

Second Edition

# Financial Algebra

ADVANCED ALGEBRA WITH FINANCIAL APPLICATIONS



Robert Gerver | Richard Sgroi



Australia • Brazil • Mexico • Singapore • United Kingdom • United States

**Financial Algebra: Advanced Algebra with  
Financial Applications, Second Edition**  
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Dr. Gerver



Dr. Sgroi

# *Financial Algebra, Second Edition,* aligns to the Common Core State Standards for Mathematical Content.

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The CCSS provides clear and consistent guidelines so students, teachers, administrators, and parents have an awareness of the mathematics proficiencies expected and how to attain them. The standards are designed to be rigorous and relevant to the real world, reflecting the knowledge and skills that students need for future success.

The CCSS Domain and Standard are identified to demonstrate that *Financial Algebra, Second Edition*, addresses at least one, if not several, core standard in each section.

## Conceptual Categories

- Number and Quantity
- Algebra
- Modeling
- Functions
- Geometry
- Statistics and Probability

A complete correlation of *Financial Algebra, Second Edition*, to the CCSS for Mathematical Content is available on the community website.

**[www.cengage.com/financial\\_alg2e](http://www.cengage.com/financial_alg2e)**

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### MATH TOPICS

Bimodal data	Percent
Bivariate data	Percentage
Causal relationship	Percentile
Correlation	Percentile rank
Correlation coefficient	Percentiles
Cumulative frequency	Range
Domain	Raw scores
Explanatory, response, lurking variables	Relative cumulative frequency
Frequency distribution	Relative frequency
Independent and dependent variables	Scatter plot
Interpolation and extrapolation	Sigma notation
Linear regression analysis	Skewed data
Linear regression equation	Spreadsheets and formulas
Mean absolute deviation	Standard deviation
Mean deviation	Trend
Measures of central tendency – mean, median, mode	Univariate data
Normal curve	Variance
Outliers	Z-scores

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### MATH TOPICS

Antilogarithm	Literal equations
Arithmetic sequence	Logarithm
Change-of-base formula	Logarithmic equation
Common logarithm	Logarithmic form
Compound interest	Natural logarithm
Continuous compounding	One-to-one property of logarithms
Exponential decay	Patterns and conjectures
Exponential equations	Power property of logarithms
Exponential form	Recursive and iterative thinking
Exponential growth	Spreadsheets and formulas
Limits	

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### MATH TOPICS

Average daily balance	Logarithms
Cubic equation	Mean
Cubic regression equation	Natural logarithms
Exponential base e	Percents
Exponential equations	Quadratic equation
Linear equations	Quadratic regression equation
Linear regression equation	Spreadsheets and formulas

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### MATH TOPICS

Chord	Metric System
Circle	Middle ordinate
Circumference	Projectile motion
Common ratio	Proportions
Conditional probability formula	Quadratic equation
Diameter	Radius
Domain	Ratios
English Standard System	Slope
Exponential decay	Slope intercept form of a linear equation
Exponential depreciation	Spreadsheets and formulas
Exponential function	Square root function
Exponential regression	System of linear equations
Geometric progression	System of linear, exponential equations
Geometric sequences	Two-way tables
Independent events	Venn diagrams
Intersection point	x-intercept, y-intercept
Linear equations	

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### MATH TOPICS

Arithmetic sequence	Literal equations
Cusps	Literal expressions
Domain	Piecewise functions
Exponential functions	Percent
Geometric sequence	Spreadsheets and formulas
Graphs of functions	

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### MATH TOPICS

Compound inequality	Literal expressions
Compound inequality notation	Percent
Domain	Piecewise function
Inequalities	Slope, intercept form of a linear equation
Interval notation	Spreadsheets and formulas
Linear equation	

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### MATH TOPICS

Apothem	Proportion
Area	Pythagorean theorem and its converse
Circumference	Regular polygons
Cosine ratio	Similar triangles
Exponential equation	Sine ratio
Exponential regression equation	Spreadsheets
Linear regression equation	Spreadsheets and formulas
Literal equation	System of linear equations
Percent	Tangent ratio
Percents	Volume
Perimeter	

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### MATH TOPICS

Average	Linear regression equation
Bar chart	Moving average
Candlestick chart	Percent decrease
Converting fractions to percents	Percent increase
Cubic regression equation	Proportion
Line graph	Quadratic regression equation
Linear equations	Spreadsheets and formulas

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### MATH TOPICS

Axis of symmetry	Objective function
Bias	Parabola
Completing the square method	Quadratic equation
Complex number	Quadratic formula
Complex roots	Random number tables
Experimental design	Roots of a quadratic equation
Hypothesis testing	Roots, zeros of a quadratic equation
Imaginary unit	Sampling
Inequality constraints	Surveying
Leading coefficient	System of linear equations
Linear equation	System of linear, quadratic equations
Linear programming	Unbiased estimators
Literal quadratic equation	
Minimum, maximum	

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### MATH TOPICS

Expected value	Percent increase
Exponential equation	Percents
Histogram	Pie charts
Literal equations	Probability
Mean	Rational equations
Measures of central tendency	Spreadsheets

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### MATH TOPICS

Addition, subtraction of matrices	Matrix
Array	Matrix multiplication
Bar graph	Piecewise functions
Central angle	Ratio
Circle graph	Scalar
Dimensions of a matrix	Scalar multiplication
Element of a matrix	Sector
Greatest integer function	Spreadsheets and formulas
Inequalities	Zero matrix
Line graph	

# New to this Edition

Note: The code “FA1E” refers to the first edition of *Financial Algebra* and the section number from the first edition follows.

## Chapter 1 Discretionary Expenses

- 1-3** Categorizing Expenses—Discretionary vs. essential expenses - measures of central tendency and frequency distributions
- 1-4** Vacation Travel Expenses—cumulative and relative frequency, percentiles
- 1-3** Entertainment Expenses—plays, movies, concerts, out to eat, video games, music downloads, sports events, amusement parks measures of spread
- 1-4** Vacation Destination Expenses—normal curve and z-scores
- 1-5** Personal Expenses—linear regression and scatterplots

## Chapter 2 Banking Services

- 2-1** Checking Accounts FA1E 3-1
- 2-2** Reconcile a Bank Statement FA1E 3-2
- 2-3** Savings Accounts—intro arithmetic sequences with constant addition plus FA1E 3-3
- 2-4** Explore Compound Interest FA1E 3-4
- 2-5** Compound Interest Formula FA1E 3-5
- 2-6** Continuous Compounding limits of rational functions, plus FA1E 3-6
- 2-7** Future Value of Investments FA1E 3-7
- 2-8** Present Value of Investments FA1E 3-8
- 2-9** The Term of a Single Deposit Account—new section—logarithms plus
- 2-10** The Terms of a Systematic Savings Account—new section—properties of logs

## Chapter 3 Consumer Credit

- 3-1** Introduction to Consumer Credit FA1E 4-1
- 3-2** Loans FA1E 4-2
- 3-3** Student Loans—new section
- 3-4** Loan Calculations and Regression FA1E 4-3

- 3-5** Credit Cards FA1E 4-4
- 3-6** Credit Card Statement FA1E 4-5
- 3-7** Average Daily Balance FA1E 4-6

## Chapter 4 Automobile Ownership

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- 4-2** Automobile Transactions FA1E 5-2
- 4-3** Automobile Insurance FA1E 5-4
- 4-4** Probability: The Basis of Insurance—conditional probability, independent events, Venn diagrams –NEW SECTION
- 4-5** Linear Automobile Depreciation FA1E 5-5
- 4-6** Historical and Exponential Depreciation—geometric sequences plus FA1E 5-6
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## Chapter 5 Employment Basics

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## Chapter 7 Independent Living

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## Chapter 9 Modeling a Business

- 9-1** Inventions—surveying, critiquing experimental designs, bias new section
- 9-2** Market Research—unbiased estimators, sampling, types of samples, critiquing experimental design methods new section

- 9-3** Supply and Demand FA1E 2-3
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- 9-9** Optimal Outcomes— new section on linear programming

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- 10-5** Diversification Of Investments—new section

## Chapter 11 Prepare a Budget

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# Inside the Student Edition



## Chapter 8

# The Stock Market

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- 8-2 Stock Market Data
- 8-3 Stock Market Data Charts
- 8-4 Trends in Stock Closing Prices
- 8-5 Stock Market Ticker
- 8-6 Stock Transactions
- 8-7 Stock Transaction Fees
- 8-8 Stock Splits
- 8-9 Dividend Income

### What do you think Frank Hubbard meant in this quote?

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

—Frank Hubbard, journalist

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. You have already learned how bank interest can help your money grow. However, the prevailing bank interest rates limit the degree to which your money can grow. Investing can help money grow in value, and there is no limit to the amount of growth, but you can also lose all of your investment.

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 principal 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. Will the corporations you choose flourish, grow, and succeed, or falter? With a strong knowledge of the stock market, corporations, and investment strategies, you as an investor can make decisions that are based on experience, data, trends, and mathematics.

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A **relevant quote** and **chapter introduction** set the stage for the topics covered in the chapter.

### Really?

**C**orporations sometimes choose names that are personal, humorous, historical, or psychological. Many are acronyms, where a new word is created by the first letters of several words. Below are some well-known corporations and how their names were established.

Amazon.com was originally known as Cadabra.com. Its founder selected Amazon as a corporate name because the Amazon River has the largest volume of any 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.

Coca-Cola is a name that has its origins in the ingredients of 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.

Lojack is a corporation that makes automobile anti-theft devices. The name is a humorous adaptation of the word "hijack."

Aflac is an acronym for the American Family Life Assurance Company.

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



**Really!**

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*"This information is interesting and relevant! Showing real-world relevance is always a good lead into the section."*

**Really? Really!** captures students' attention by discussing a fascinating real-life topic that relates to the chapter's content.

# Structure Puts Math into Context

**8-1 Business Organization**

*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

**Objectives**

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

**Key Terms**

capital  
sole proprietorship

profit  
personally liable  
partnership  
corporation  
shares of stock  
shareholders  
limited liability  
private corporation  
public corporation

**Warm-Up**  
Create and solve an equation that models the following relationship in terms of  $x$ .  
Find two consecutive integers such that the sum of three times the first and twice the second is 27.

**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 called **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

**Warm-Up** provides a refresher for basic concepts.

A list of **objectives** provides the main learning outcomes for the chapter.

*“An intriguing quote at the beginning of each section motivates learning!”*

*“An interesting introduction and a great metaphor for the section!”*

*The best way to deal with credit card debt is to educate yourself.*  
**Mark Rosen, Author**

*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**

*Nobody ever lost money taking a profit.*  
**Bernard Baruch, Businessman**

# The Essential Question helps focus attention on the big idea

What are social security and medicare?

How do people gain access to money they keep in the bank?

What is compound interest?

What information do you need to know before taking out a loan?

What information does a credit card statement give you?

How do revenue and expenses contribute to profit calculation?

The **Essential Question** helps focus attention on the big idea of each section. You will be able to answer the question by the end of the section.

## 8-3 Stock Market Data

*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

### 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

### Warm-Up

An item usually sells for  $X$  dollars. It is marked down to  $Y$  dollars. Interpret each of the following algebraic expressions in this context.

- $|Y - X|$
- $|Y - X|/X$
- $100|Y - X|/X$

Each section begins with a discussion of **terms and concepts** related to the section topic.

### How Can Stock Data Be Displayed?

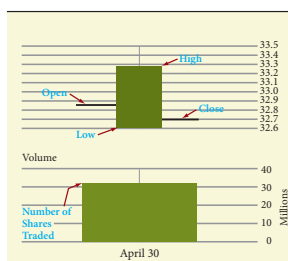
Stock data can be presented in list form or in graphical form. The graphical form is known as a **stock chart**. These charts offer pictorial information on anything from a day's worth of data to multiyear data trends. Most stock charts present historical information about the trading prices and volumes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

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

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

The top shaded bar is a rectangle formed by 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 on the range in the volume. Stock bar charts can also be used to show the market action on multiple days.



8-3 Stock Market Data Charts 477

*“This book contains relevant and current information high school students need. The educational focus of today is on standards. This book allows both to be addressed.”*

# When am I ever going to use this in real life?

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 all of the shares are owned solely by a few individuals, and are not available for sale to the public, the corporation is a **private corporation**, also known as a **privately held corporation**. The New York Yankees are an example of a private corporation. So is Lego. Your local car dealership is most likely a private corporation. 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. These corporations are owned by housewives, doctors, plumbers, teachers, students, senior citizens—anyone who buys a share in the corporation. If a shareholder owns more than 50% of the shares, that shareholder owns a majority of the shares. 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 percentages can be used to represent the financial responsibility of owners and partners. Recall the relationship between decimals and percentages.

To convert a decimal to a percentage, multiply the decimal by 100 and annex a percent sign.

To convert a percentage to a decimal, divide the percent by 100 and drop the percent sign.

### 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.

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?

In **Skills and Strategies**, the heart of the section, math concepts are taught through **worked-out examples**. Examples present each math concept step-by-step.

*"I love the emphasis on applications with relevance to the world we live in, not on symbolic manipulation."*

### EXAMPLE 2

The total number of shares of stock in Bulls Corp is 650,000. Mike owns 12% of the shares. How many shares of Bulls Corp 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 the Bulls Corp.

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.

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

$$10x = 900,000$$

$$x = 90,000$$

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

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

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?

All math concepts are taught within **real-life context**. *When am I ever going to use this in real life?* is answered here!

# Ongoing Assessment and Review

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 four 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,  $\frac{121}{4}$ , and  $\frac{124}{4}$ .  $120.50 - \frac{121}{4} + \frac{124}{4} = 121.25$

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

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

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

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

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

 Check 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?

 Extend Your Understanding

8-4 Trends in Stock Closing Prices 485

*"I like the immediate check of understanding instead of waiting until the end of the chapter."*

## Check Your Understanding

allows you to immediately practice the concept on your own. The questions are similar to the example and help you gauge your understanding of the skills being taught.

## Extend Your Understanding

provides an opportunity to solve a more challenging problem.

Carefully developed, proven applications at the end of each section require you to apply the concepts to a specific question or scenario.

## 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?

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

2. Determine the 3-day SMA for the 10-consecutive-day closing prices of Angle's List Inc. 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 10-consecutive-day closing prices for Sherwin-Williams Co 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 10-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 12-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.

6. Determine the 2-day SMA for the 10-consecutive-day closing prices for Western Digital 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 10-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 10-consecutive-trading-day closing prices for Toyota Motor 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 10-consecutive-trading-day closing prices for SunEdison Inc. listed below.

\$2.65 \$2.63 \$2.70 \$2.63 \$2.50 \$2.65 \$2.66 \$2.56 \$2.52 \$2.37

8-4 Trends in Stock Closing Prices

**Chapter Assessment** provides an opportunity to check your knowledge of the chapter content.

**Real Numbers: You Write the Story!** asks you to examine a graph and write a story focused around the graph's information, giving you an opportunity to be creative while at the same time sharpening your graph interpretation skills.

**Chapter 8 Assessment**

**Real Numbers**

**You Write the Story!!**  
Examine the graph below. Write a short news-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/financial\\_alg2e](http://www.cengage.com/financial_alg2e). Copy and paste it into your article.

**What's the Problem?**

1. Examine the equation below used for determining the capital gain made on a stock. Look through this chapter and your notes to help you write a problem that could be modeled by this equation.

$$((900)(12.55) - (900)(12.55)(.01)) - ((900)(8.14) + 25) = 3,831.05$$

**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 3 weeks. Set up a graph to record these prices and the volume. Discuss the trends for the 3-week period. Check the corporation's website for major news about the corporation. Do a regression analysis for the last 15 trading days of this stock. Discuss the trend over the 3 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 now, or ever did. If you earn money, discuss with them the possibility of purchasing shares of stock for a corporation you are interested in following.

524 Chapter 8 The Stock Market

**Chapter 8 Assessment**

**Real Numbers**

**You Write the Story!!**  
Examine the graph below. Write a short news-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/financial\\_alg2e](http://www.cengage.com/financial_alg2e). Copy and paste it into your article.

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524 Chapter 8 The Stock Market

**Reality Check** provides specific suggestions for research opportunities, projects, and guest speakers to extend your learning experience.

**What's The Problem?** provides you with a problem posing activity related to a chapter problem. You are given an equation or formula featured in the chapter, with numerical substitutions for each variable. You then have to think backwards and create the problem, using the numbers, that have a solution modeled by the given equation.

*“Excellent activities that help connect math to the real world.”*

**Really? Really! Revisited** continues the theme of the Really? Really! feature at the beginning of each chapter. In Really? Really! Revisited, you use mathematics to solve a problem or extension related to the Really? Really! theme.

**Really? Really! Revisited**

Google is derived from the number googol, which is a 1 with 100 zeros following it. This is equivalent to  $10^{100}$ . Despite the original accidental change in spelling (but not pronunciation), the name still elicits the idea of something very large. How large is  $10^{100}$ ? There isn't a googol of anything on the planet! Let's take a look at some surprisingly large and surprisingly small numbers.

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

- To get an idea of the "power" of exponents, investigate a famous problem in mathematics.
- How many times would you have to fold a piece of paper so it reached from Earth to the Sun, approximately 93 million miles?
1. A ream of paper (500 sheets) is 2 inches thick. What is the thickness of one sheet of paper?
  2. Take a sheet of paper and fold it as many times as you can. For the rest of the problem you will have to imagine that you could continually fold the piece of paper.
  3. Convert 93 million miles into inches.
  4. Each fold represents a doubling of the previous thickness, so each fold multiplies the paper thickness by 2. Use your calculator and trial and error to find the lowest value of  $n$  for which the answer exceeds 93 million miles. How many folds would it take to reach to the sun?

You were probably unable to fold the paper more than six or seven times, so you had to imagine the doubling of the thickness mathematically. After viewing the thickness of the paper after six folds, are you surprised at how few folds it will take the thickness of the paper to reach the sun? The "power" of 2 is amazing!

**Applications**

1. Nick and Matt are 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?
  - b. What percent of the business was owned by Matt? Round to the nearest tenth of a percent.
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?
3. The top three shareholders in a certain corporation each own  $s$  shares of stock. The corporation's ownership is represented by a total of  $r$  shares of stock. Express the percent of the corporation owned by the top three shareholders algebraically.
4. Maribel 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.
5. A local hairstylist 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.
  - b. What was the total purchase price for the 450 shares?
  - c. What was the total selling price for the 450 shares?
  - d. What was the percent capital gain for the 450 shares? Round to the nearest tenth of a percent.

*"I love how it is tied to what started the chapter!"*

*"Great variety of problems that will prepare students for life outside of school!"*

**Really? Really! Revisited**

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**Applications**

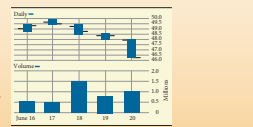
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6. Deanna purchased \$20,000 worth of stock and paid her broker a 1% broker fee. She sold the stock when it increased to \$25,100 3 years later and used a discount broker who charged \$30 per trade. Compute her net proceeds after the broker fees were taken out.
7. Booile Corp paid Leslie a quarterly dividend payment for \$828. Leslie owns 450 shares of Booile. What was the quarterly dividend for one share of Booile?
8. Aann owned  $s$  shares of a corporation and received an annual dividend of  $y$  dollars. Express the quarterly dividend for one share algebraically.
9. Zivo Corp 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.
  - b. At what price did Zivo close on Monday?
  - c. What was the yield at Monday's close? Round to the nearest tenth of a percent.
10. Use the table below to answer a–h.
  - a. What was the difference between the 52-week high and the 52-week low for one share of ATRTY?
  - b. What was the difference between the day's high and low for one share of Southern Copper?
  - c. Which stock had a close that was farther from the day's low?
  - d. Determine the close on March 2 for JPMorgan Chase.
  - e. How many shares of ITT were traded on March 3?
  - f. What was the percent net change from March 2 to March 3 for ATRTY? Round to the nearest hundredth of a percent.
  - g. Which stock had a day's high that was approximately 30% less than its 52-week high?
  - h. On March 2, there were 19,987,655 shares of JPM traded. What was the difference in the number of shares traded from March 2 to March 3?

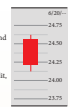
Market Data, As of the Close on March 3

Symbol	Stock	52-Week High	52-Week Low	Last	Change	Sales Volume	High	Low
SCCO	Southern Copper	29.53	19.50	22.06	-1.79	1,823,791	22.07	22.07
Y	ITT	37.56	36.97	37.12	-0.21	22,908,098	37.66	37.06
ESI	ITT Est Services	7.95	1.93	2.95	-0.03	140,466	3.11	2.92
JPM	JPMorgan Chase & Co.	70.61	57.07	57.45	+1.11	20,987,678	58.11	57.14

11. Use the stock bar chart to answer the questions below.
  - a. What was the day's open on June 17?
  - b. What was the approximate difference between the day's high and low on June 18?
  - c. On what day was the close also the day's low?
  - d. Write the approximate volume for June 19.



12. Use the candlestick chart to answer the questions below.
  - a. What was the approximate low on June 20?
  - b. What was the approximate high on this date?
  - c. What was the difference between the opening price and the closing price?
  - d. What does the red candlestick color indicate?
13. Lea owns 800 shares of ABC Inc. On April 6, the corporation instituted a 5-for-2 stock split. Before the split, each share was worth \$22.60.
  - a. How many shares did Lea hold after the split?
  - b. What was the post-split price per share?
  - c. Show that the split was a monetary movement for Lea.
14. Gene owns 1,200 shares of XYZ Corp. 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?
  - b. What was the post-split price per share?
  - c. Show that the split was a monetary movement for Gene.
15. Use the table of closing prices for Microsoft. Round answers to the nearest cent.
  - a. Determine the 3-day simple moving average.
  - b. Determine the 10-day simple moving average.



Date	Close	3-day Average	10-day Average
25-May	28.05		
27-May	28.64		
28-May	28.18		
29-May	28.31		
30-May	28.32		
2-Jun	27.98		
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	28.07		
16-Jun	28.93		

Use the following stock market ticker to answer Exercises 16 and 17.

GE 29.39@26.11A 1.13 F 67K@12.46W 38 C8K@12.15A 1.47 T 1.8K@17.12V 1.88

**Meaningful applications** at the end of each chapter require you to apply concepts that were taught throughout the chapter.



# Comprehensive Teaching and Learning Tools

## **Annotated Instructor's Edition** 9781337271806

The Annotated Instructor's Edition keeps useful teaching and reference notes, helpful suggestions, and ready solutions at your fingertips.

## **Financial Algebra Instructor Companion Website**

- Lesson plans
- PowerPoint slides for each lesson
- Workbook answers
- Solutions Manual - Additional resources for use in the classroom or planning your curriculum

## **Computerized Testbank** 9781337271905

An online testbank saves time in effectively assessing your students' understanding of chapter concepts. Simply edit, add, delete, or rearrange questions.

## **Practice Problems for Financial Algebra** 9781337271820

The student workbook offers additional resources for mastering algebraic concepts within a financial context.

## **MindTap 9781337271851**

MindTap® for Gerver and Sgroi's FINANCIAL ALGEBRA, Second Edition provides you with the tools you need to better manage your limited time – you can complete assignments whenever and wherever you are ready to learn with course material specially customized for you by your instructor and streamlined in one proven, easy-to-use interface. With an array of tools and apps – from note taking to flashcards—you'll get a true understanding of course concepts, helping you to achieve better grades and setting the groundwork for your future courses.

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