	3.61	2643.7	110.68	105.68
42.97	32.95	T	AT&T, Inc.	34.43	–0.72	43386.8	35.59	34.41
131.82	42.24	ESI	ITT Ed Services	88.40	3.91	3429.5	90.71	82.06
50.48	36.01	JPM	JPMorgan Chase & Co.	37.86	–0.79	553772	39.19	36.95

10. Use the table above to answer the following questions.

a. What was the difference between the 52-week high and the 52-week low for one share of AT&T? $10.02

b. What was the difference between the day's high and low for one share of Southern Copper? $5.00

c. Which stock had a close that was furthest from the day's low? ITT Ed Services

d. Determine the close on June 19 for JPMorgan Chase. $38.65

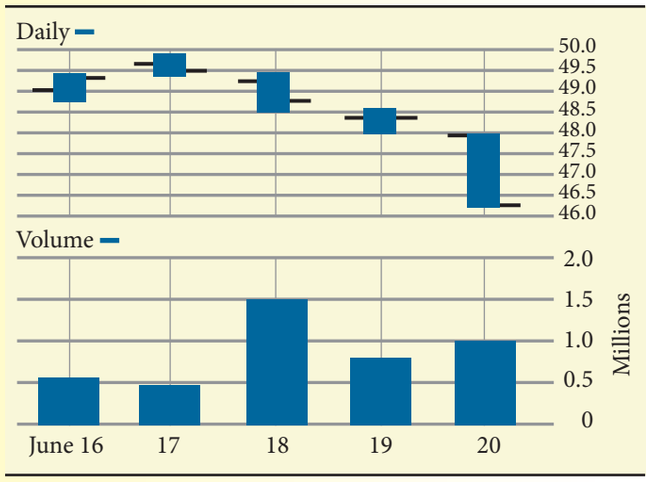
e. How many shares of ITT were traded on June 20? 342,950

f. What was the percent net change from June 19 to June 20 for AT&T? Round to the nearest hundredth of a percent. −2.05%

g. Which stock had a day's high that was approximately 30% less than its 52-week high? ITT

h. On June 19, there were 59,945,400 shares of JPM traded. What was the difference in the number of shares traded from June 19 to June 20? 4,568,200

11. Use the stock bar chart to answer the questions below.



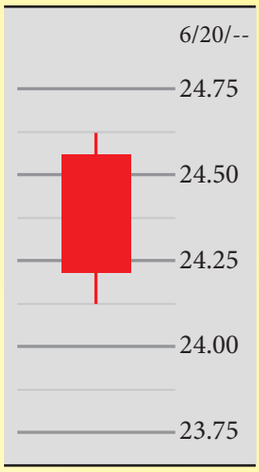
a. What was the day's open on June 17? about $49.60

b. What was the approximate difference between the day's high and low on June 18? approximately $49.45 – $48.50 = $0.95

c. On what day was the close also the day's low? June 20

d. Write the approximate volume for June 19. 750,000

12. Use the candlestick chart to answer the questions below.



- **a.** What was the approximate low on June 20? $24.13
- **b.** What was the approximate high on this date? $24.62
- **c.** What was the difference between the opening price and the close? $0.35
- **d.** What does the red candlestick color indicate? The opening price was greater than the closing price.

13. Lea owns 800 shares of ABC, Incorporated. On April 6 the corporation instituted a 5-for-2 stock split. Before the split, each share was worth $42.60.

- **a.** How many shares did Lea hold after the split? 2,000
- **b.** What was the post-split price per share? $17.04
- **c.** Show that the split was a monetary non-event for Lea. Pre-split value was $34,080; post-split value is $34,080.

14. Gene owns 1,200 shares of XYX Corporation. The company instituted a 1-for-10 reverse stock split on November 7. The pre-split market price per share was $1.20.

- **a.** How many shares did Gene hold after the split? 120
- **b.** What was the post-split price per share? $12.00
- **c.** Show that the split was a monetary non-event for Gene. Pre-split market value was $1,440; post-split market value is $1,440.

15. Use the table of closing prices for Microsoft. Round answers to the nearest cent. See margin.

- **a.** Determine the 3-day moving averages.
- **b.** Determine the 10-day moving averages.

Date	Close	3-day Averages	10-day Averages
23-May	28.05		
27-May	28.44		
28-May	28.18		
29-May	28.31		
30-May	28.32		
2-Jun	27.80		
3-Jun	27.31		
4-Jun	27.54		
5-Jun	28.30		
6-Jun	27.49		
9-Jun	27.71		
10-Jun	27.89		
11-Jun	27.12		
12-Jun	28.24		
13-Jun	29.07		
16-Jun	28.93		

Use the following stock market ticker to answer Exercises 16 and 17.

GE 12.5K@26.13▲1.13 F .67K@5.01▼0.38 C 3K@16.19▲ 1.47 T 1.6K@26.14▼1.08

16. Nick bought some shares of Ford Motor Company (F).

- **a.** How many shares did Nick buy? 670
- **b.** How much did each share cost? $5.01
- **c.** What was the value of Nick's trade? $3,356.70

17. Patrick sold his shares of AT&T (T).

- **a.** How many shares did he sell? 1,600
- **b.** For how much did each share sell? $26.14
- **c.** Based on Patrick's sale, what was the closing price of T on the previous trading day? $27.22

18. The stock in a real estate corporation was selling for $78 per share with an annual dividend of $1.86. It underwent a 3-for-2 split.

- **a.** What was the value of one share of the stock after the split? $52
- **b.** What was the annual dividend after the split? $1.24

19. A stock that was selling for $\$x$ per share underwent a y-for-p split. It was originally paying an annual dividend of $\$d$ per share. Express the annual dividend after the split algebraically. $\frac{pd}{y}$

20. Suki purchased $9,600 worth of stock and paid her broker a 1.75% broker fee. She had an immediate need for cash and was forced to sell the stock when it was worth $8,800. She used a discount broker who charged $32.50 per trade. Compute Suki's net loss after the broker fees were taken out. $1,000.50

ANSWERS

15a. 3-day averages: 28-May: 28.22; 29-May: 28.31; 30-May: 28.27; 2-Jun: 28.14; 3-Jun: 27.81; 4-Jun: 27.55; 5-Jun: 27.72; 6-Jun: 27.78; 9-Jun: 27.83; 10-Jun: 27.70; 11-Jun: 27.57; 12-Jun: 27.75; 13-Jun: 28.14; 16-Jun: 28.75

15b. 10-day averages: 6-Jun: 27.97; 9-Jun: 27.94; 10-Jun: 27.89; 11-Jun: 27.78; 12-Jun: 27.77; 13-Jun: 27.85; 16-Jun: 27.96