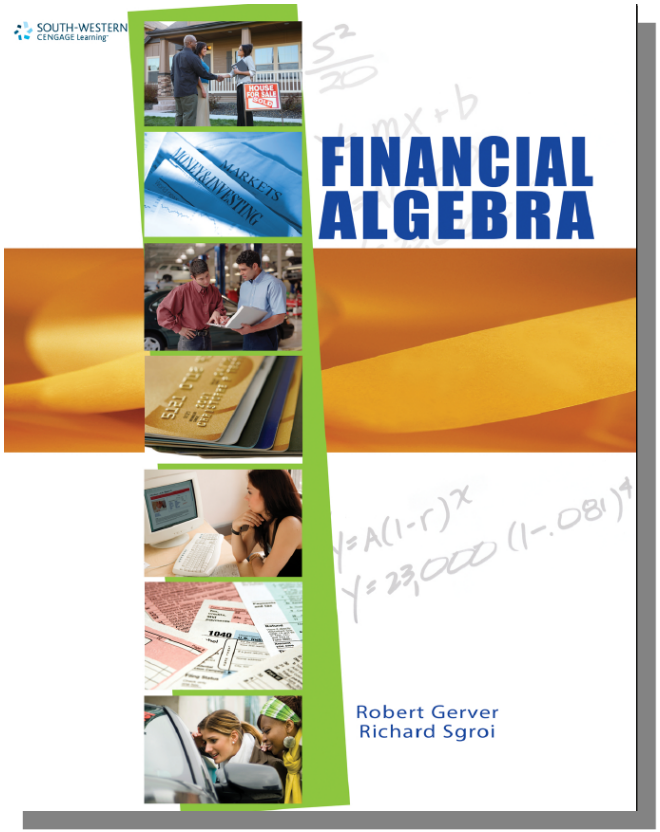

Financial Algebra

Gerver/Sgroi

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Introductions

Robert Gerver, Ph.D.

North Shore High School

450 Glen Cove Avenue

Glen Head, NY 11545

gerverr@northshoreschools.org

Rob has been teaching at North Shore High School since 1977. He received the Presidential Award for Excellence in Mathematics Teaching from President Reagan in 1988.

He attended Martin Van Buren HS, and did his student teaching there in 1976.

Introductions

Richard Sgroi, Ph.D.

Fox Lane High School

Bedford, NY

rsgroi1014@bcsdny.org

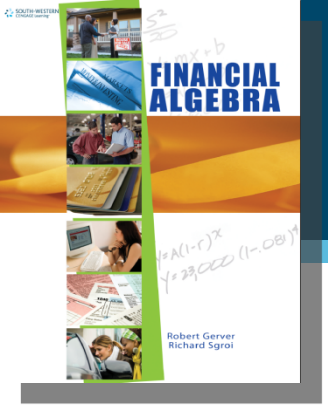
Rich Sgroi taught at Fox Lane High School, Bedford, New York. During his long career he has been an assistant professor of mathematics and mathematics education, and a school district administrator/supervisor of mathematics.

Agenda

1. Who, What, Why, and Where
2. Examples from the textbook
3. Instructional Model
4. Instructor Support

The New York Times April 9, 2010

Most Americans aren't fluent in the language of money. Yet we're expected to make big financial decisions as early as our teens … even though most of us received no formal instruction on financial matters until it is too late. All of this raises the question: What's happening inside our classrooms? And how many schools even broach the topic? As it turns out, for a country that prizes personal responsibility, we're doing very little.



What Do You Know?
What Should You Know?

Who won the World Series last year?
What rock band played at the last Super Bowl?
Who are the two newest judges on American Idol?
Do you check the sports scores everyday?
Does the iPod have an APP for checking restaurant menus?

What is No-Fault insurance?
What is a progressive tax system?
Do you keep track of your car loan and mortgage payments?
Do you know your FICO score?
Do you check each expense on your credit card bills?

What is Financial Algebra?

- **A mathematically rigorous, algebra-based** course. (Not an arithmetic-based personal finance course).
- **Algebra 1** is the prerequisite, and Algebra 1 skills are reinforced throughout.
- Includes selected topics from **Algebra 2, Precalculus, Statistics, Probability and Geometry** that are taught at an ability-appropriate level for the Algebra 1-prerequisite audience.
- It is technology-dependent and applications-oriented.

Topics Covered

- Investments
- Starting Your Own Business
- Banking
- Credit
- Automobile Ownership
- Employment Basics
- Income Taxes
- Home Ownership
- Retirement
- Budgeting

FINANCIAL ALGEBRA

is aligned with the

NATIONAL COMMON CORE STATE STANDARDS

COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Financial Algebra by Gerver & Sgroi		**Common Core Standard**
In Financial Algebra, the mathematics necessary for daily living is embedded in content that directly relates to financial decisions adults make in their daily lives. The mathematical formulas, functions, and pictorial representations used in Financial Algebra assist students in making sense of the financial world around them through mathematical modeling and, equip them with the ability to make sound financial decisions based on data.		Mathematics| High School Modeling★ Modeling Standards *Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol* (★).
Financial Algebra Chapter & Section	**Financial Algebra Page Numbers**	**Common Core Standard**
CHAPTER 1		
C1 1-1	Pages 5-9	Algebra - Creating Equations★ A-CED **Creating equations that describe numbers or relationships** 1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
		Algebra - Reasoning with Equations and Inequalities A-REL **Solve equations and inequalities in one variable** 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
C1 1-2 (continued on next page)	Pages 10-15	Number and Quantity - Quantities★ N-Q **Reason quantitatively and use units to solve problems** 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
		Number and Quantity - Quantities★ N-Q **Reason quantitatively and use units to solve problems** 2. Define appropriate quantities for the purpose of descriptive modeling.

Who is the target audience?

- Students in need of a **third or fourth-year math credit**
- Students looking to take a **math elective**
- Students who may have experienced difficulty in Algebra 1 and/or Geometry and may **not be ready for Algebra 2 or Precalculus**

Where does this course fit?

Freshman	Sophomore	Junior	Senior
Algebra 1	Financial Algebra	Geometry	Algebra 2
Algebra 1	Geometry	Financial Algebra	Algebra 2
Algebra 1	Geometry	Algebra 2	Financial Algebra

- Concurrently with Geometry, Algebra 2, or Precalculus
- Can be taken as an ELECTIVE

Why should students take Financial Algebra

- It is a chance for students who struggled in algebra and/or geometry to gain confidence in, and an appreciation for, mathematics.
- It allows solid mathematics students to use their mathematics savvy on a daily basis.
- All students *need* this material.
- It offers a mathematics course that addresses a current "hot topic" in education.
- It allows departments to graduate all students with 3 and 4 years of mathematics, and as a result could increase math enrollment.

There is an abundance of rich **mathematics** content in *Financial Algebra*. We are going to look at a sampling of some of the advanced algebra, precalculus and statistics that it covers, all with an Algebra 1 prerequisite.

Scatterplots, linear regression, modified boxplots, outliers, mean, median, range, interquartile range:

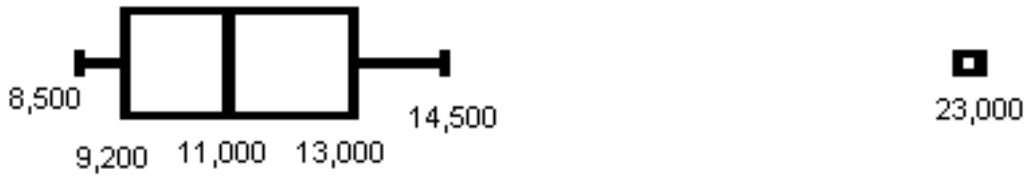
What role can statistics play in negotiating an automobile purchase or sale?

Megan is selling a used Honda. The car has 60,000 miles on it and the price is $19,000. Megan comparison shops and finds these prices for the same car.

Mileage, x	Price, y
21,000	$22,000
30,000	$19,000
40,000	$18,000
51,000	$16,700
55,000	$15,900

Price
$22,000
$19,000
$18,000
$16,700
$15,900

Brian compares 13 Chevy trucks: $8,500 $8,500 $8,500 $9,900 $10,800 $10,800 $11,000 $12,500 $12,500 $13,000 $13,000 $14,500 $23,000



It's of immediate interest to most high school students…

AUTOMOBILE INSURANCE

Mollie has 100/300/50 liability insurance, and $50,000 PIP insurance. She runs a stop sign and hits a telephone pole and bounces into a minivan with 8 people inside. Some are seriously hurt and sue her. Others have minor injuries. Three passengers in Mollie's car are also hurt.

a. The pole will cost $7,000 to replace. Mollie also did $6,700 worth of damage to the minivan. What insurance will cover this, and how much will the company pay?

b. The minivan's driver was a concert violinist. The injury to his hand means he can never work again. He sues for $4,000,000 and is awarded that money in court. What type of insurance covers this, and how much will the insurance company pay?

c. The minivan's driver (from part b) had medical bills totaling $60,000 from his hospital trip and physical therapy after the accident. What type of insurance covers this, and how much will the insurance company pay?

d. The three passengers in Mollie's car are hurt and each requires $12,000 worth of medical attention. What insurance covers this, and how much will the company pay?

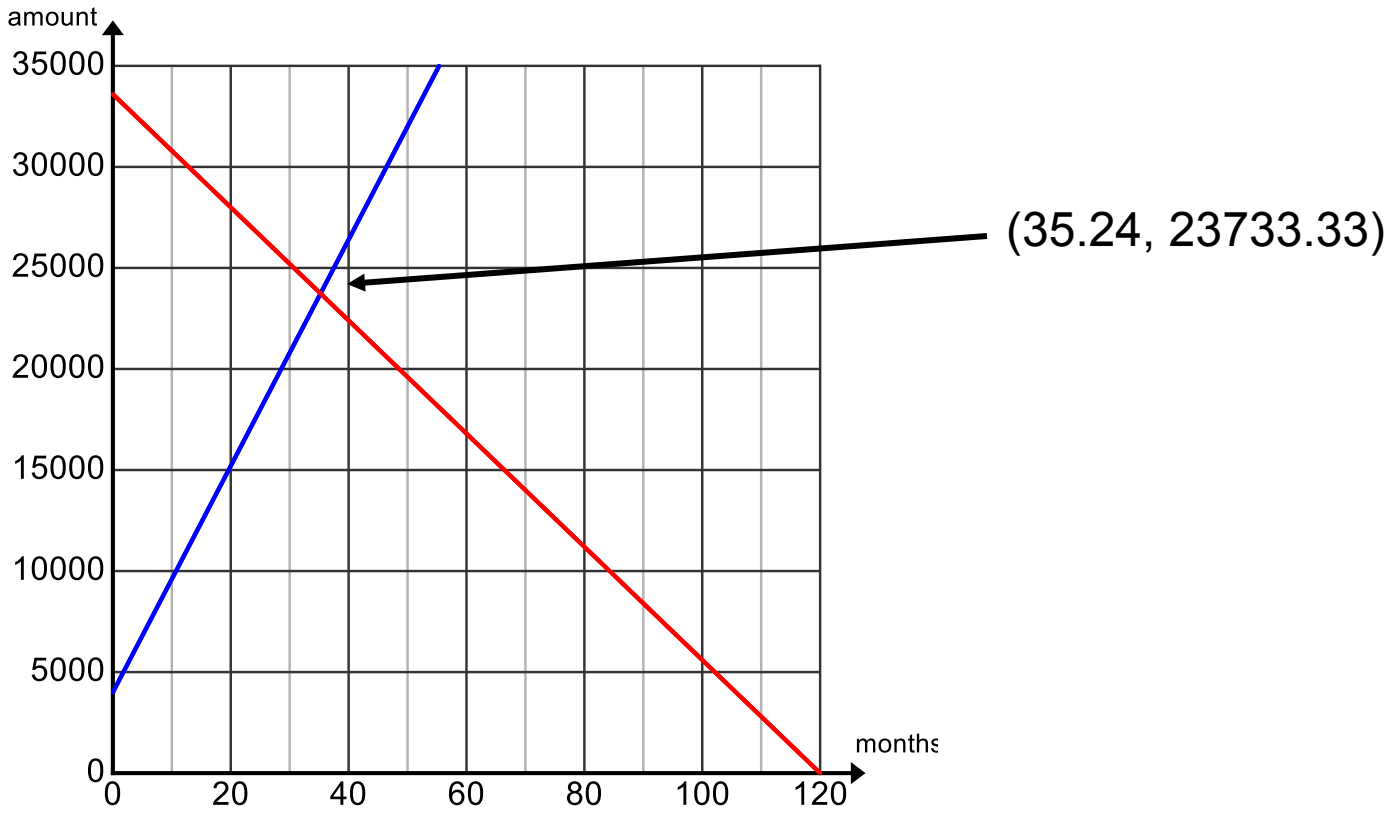
AUTOMOBILE DEPRECIATION:

How does your car appreciate or depreciate; linearly, exponentially, or like a historical "bath tub"?

STRAIGHT LINE DEPRECIATION-linear, with a negative slope.
The x and y intercepts have specific interpretations.

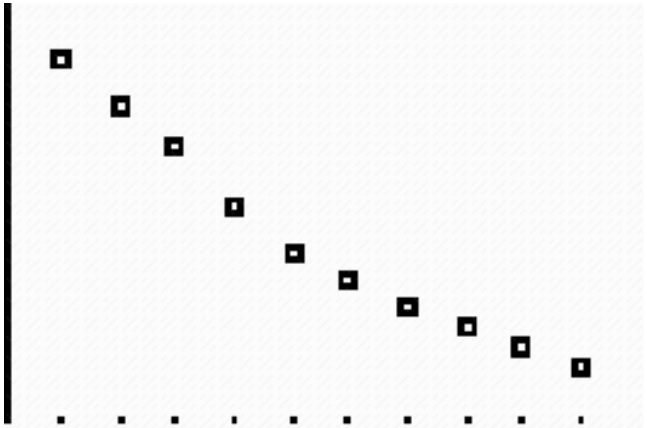
Celine bought a new car for $33,600. She made a $4000 down payment and pays $560 each month for 5 years to pay off her loan. She knows from her research that the make and model of the car she purchased is straight-line depreciated over 10 years.

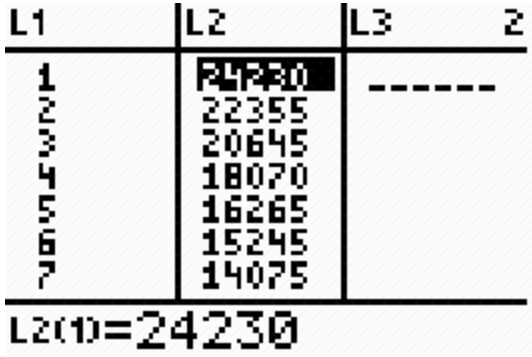
How can you model automobile loan and down payments and depreciation over a fixed period of time?

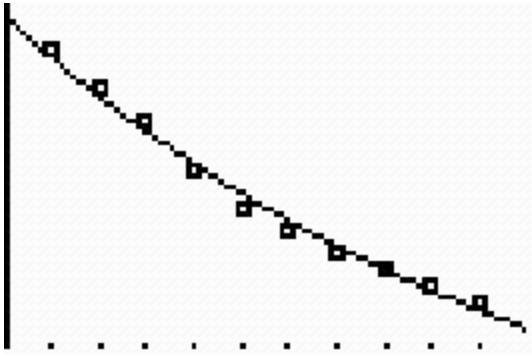


EXPONENTIAL DEPRECIATION-Students learn to model the fact that a car can lose a constant *percent* of its value each year.

AGE	VALUE		AGE	VALUE
1	24230		6	15245
2	22355		7	14075
3	20645		8	13100
4	18070		9	12325
5	16265		10	11525







Your speed can determine your financial liability in an auto accident.

- **Simple arithmetic:**

A car traveling 55 miles per hour covers 4840 feet per minute, or about 80 feet in one second. *It covers 60 feet in the reaction time of ¾ second!*

- **A quadratic function:**

Braking Distance = $5(.1s)^2$, where s = speed

- **A square root function:**

Skid speed S = $\sqrt{30Dfn}$

S = speed entering skid; D = skid distance; f= drag factor (an index); n = braking efficiency (an index).

What is compound interest?
SAVINGS ACCOUNTS

Jennifer has a bank account that compounds interest daily at a rate of 3.2%. On the morning of Feb 10 the principal is $1,234.98. That day she withdraws $200 to pay for a car repair. Later that day she is mailed a $34 check from her health insurance company, and she deposits that in the bank. On Feb 11, she deposits her $345.77 paycheck. What is her balance at the end of the day on Feb 11?

Students should get a feel for "getting interest on your interest" before deriving the compound interest formula.

Date→	Feb 10	Feb 11
Opening Balance	$1,234.98	$1,069.07
Deposit (+)	$34.00	$345.77
Withdrawal (-)	$200.00	---
Principal Used to Compute Interest	$1,068.98	$1,414.84
Day's Interest rounded to the nearest cent	$0.09	$0.12
Ending Balance- (also tomorrow's opening balance)	$1,069.07	$1,414.96

After this introduction, students derive the compound interest formula

$$B = P\left(1 + \frac{r}{n}\right)^{nt}$$

They use a calculator to evaluate

$$e = \lim_{x \to \infty}\left(1 + \frac{1}{x}\right)^{x}$$

and use $B = Pe^{rt}$ for continuous compounding.

LOANS: The vocabulary of the promissory note, lending institutions, credit ratings.

The Dalton Family wants to take out a $50,000, 10-year loan with an APR of 4.15%. What is the monthly payment?

The monthly loan payment formula must be carefully entered into a calculator—understanding the placement of the parentheses is crucial!

$$M = \frac{\left(P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{12t} \right)}{\left(\left(1+\frac{r}{12}\right)^{12t} - 1\right)}$$

MORTGAGES: The mathematics is taught alongside the vocabulary.

adjustable rate mortgage
assessed value **closing costs**
back-end ratio **balloon mortgage**
debt-to-income ratio **escrow**
foreclose **front-end ratio**
homeowner's insurance
interest only **market value**
mortgage **property taxes**

What is that "FICA" box on your paystub?

SOCIAL SECURITY & MEDICARE PAYROLL TAXES

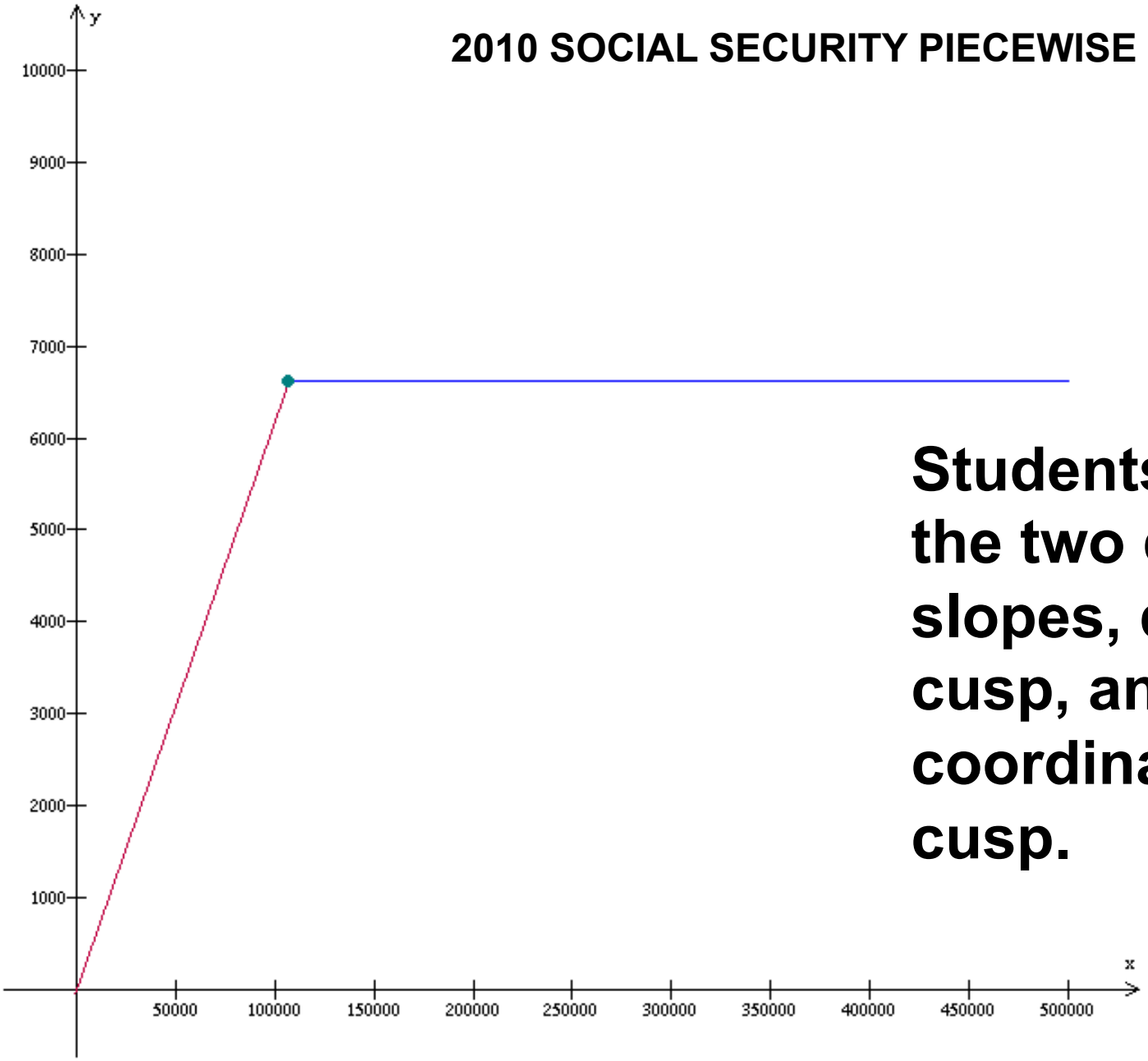
For 2010, the Social Security Tax maximum salary was $106,800. If the tax rate was 6.2% of all gross earnings up to this maximum,

a) Express the 2010 Social Security Tax as a piecewise function.

b) Draw the graph of this function.

c) Identify and interpret the coordinates of the cusp.

2010 SOCIAL SECURITY PIECEWISE FUNCTION



Students interpret the two different slopes, define a cusp, and give the coordinates of the cusp.

How can you model and graph the tax schedules?

FEDERAL TAXES

Schedule Y-1—If your filing status is **Married filing jointly** or **Qualifying widow(er)**

If your taxable income is:		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$15,100	..... 10%	$0
15,100	61,300	$1,510.00 + 15%	15,100
61,300	123,700	8,440.00 + 25%	61,300
123,700	188,450	24,040.00 + 28%	123,700
188,450	336,550	42,170.00 + 33%	188,450
336,550	.....	91,043.00 + 35%	336,550

If *f*(*x*) represents the entire tax liability function for married taxpayers filing jointly, then this tax schedule can be written in piecewise function notation as

$$f(x)=\begin{cases} 0.10x & 0 < \mathrm{x} \le 15100 \\ 1510+0.15(x-15100) & 15100 < x \le 61300 \\ 8440+0.25(x-61300) & 61300 < x \le 123700 \\ 24040+0.28(x-123700) & 123700 < x \le 188450 \\ 42170+0.33(x-188450) & 188450 < x \le 336550 \\ 91043+0.35(x-336550) & x > 336550 \end{cases}$$

For taxable incomes over $61300 but not over $123700, the equation is stated as

$$f(x) = 8440 + .025(x - 61300)$$

Distribute and combine like terms to get

y = mx + b form:

$$f(x) = 0.25x - 6885$$

This is what the IRS uses on the tax worksheet:

Section B—Use if your filing status is **Married filing jointly** or **Qualifying widow(er)**. Complete the row below that applies to you.

Taxable income. If line 43 is—	(a) Enter the amount from line 43	(b) Multiplication amount	(c) Multiply (a) by (b)	(d) Subtraction amount	**Tax.** Subtract (d) from (c). Enter the result here and on Form 1040, line 44
At least $100,000 but not over $123,700	$	× 25% (.25)	$	$ 6,885.00	$
Over $123,700 but not over $188,450	$	× 28% (.28)	$	$ 10,596.00	$
Over $188,450 but not over $336,550	$	× 33% (.33)	$	$ 20,018.50	$
Over $336,550	$	× 35% (.35)	$	$ 26,749.50	$

How can you set up an expense and a demand function?

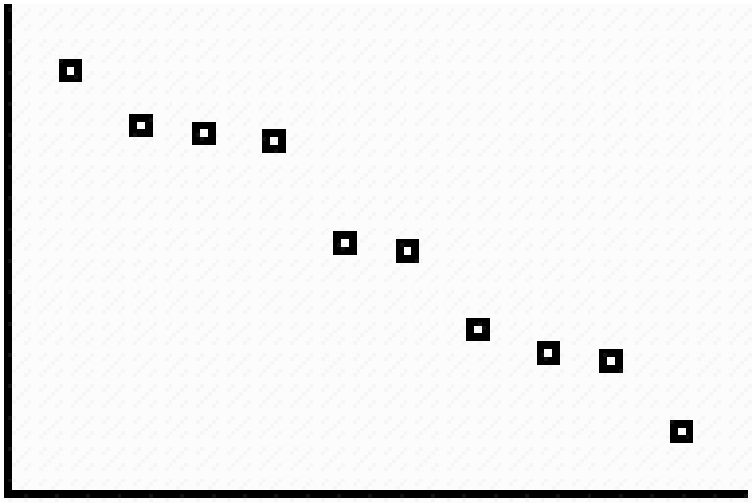
The accounting department has calculated that this new widget could be the biggest product to hit the market in years!

- They anticipate that the fixed costs to make the product will be $160,000 and the variable cost will be $150 per widget.

- The market research department conducted surveys from retail outlets that would potentially buy the widgets. In these ordered pairs, the first number represents the possible price and the second number represents the quantity demanded. The points are listed as (p, q).

  (300, 10000), (325,8900), (350, 8800), (375, 8650), (400, 6700),

  (425, 6500), (450, 5000), (475, 4500), (500, 4450), (525, 3000)



Using Linear Regression, the demand equation is

$$q = -30.74p + 19330$$

Using the concept of fixed and variable costs, the expense equation is

$$E = 150q + 160000$$

How can Revenue be expressed in terms of price?

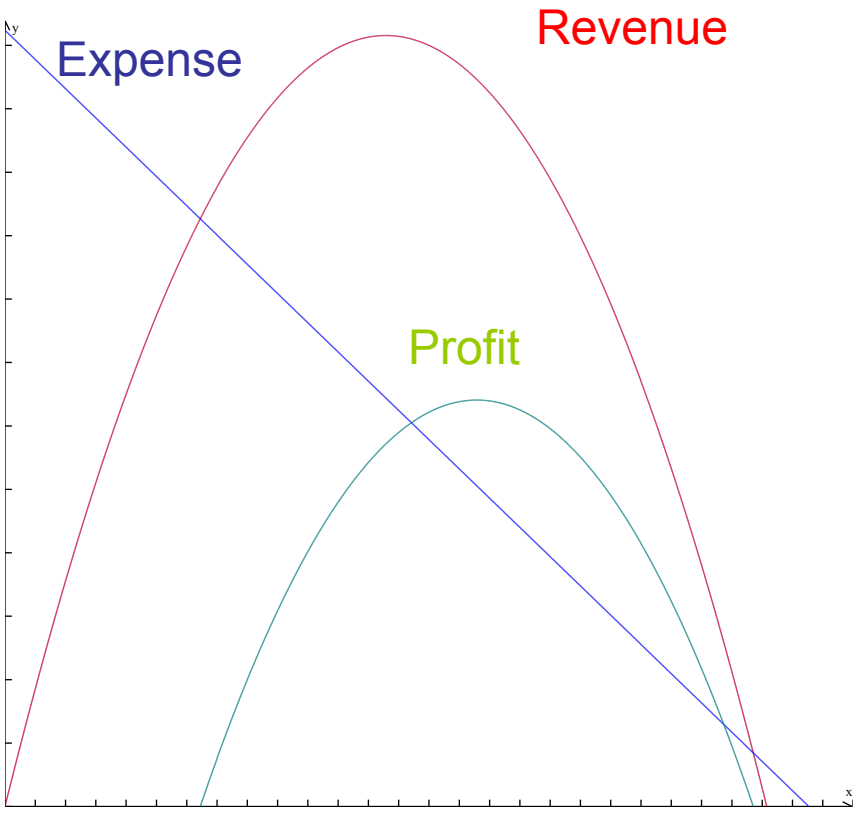
The amount of revenue generated by the sale of q widgets at a price of p dollars per widget is the product of p and q.

$$R=pq$$

Recall that q is a function of p, so the revenue function's graph is a concave down parabola.

How can profit be modeled as the difference between a quadratic and linear function?

Profit = Revenue - Expense



HOME OWNERSHIP: How many BTU's do I need?

Mike's bedroom measures 16 feet by 14 feet, and has a 9-foot ceiling. It is well-insulated, and is on the west side of his house. He wants to purchase an air conditioner. How large an air conditioner should he purchase?

$$\text{BTU rating} \approx \frac{while}{60}$$

l, w, h = length, width, height
i = insulation (an index)
e = exposure (an index)

Combining piecewise functions and the greatest integer function to model

CELL PHONE EXPENSES!

A cell phone calling plan has a basic charge per month, which includes a certain amount of free minutes. There is a charge for each additional minute. The split function below gives the price f(x) of an x-minute phone call. Fractions of a minute are charged as if they were a full minute.

$$f(x) = \begin{cases} 40 \text{ if } x \le 750 \\ 40 + 0.35(x - 750) \text{ if x} > 750 \text{ and x is an integer} \\ 40 + 0.35(\lceil x - 750 \rceil + 1) \text{ if x} > 750 \text{ and x is not an integer} \end{cases}$$

Describe the cost of the plan by interpreting the split function.

Combining the dozens of expenses addressed in the first nine chapters:

SPREADSHEETS & HOUSEHOLD BUDGETS

Mortgage
Savings
Groceries
Dining out
Car loan
College loan
Personal loan
Gasoline
Electricity
Oil
Natural gas

Cell phone
Land line phone
Water
Sanitation
Medical Insurance
Auto Insurance
Homeowner's insurance
Cable TV/Internet
Entertainment
Credit card payment
Medical bills

Auto repairs
Landscape maintenance
Plumber
Clothing
Life Insurance
Tuition
Vacation expenses
Gifts to charity
Property taxes
Income taxes, etc.

What are the essential elements of a Financial Algebra classroom?

How is it the same as a "typical" math class?

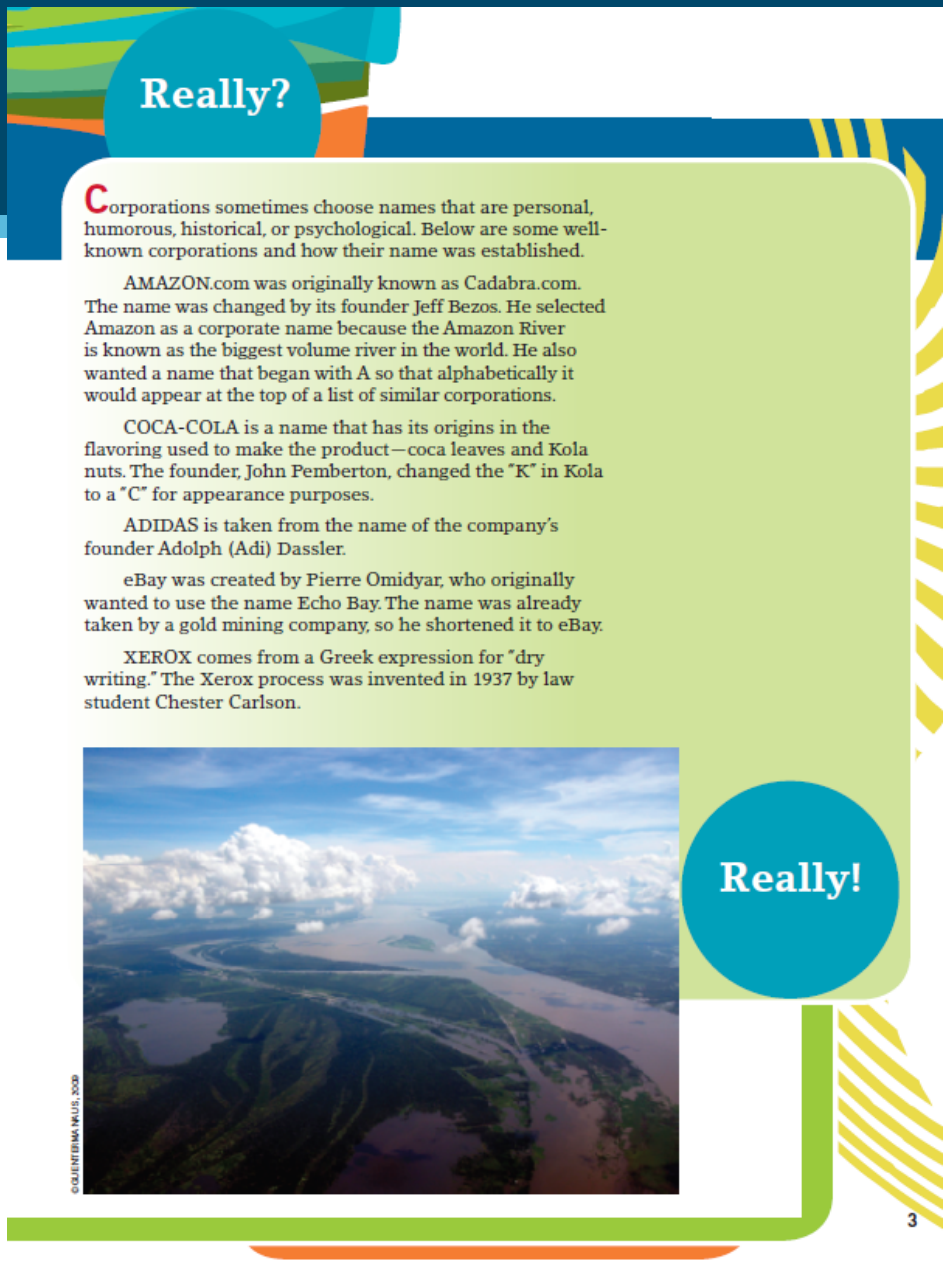
Do now, motivation, development, model problems, practice, and applications problems.

How does it differ?

DISCUSSION
PASSION
READING
HIGHLIGHTING
QUOTES
USING OUTSIDE RESOURCES
PROJECTS.
OCCASIONALLY ADMITTING *"I don't know—let's find out!"*

Instructional Model

Really? Really! grasps students' attention by discussing a fascinating real-life topic related to the chapter content.



Really?

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

Really!

3

Instructional Model

Each section opens with the statement of an ESSENTIAL QUESTION.

3-7 Future Value of Investments

How can you effectively plan for the future balance in an account?

5-9 Accident Investigation Data

What data might a car leave behind at the scene of an accident?

6-4 Employee Benefits

What are the benefits of a job?

Instructional Model

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

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

How Do You Buy and Sell Stock?

You don't buy stock at a store. Shares of stock can only be purchased through licensed **stockbrokers**. 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 at their offices. An online trading account is convenient because the investor can access it 24 hours a day.

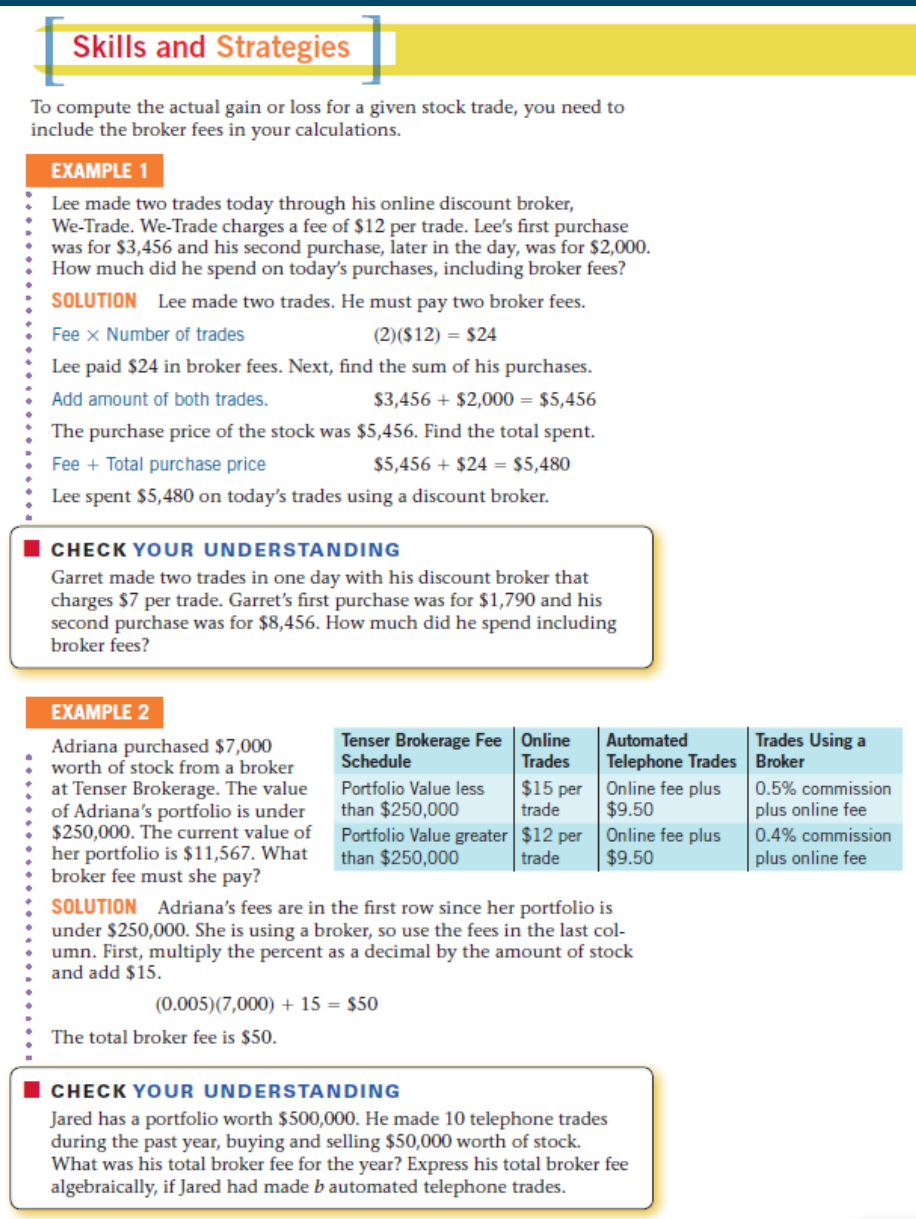
If you buy or sell **at the market**, you are instructing your broker to get the best available price. You can also place a **limit order**, which specifies the price you want to pay. If you put in a limit order to buy a stock only for a specific price, your broker will not make a purchase for any price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

Instructional Model

Skills and Strategies, teaches the math concepts through worked-out examples. Several examples teach each math concept step-by-step.

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



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 today 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 today's purchases, including broker fees?

SOLUTION Lee made two trades. He must pay 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 today's trades using a 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 value of Adriana's portfolio is under $250,000. The current value of her 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 since her portfolio is under $250,000. She is using a broker, so use the fees in the last column. First, multiply the percent as a 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.

Instructional Model

Check Your Understanding allows students to immediately practice the concept on their own.

Extend Your Understanding provides an opportunity to solve a more challenging problem.

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 gains.

Multiply 300 by purchase price.	$(300)(\$34.87) = \$10,461$
Multiply 300 by selling price.	$(300)(\$41) = \$12,300$
Subtract purchase price from selling price.	$\$12,300 - \$10,481 = \$1,819$

Jessica's gross capital gain was $1,819.

CHECK YOUR UNDERSTANDING

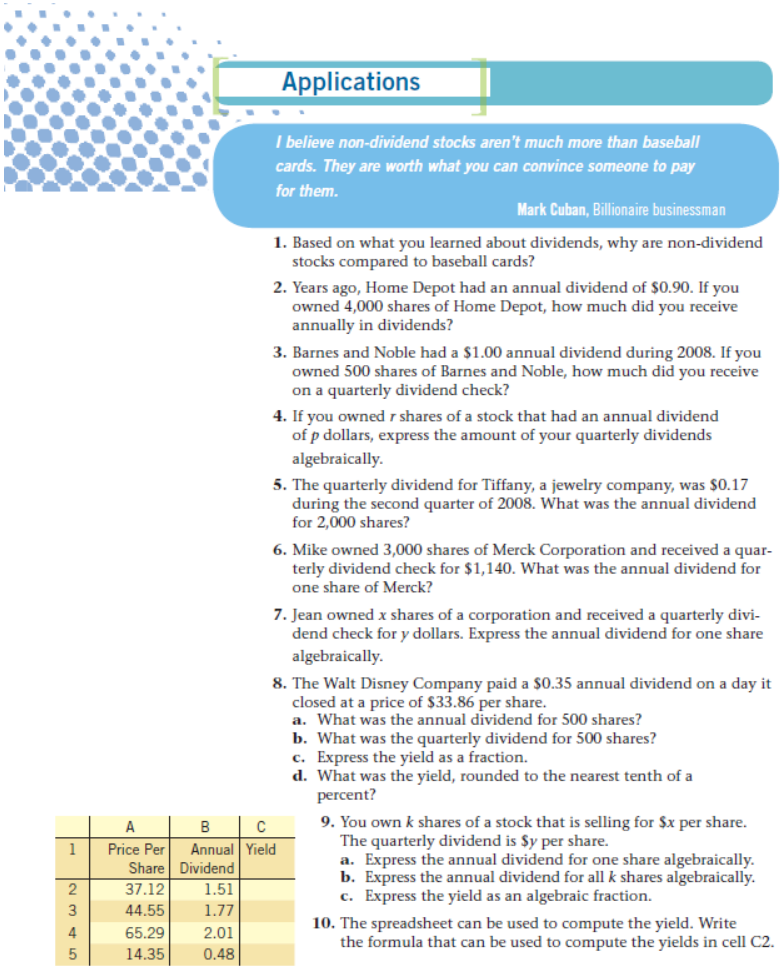
Kelvin bought 125 shares of stock for $68.24 per share. He sold them nine months later for $85.89 per share. What was his capital gain?

EXTEND YOUR UNDERSTANDING

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

Instructional Model

Carefully developed applications at the end of each lesson require students to apply concepts leanred in the section.



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?
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. 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?
4. If you owned r shares of a stock that had an annual dividend of p dollars, express the amount of your quarterly dividends algebraically.
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?
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?
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.
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?
   b. What was the quarterly dividend for 500 shares?
   c. Express the yield as a fraction.
   d. What was the yield, rounded to the nearest tenth of a percent?

	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	

9. You own k shares of a stock that is selling for $\$x$ per share. The quarterly dividend is $\$y$ per share.
   a. Express the annual dividend for one share algebraically.
   b. Express the annual dividend for all k shares algebraically.
   c. Express the yield as an algebraic fraction.
10. The spreadsheet can be used to compute the yield. Write the formula that can be used to compute the yields in cell C2.

Instructional Model

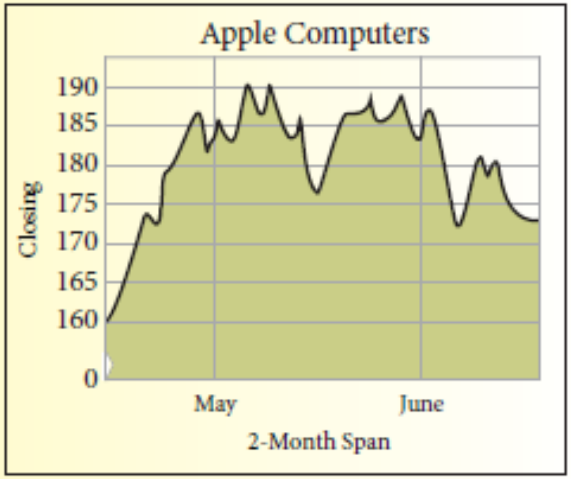
CHAPTER 1

Assessment

Real Numbers

You Write the Story!!

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



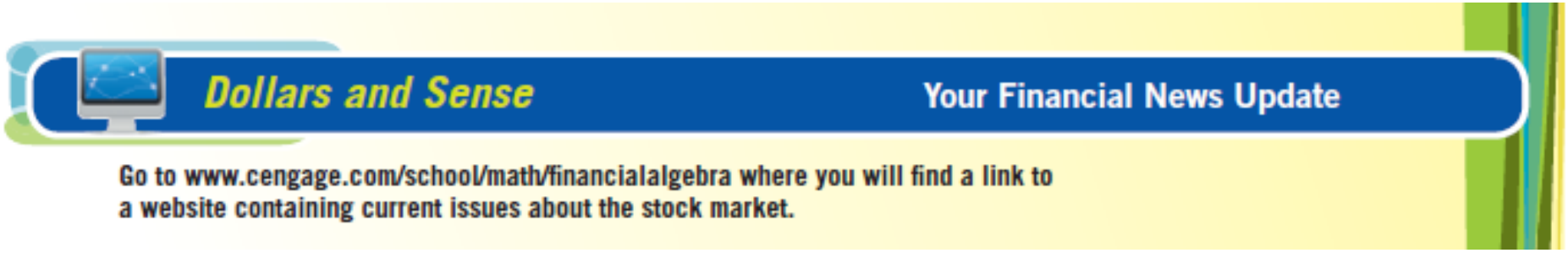
Instructional Model

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. During the three weeks, 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. Contact the New York Stock Exchange by mail or through the website. Request a list of publications that the Exchange offers.
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 stock broker 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.

Instructional Model

Dollars and Sense guides students to the companion website where they will find up-to-date information and activities related to the chapter content.



Instructional Model

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

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.
   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 them when the price rises 20%. At what price will he sell his shares?
3. The top three shareholders 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.
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.
5. A local hairdresser bought 450 shares of a cosmetics corporation for $33.50 per share. He sold them 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.
6. Deanna purchases $24,000 worth of stock and pays her broker a 1% broker fee. She sells it when it increases to $29,100 three years later and uses a discount broker who charges $35 per trade. Compute her net proceeds after the broker fees are taken out.
7. The Revreg Corporation paid Leslie a quarterly dividend check for $828. Leslie owns 450 shares of Revreg. What was the quarterly dividend for one share of Revreg?
8. Aaron owned x shares of a corporation and received an annual dividend of y dollars. Express the quarterly dividend for one share algebraically.
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 has 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 Zyco close on Monday?
   c. What was the yield on Monday? Round to the nearest tenth of a percent.

Instructional Model

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

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.

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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.

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

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.

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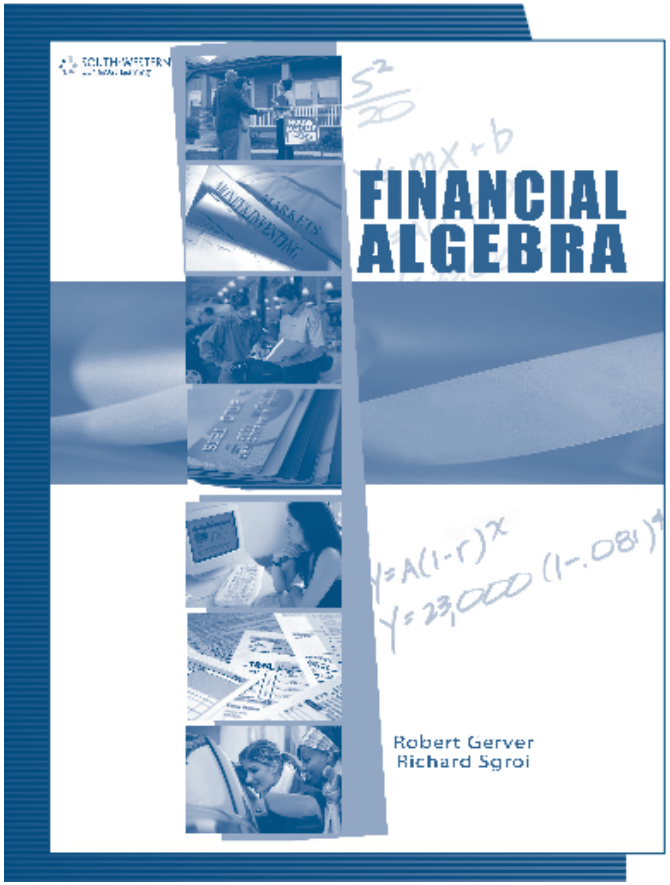


NATIONAL GEOGRAPHIC LEARNING

Name _____ Date _____

1-5 Stock Market Ticker

Exercises

Use the following ticker to answer Exercises 1 - 6. The stock symbols represent the corporations: C, CitiGroup Inc; BAC, Bank of America; F, Ford Motor Corp; and MOT, Motorola.

MOT 4.2K @ 8.38 ▼ 0.16 BAC .65K @ 15.28 ▲ 1.11

F 61.8K @ 9.67 ▼ 2.07 C 76K @ 3.42 ▲ 0.09

1. Millie is following the trades of Motorola. The result of the latest trade is posted on the ticker.
   a. How many shares of MOT were traded and at what price per share?
   b. What was the value of the MOT trade?
   c. Suppose the next MOT trade represents a sale of 1,200 shares at a price that is $0.23 lower than the last transaction. What will Millie see scrolling on the ticker for this transaction?
2. Susan sold her Bank of America shares as indicated on the ticker above.
   a. How many shares did she sell?
   b. For how much did each share sell?
   c. What was the total value of all the shares Susan sold?
   d. Suppose that the next BAC trade that comes across the ticker represents a sale of 34,000 shares at a price that is $2.31 higher than the last transaction. What will Susan see scrolling across her screen for this transaction of BAC?
3. How many shares of Ford are indicated on the ticker?
4. What is the total value of all of the CitiGroup shares traded?
5. Interpet each of the following.
   a. @3.42 b. MOT 4.2K c. ▲1.11
6. What was the previous day's closing price for each stock?

Workbook

Name _____ Date _____

11. How much interest would y dollars earn in one day at a rate of 3.75% compounded daily?

12. Mrs. Huber opened a savings account on June 26 with a $1,300 deposit. The account pays 3.6% interest compounded daily. On June 27, she deposited $450 and on June 28 she withdrew $110. Complete the table based on Mrs. Huber's banking activity.

	June 26	June 27	June 28
Opening balance	a.	f.	k.
Deposit	b.	g.	---
Withdrawal	---	---	l.
Principal used to Compute Interest	c.	h.	m.
Interest	d.	i.	n.
Ending Balance	e.	j.	p.

13. Mr. Nolan has a bank account that compounds interest daily at a rate of 3.7%. On the morning of December 7, the principal is $2,644.08. That day he withdraws $550 to pay for a snow blower. Later that day he receives a $934 paycheck from his employer, and he deposits that in the bank. On December 8, he withdraws $300 to go holiday shopping. What is his balance at the end of the day on December 8?

14. Mrs. Platt has an account that pays p percent interest compounded daily. On April 27, she had an opening balance of b dollars. Also on April 27, she made a w dollars withdrawal and a d dollars deposit. Express her interest for April 27 algebraically.

15. This morning, Mrs. Rullan had a balance of b dollars in an account that pays 3.05% interest compounded weekly. This afternoon she makes a withdrawal in the amount of w dollars. Express her interest for the day algebraically.

16. Kristin deposited $9,000 in an account that has an annual interest rate of 4.1% compounded monthly. How much interest will she earn at the end of one month?

17. How much would $25,000 earn in one hour at the rate of 5%, compounded hourly?

18. The Jules Server Scholarship Fund gives a graduation award of $250 to a graduating senior at North End High School. Currently the fund has a balance of $8,300 in an account that pays 5.2% interest compounded annually. Will the amount earned in annual interest be enough to pay for the award?

19. Kelly has d dollars in an account that pays 3.4% interest compounded weekly. Express her balance after one week algebraically.

Name _____ Date _____

3-5 Compound Interest Formula

Exercises

Round to the nearest cent wherever necessary.

1. Mr. Mady opens a savings account with principal P dollars that pays 4.11% interest compounded quarterly. Express his ending balance after one year algebraically.

2. Jeff deposits $2,300 at 3.13% interest compounded weekly. What will be his ending balance after one year?

3. Nancy has $4,111 in an account that pays 3.07% interest compounded monthly. What is her ending balance after two years?

4. Mr. Weinstein has a savings account with a balance of $19,211.34. It pays 4% interest compounded daily. What is his ending balance after three years, if no other deposits or withdrawals are made? How much interest does he earn over the three years?

5. If you invested $10,000 at 3.8% compounded hourly for five years, what would be your ending balance?

6. Danielle has a CD at Crossland Bank. She invests $22,350 for four years at 4.55% interest, compounded monthly. What is her ending balance? How much interest did she make?

7. Ms. Santoro is opening a one-year CD for $16,000. The interest is compounded daily. She is told by the bank representative that the annual percentage rate (APR) is 4.8%. What is the annual percentage yield (APY) for this account?

8. Knob Hill Savings Bank offers a one-year CD at 3.88% interest compounded daily. What is the APY for this account? Round to the nearest hundredth of a percent.

9. Kings Park Bank is advertising a special 5.08% APR for CDs. Kevin takes out a one-year CD for $24,000. The interest is compounded daily. Find the APY for Kevin's account.

10. Imagine that you invest $100,000 in an account that pays 5.9% annual interest compounded monthly. What will your balance be at the end of 18 years?

11. Yurik invests $88,000 in a CD that is locked into a 4.75% interest rate compounded monthly, for seven years. How much will Yurik have in the account when the CD matures?

Guided Practice CD

Name _____ Date _____

1-1 Business Organization

Key Words

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

Key Math Concepts

- Multiply a decimal by 100 to change it to a percent. Then insert a % sign.
- Divide a percent by 100 to change it to a decimal. Then remove the % sign.
- $\frac{\text{amount of investment}}{\text{total investment}}$ = percent of investment

Guided Exercises

1. The Metropolitan Corporation has issued a total of 2,400,000 shares. The North Side Investment Group owns 7.5% of those shares. How many shares does North Side own?

Total number of shares × Percent = Number of shares owned

2,400,000 × 7.5% = Number of shares owned

2,400,000 × =

North Side Investment Group owned shares.

2. Enid, Eve, and Tammy have formed a partnership. The total investment was $400,000. Enid owns 35.4% and Eve owns 28.8% of the partnership. How much did Tammy invest?

(Enid + Eve + Tammy) % = 100%

+ + = 100

100 – 35.4 – 28.8 =

Tammy invested % in the partnership.

Amount of total investment × Tammy's percent = Amount Tammy invested

× = Amount Tammy invested

× =

Tammy invested in the partnership.

Name _____ Date _____

Exercises

3. Three partners are investing a total of $1,200,000 in a new restaurant. Their investments are in the ratio of 6:8:11. How much did each invest?

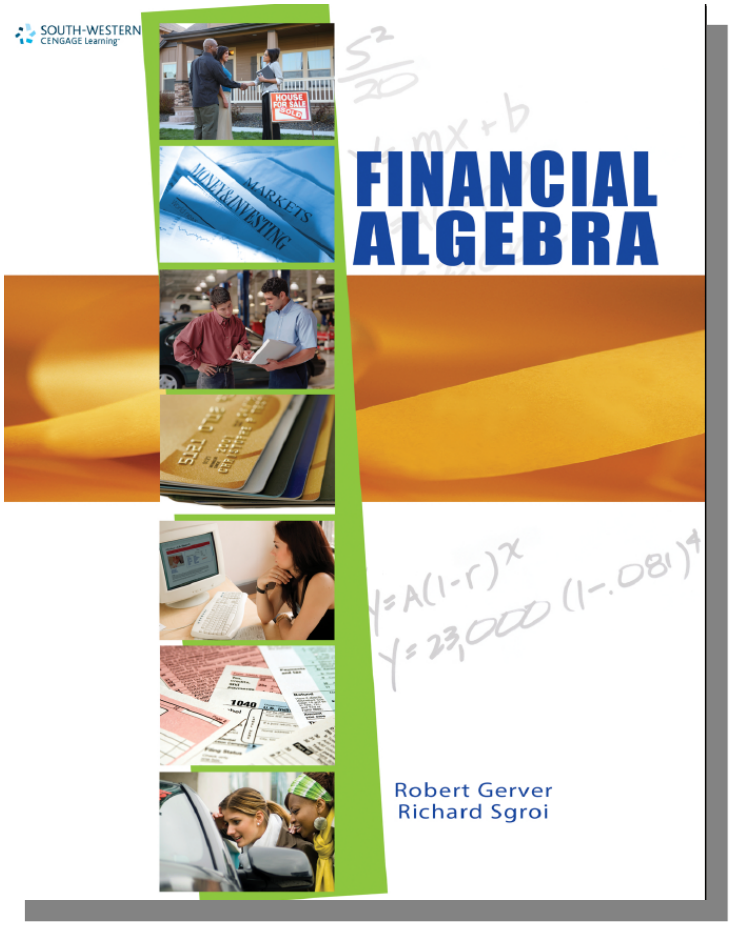
4. Dennis owns 24% of a partnership. Bob owns 48% of the partnership. If Rich is the third partner, what percent of the partnership does he own? Write a simplified ratio to represent their investments in the partnership.

5. Angel owns $\frac{5}{8}$ of a partnership in a bakery. What percent of the bakery does Angel own? Angel's partner, Lisa, owns the remaining portion of the bakery. Write a simplified ratio to represent Angel's ownership to Lisa's ownership in the bakery.

6. The Barnaby Corporation issued 2,700,000 shares of stock. How many shares must a shareowner own to have a majority of the shares?

7. Mike, Rob, Jon, and Kristy own shares in the Arlington Partnership in the ratio of *a*:*b*:*c*:*d* respectively, Arlington is now worth *E* dollars. Write an algebraic expression for the percent of the partnership that represents Mike's investment.

Any questions?
rgerver@optonline.net



Financial Algebra

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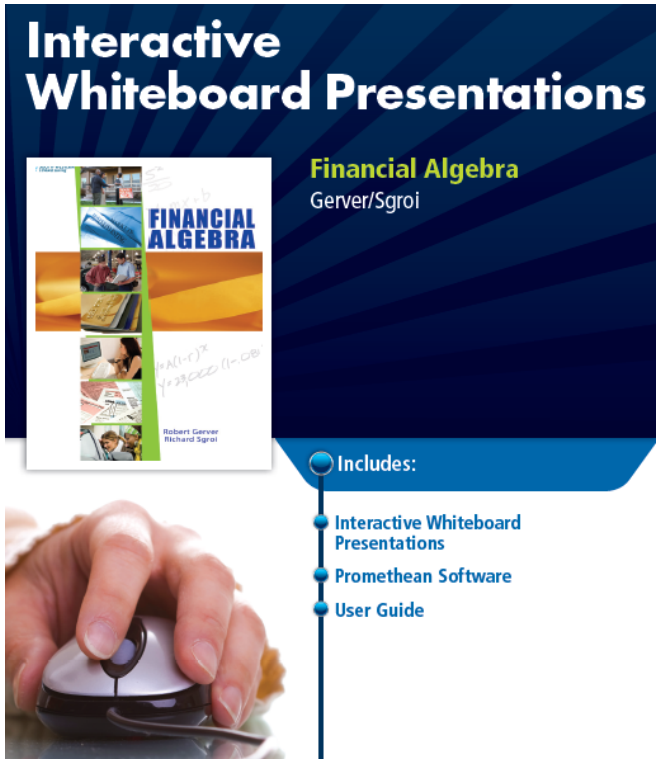

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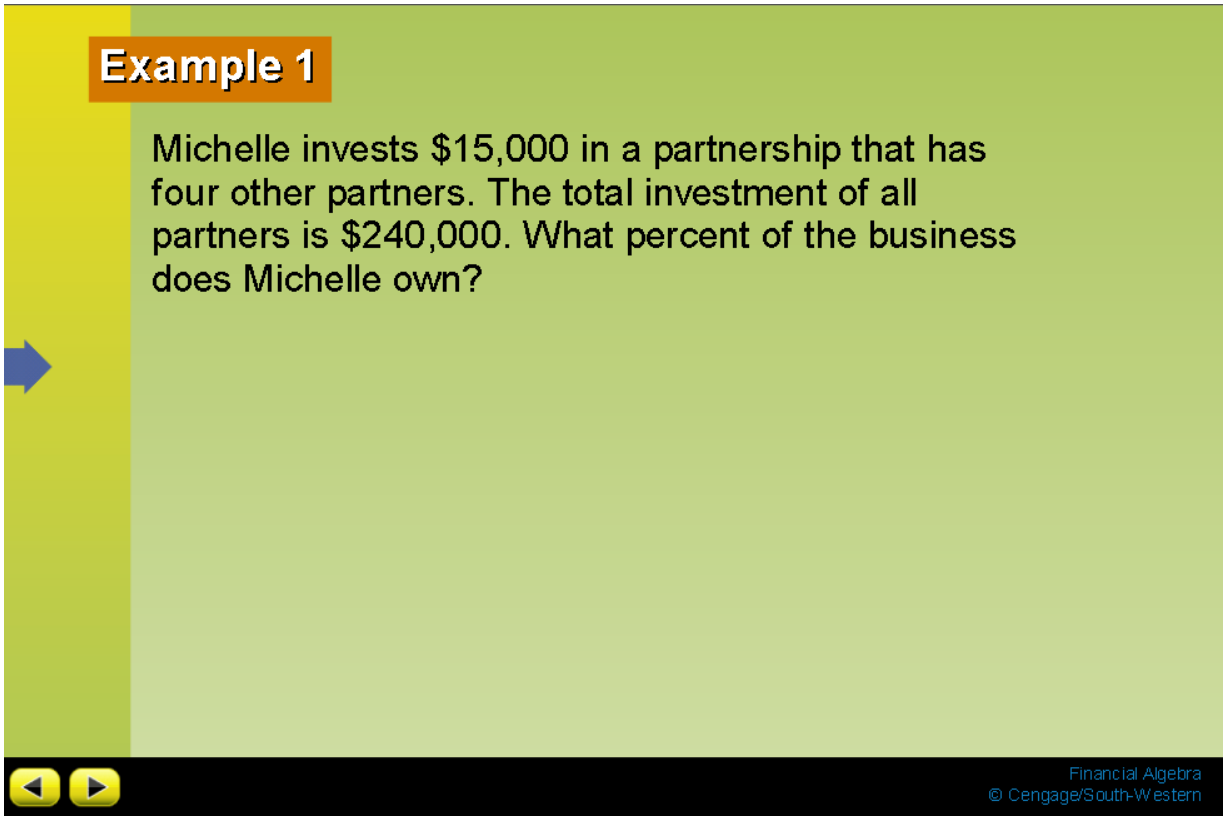

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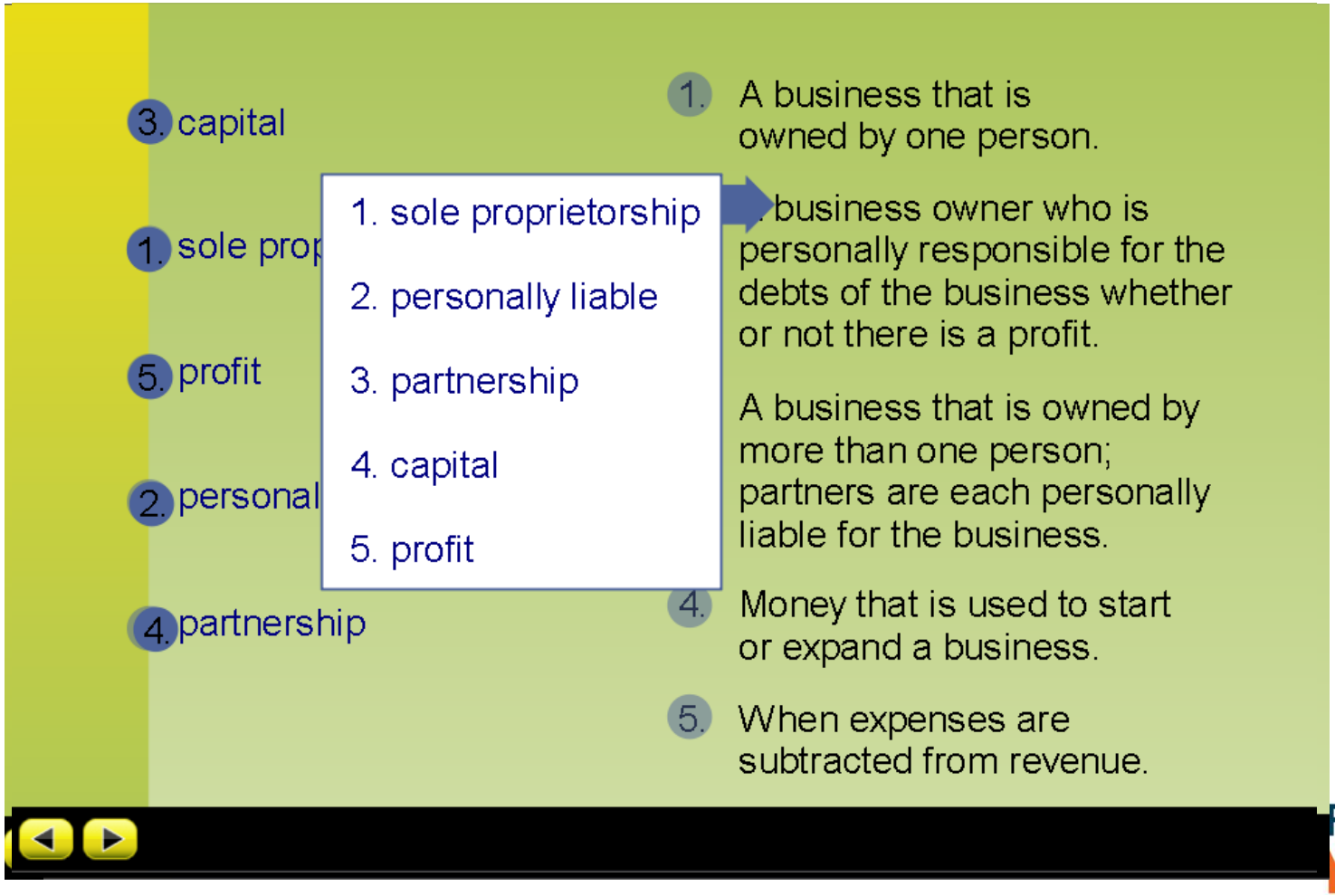

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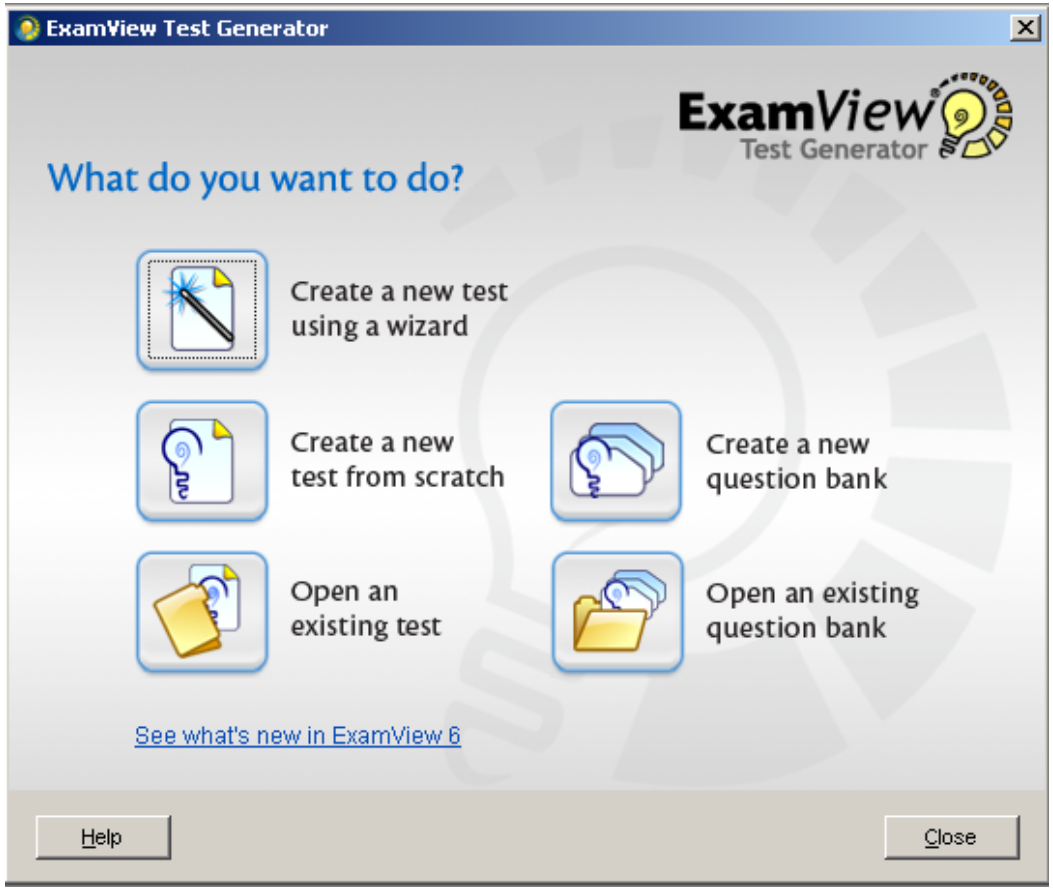
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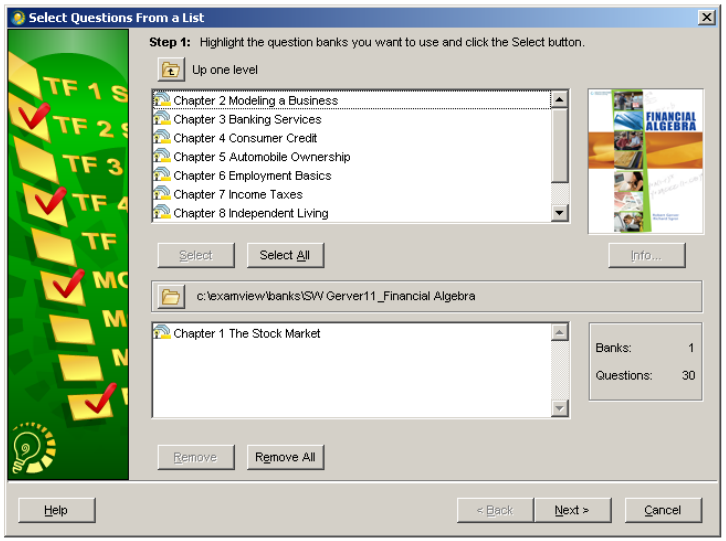
Name: _____ Class: _____ Date: _____ ID: A

Chapter 1 Test



Chapter 1 Test

Name: _____ Class: _____ Date: _____ ID: A

Chapter 1 Test

True/False
Indicate whether the statement is true or false.

____ 1. In a reverse stock split, the number of outstanding shares is reduced while the market price per share stays the same.

____ 2. Comanche Ltd closed at $15.89, a $0.43 decrease from the closing price the day before. This is a 2.6% decrease.

____ 3. A crossover occurs when one moving average crosses over another. Investor fast-moving average crosses over a slow-moving average and should consi de crosses below a slow-moving average.

____ 4. When there is a fractional part of a share, the company will buy the fractiona fractional shares are not traded.

____ 5. Vito owned 120 shares of a stock before the corporation instituted a 5-for-3 was selling at $16 a share. Vito now has 200 shares of the stock that is worth

____ 6. Xavier bought 4,000 shares of XYZ stock at $17.37 per share. This price wa day's closing price. The ticker for this transaction will appear as XYZ 4K@

____ 7. One share of Kimco's common stock pays an annual dividend of $1.43. Tod a net change of +0.72. The stock yield at yesterday's closing price is about

____ 8. Rebecca correctly calculated the 3-day SMA of these stock prices $11, $14, $12.67, and $12.00.

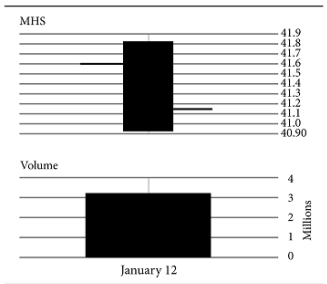
____ 9. Leon purchased 8,500 shares of stock at a price of $11.45 a share. He sold th of $19.78 per share. His capital gain is about 58%.

____ 10. Roxanne placed a limit order. This means she specified the price that she wo does not fall to that price, then the stocks are not purchased.

Name: _____

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 11. The stock bar chart below shows price and volume information for Medco Hea January 12. What was the opening price?



a. 40.92 c. 41.14
b. 41.60 d. 40.92

____ 12. A candlestick chart is a type of stockbar chart. The real body is displayed in di action for that day. What does it mean if the real body is red?
a. The stock closed higher than the opening price.
b. The stock closed at the opening price.
c. The stock opened higher than the closing price.
d. The stock closed lower than the opening price.

____ 13. On July 3, the ABC corporation closed at $43.67. This was a $0.47 increase from the close the day before. What percent change is this?
a. +98.91% c. +1.09%
b. –1.09% d. –1.07%

____ 14. Eleanor purchased $2,568 worth of stock and paid her broker a 0.5% fee. She sold the stock when the stock price increased to $3,298, using an online broker that charged $7 per trade. What are her net proceeds?
a. $710.16 c. $755.68
b. $735.84 d. $851.40

Name: _____ ID: A

23. McKenzie buys 250 shares of stock for $12 a share and pays a 2% commission. She sells the stock 3 years later for $18 a share and pays a 1% commission. What are her net proceeds?

24. Quinton bought x number of shares for p dollars and paid a 1% commission. He sold the stock for y dollars and paid a flat fee of $7. Express Quinton's net proceeds algebraically.

25. Katelyn owns 140 shares of a stock that sells for $39 a share before a 3-for-2 split is announced. After the split, how many shares of the stock will Katelyn own and what will they be worth?

26. Mrs. Thomas owns 1,500 shares of a corporation that pays a quarterly dividend of $0.36 a share. How much in dividends did she receive last year?

27. This information was posted at the end of the trading day on June 12.

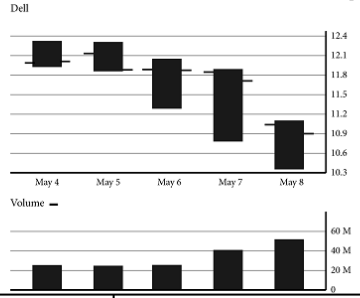
52-week High	52-week Low	Stock	Last	Change	Sales of 100s	High	Low
64.89	50.34	ABC Inc	58.19	–2.03	23.9	60.18	54.42
212.65	189.40	XYZ Corp	207.21	–17.54	1.6	210.16	197.34
145.90	113.38	CAT Ltd	144.68	+8.92	38.2	132.75	127.89

What was the closing price of CAT Ltd on June 11?

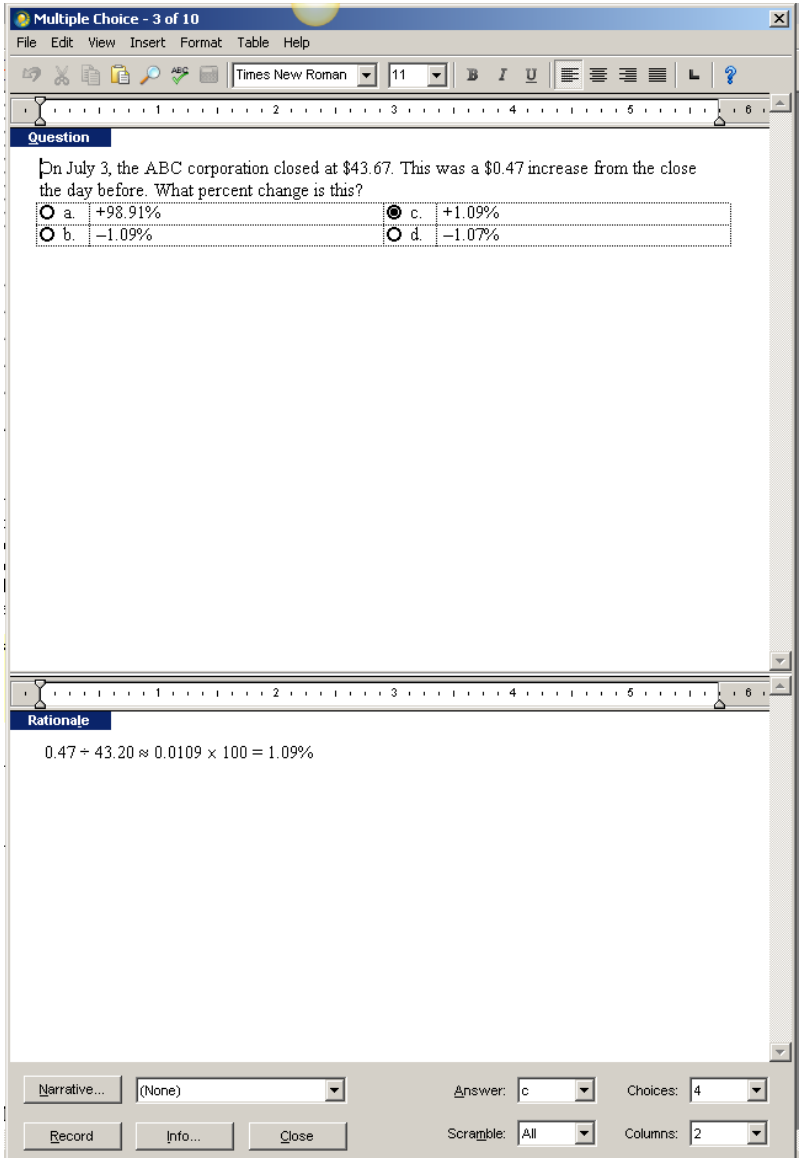
28. A certain corporation listed their sales in 100s as 1700. What was their actual volume in thousands?

29. The information released on a particular corporation at closing shows a Chg of –2.35. What does this mean?

30. The stock bar chart shows the market action for Dell during the week of May 4.



Edit Question



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