

GETTING TO KNOW

FINANCIAL ALGEBRA

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**Everytime I see a math word problem it looks like this:
If I have 10 ice cubes and you have 11 apples.
How many pancakes will fit on the roof?**

**Answer:
Purple because aliens
don't wear hats.**

arrg!  cards



What Have We Learned From The Madoff Ponzi Scheme?

.....consider the strange story of Harry Markopolos. Mr. Markopolos is the former investment officer with Rampart Investment Management in Boston who, for nine years, tried to explain to the Securities and Exchange Commission that Bernard L. Madoff couldn't be anything other than a fraud. Mr. Madoff's investment performance, given his stated strategy, was not merely improbable but **mathematically impossible**. And so, Mr. Markopolos reasoned, Bernard Madoff must be doing something other than what he said he was doing.”

- New York Times January 2009

THE ALGEBRA / FINANCE RELATIONSHIP



- MATHEMATICAL MODELING**
- INDEPENDENT & DEPENDENT VARIABLES**
- MULTIPLE REPRESENTATIONS –
VERBAL, PICTORIAL, GRAPHICAL, SYMBOLIC**
- USING STATISTICS TO ANALYZE DATA AND MAKE
PREDICTIONS**

REAL WORLD - REAL MATH



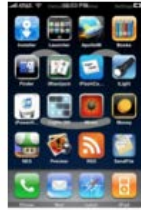
MAKING THE CASE

FOR

**QUANTITATIVE
FINANCIAL
LITERACY**

WHICH ARE YOUNG ADULTS LIKELY TO KNOW MORE ABOUT?

APR or **APP?**



Celebrity Splits

iRS or **iRA** or **iPad?**



CD RATES



CDs



FICO



FICA



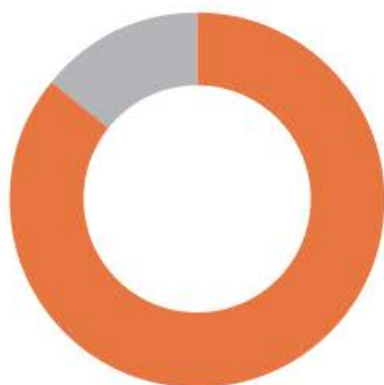
FACEBOOK



2011 TEENS & MONEY SURVEY FINDINGS

INSIGHTS INTO MONEY ATTITUDES, BEHAVIORS AND EXPECTATIONS OF 16- TO 18-YEAR-OLDS

MOST TEENS ARE INTERESTED IN LEARNING MORE ABOUT MONEY



86%

SAY THEY WOULD RATHER LEARN ABOUT MONEY MANAGEMENT IN A CLASS BEFORE MAKING MISTAKES IN THE REAL WORLD.



75%

SAY THAT LEARNING MORE ABOUT MONEY MANAGEMENT, INCLUDING BUDGETING, SAVING AND INVESTING, IS ONE OF THEIR TOP PRIORITIES.

FINANCIAL LITERACY AND IGNORANCE

WHAT DO PEOPLE ACTUALLY KNOW ABOUT
PERSONAL FINANCE? NOT MUCH, IT SEEMS...

Annamaria Lusardi, Dartmouth College
annalusardi.blogspot.com/

THREE REASONS TO TEACH FINANCIAL LITERACY IN SCHOOLS

- 1 – It is important to be financially literate **BEFORE** engaging in financial contracts and **NOT AFTER!**
- 2 – Financial knowledge is based on scientific concepts...and the groundwork for this sort of conceptual understanding is **BEST LAID IN A FORMAL EDUCATIONAL SETTING.**
- 3 – Current studies show that financial literacy is **UNEQUALLY DISTRIBUTED** in the young population...[We should] give everyone a chance to learn it.

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.

THE NEW YORK TIMES August 24, 2011

There is widespread alarm in the United States about the state of our math education. All this worry, however, is based on the assumption that there is a single established body of mathematical skills that everyone needs to know to be prepared for 21st-century careers. This assumption is wrong. The truth is that different sets of math skills are useful for different careers, and our math education should be changed to reflect this fact.

THE NEW YORK TIMES July 28, 2012

Algebraic algorithms underpin animated movies, investment strategies and airline ticket prices. And we need people to understand how those things work and to advance our frontiers. Quantitative literacy clearly is useful in weighing all manner of public policies... I propose that we start thinking about alternatives.... Mathematics teachers at every level could create exciting courses in what I call "citizen statistics" [which] would familiarize students with the kinds of numbers that describe and delineate our personal and public lives.

Before I came to this class, I had no idea about money. I have way more knowledge now!

Considering what has happened to the economy, everyone should learn this.

This should be a requirement because it teaches you math you will use.

The course has prepared me for financial life. It really opens your eyes.

Here is what my students said...

The course is a great way to get a head start on the financial world.

It teaches you financial life lessons that teenagers need as they go on in life. It has helped me to learn how to manage my finances and my credit.

My favorite part is learning things beyond what banks and credit card companies let us know. It is all so important.

This course helps us manage our money responsibly.

From a parent.....

- *I just wanted to take the time to thank you for such a giving class that you have created. I have never heard so much about a class over the years from any of my children. It definitely is a life learning class.*

The Jump Start Coalition for Personal Financial Literacy

www.jumpstart.org



919 Eighteenth Street NW
Suite 300
Washington, DC 20006-5517

FINANCIAL ALGEBRA

Q & A

WHAT IS IT?

WHAT'S IN IT?

WHO IS IT FOR?

WHERE DOES IT FIT?

WHY SHOULD STUDENTS TAKE IT?

WHY DO STUDENTS LIKE IT?

WHERE ELSE IS IT BEING TAUGHT?

WHEN AM I EVER GOING TO USE THIS?



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 employs **spreadsheets** and the **graphing calculator**.

-----TOPICS COVERED IN THE TEN CHAPTERS-----

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

What Financial Topics Comprise the **FINANCIAL Algebra** Program?

- **Investing**
- **Starting Your Own Business**
- **Banking**
- **Credit**
- **Owning an Automobile**
- **Employment Basics**
- **Income Taxes**
- **Independent Living**
- **Retirement Planning**
- **Budgeting**

Covers these units using selected topics from Algebra 2, Precalculus, Statistics, Probability and Geometry that are taught at an ability-appropriate level for the Algebra 1-prerequisite audience.

What Mathematical Topics Comprise the **Financial Algebra** Program?

Piecewise functions

Linear and curvilinear
regression

Quadratic/linear systems

Slopes and intercepts

Inequalities

Limits

Maximization

Exponential functions

Greatest integer function

Modified box & whisker plots

Expected value

Outliers

Probability

Graphing

Solving equations

Apothem, area, perimeter

Rational functions

Irrational functions

Spreadsheets

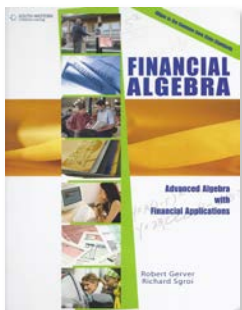
Literal equations

Modeling

www.cengage.com/community/financialalgebra

“Making The Case For Financial Algebra”

STRATEGIES FOR TACKLING THE MATHEMATICS



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
- Students who failed Algebra 2, and need another math course.

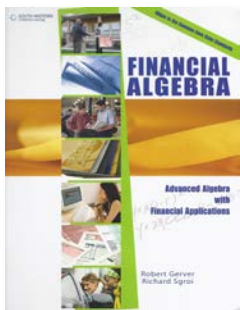


WHAT ARE THE DIFFERENT PATHWAYS TO GRADUATION THAT INCLUDE FINANCIAL ALGEBRA (FA)?

Freshman	Sophomore	Junior	Senior
Algebra 1	FA	Geometry	Algebra 2
Algebra 1	Geometry	FA	Algebra 2
Geometry	Algebra 2	PreCalc/FA	Calculus
Geometry	Algebra 2	FA	Precalculus*
Algebra 1	Geometry	Algebra 2	FA
-----TWO YEAR ALGEBRA-----		Geometry	FA
Algebra 1	-----TWO-YEAR GEOMETRY-----		FA

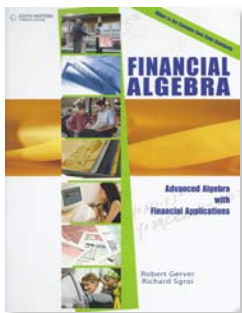
**Customize your senior course—a fall semester of matrices, polar coordinates, limits, etc., and then a spring semester of five chapters of Financial Algebra—Automobiles, Employment, Income Taxes, Credit and Banking.*

FA can be taken concurrently with Geometry, Algebra 2, or Precalculus, and it can be taken as an ELECTIVE.



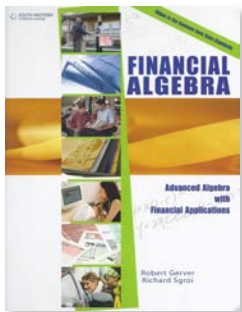
WHY SHOULD STUDENTS TAKE FINANCIAL ALGEBRA?

- 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.



HOW DOES FINANCIAL ALGEBRA DIFFERENTIATE INSTRUCTION?

- The problem sets generally graduate in difficulty level, making developing appropriate assignments a teacher-friendly process.
- Projects allow students to demonstrate knowledge in many alternative ways.
- Projects can be completed at many different skill levels.
- Sections and chapters can be skipped without loss of continuity.
- The course offering allows students to demonstrate mastery of rigorous math concepts in a format alternative to the traditional course path.
- Order of presentation of chapters can be changed.



WHY DO STUDENTS LIKE FINANCIAL ALGEBRA?

- It treats them like an adult with age-level interest material.
- It finally gives them a place to see where they **NEED** mathematics.
- It gives them a chance to use their mathematical skills to save them money.
- The motivational topics are of current interest to them.
- They have a chance to discuss, comment, and argue in a mathematics class.

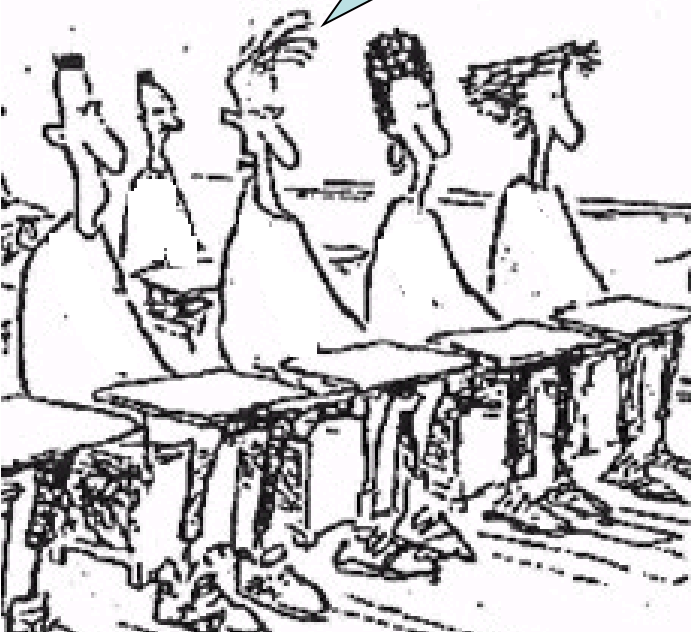
WHERE IS FINANCIAL ALGEBRA BEING USED?

DENVER CENTER FOR INTL STUDIES	DENVER	NEW LOTHROP SR HIGH SCHOOL	NEW LOTHROP	MI
DENVER PUBLIC SCHOOL DIST 1	DENVER	NORTHVILLE PUBLIC SCHOOL DIST	NORTHVILLE	MI
EAST HIGH SCHOOL	DENVER			
FRED N THOMAS CAREER EDUC CTR	DENVER	DETROIT CATHOLIC CENTRAL H	HILLSBORO SCHOOL DISTRICT 1J	HILLSBORO OR
GEORGE WASHINGTON HIGH SCHOOL	DENVER	WESTERN SCHOOL DISTRICT	SOUTHERN OREGON ED SERV DIST	MEDEFORD OR
JOHN F KENNEDY		PORTLAND HIGH SCHOOL	PHILOMATH HIGH SCHOOL	PHILOMATH OR
NORTH HIGH SCH	EFFINGHAM CO SCHOOL DISTRICT	REDFORD UNIV	MILWAUKIE HIGH SCHOOL	MILWAUKIE OR
SOUTH HIGH SCH	PATRICK HENRY HIGH SCHOOL	LAKE SHORE	NORTHWEST TEXTBOOK	PORTLAND OR
SOUTH HIGH SCH	STOCKBRIDGE HIGH SCHOOL	WHITTFMORE	-	-
THOMAS JEFFERS	WOODLAND HIGH SCH	HANNAHVILL	Not Specified	-
WEST HIGH SCH	WOODLAND HIGH SCH	WAYZATA HI	SYRACUSE CITY S	REYNOLDS HIGH SCHOOL
BERLIN HIGH SCH	WORTH CO SCHOOL DISTRICT	ST LOUIS PAR	SYRACUSE CITY S	TULPEHOCKEN JR SR HIGH SCHOOL
DYSART HI	LIPSON-LE HIGH SCHOOL	MATH SCIENC	WESTLAKE HIGH	CARBONDALE AREA JR SR HIGH SCH
PONDEROS	HENRY ABBOTT E	MBS TEXTBOO	WAYLAND-COHO	CLEARFIELD AREA HIGH SCHOOL
FRDONIA	EAST HAVEN HIGH	MCCLUER NO	NASSAU BOCES T	BEN FRANKLIN FRESHMAN ACADEMY
APOLLO HI	SANDY CREEK HIGH SCHOOL	FAMILY CENT	WESTMORELAND	TRUMAN SENIOR HIGH SCHOOL
COPPER CA	HADDAM-KILLING	HOLLY SPRING	SPRINGFIELD LOC	NORTHEASTERN SCHOOL DISTRICT
GLENDALE	ACADEMY OF INF	FARGO SCHOO	SENECA EAST LO	CENTER AREA SCHOOL DISTRICT
GLENDALE	EDWIN O SMITH H	BERTRAM	REDFORD HIGH S	CENTRAL VALLEY HIGH SCHOOL
INDEPENDE	STAPLES HIGH SCH	Not Specified	CHAGRIN FALLS E	MORRISVILLE BORO SCH DISTRICT
JOSEPH CIT	FRIENDSHIP COLL	INTER-LA	SENECA EAST LO	
RAY UNIF S	CAPE HENI OPEN	FREEHOL	BETHEL SCHOOL DISTRICT 403	SPANAWAY WA
RAY UNIF S	INDIAN RIVER SCH	FREEHOL	ISSAQUAH SCHOOL DISTRICT 411	ISSAQUAH WA
KINGMAN U	ORANGE CO SCH	FREEHOL	RENTON SCHOOL DISTRICT 403	RENTON WA
PAGE UNIF	APOPKA HIGH SC	LAWRENCE	RICH AND SCHOOL DISTRICT 400	RICH AND WA
CORTEZ HI	WEEKIVA HIGH SC	RED BAN	Not Specified	-
MOON VAL	AUBURNDALE HIGH	EAST SID	SEATTLE SCHOOL DISTRICT	SEATTLE WA
MOUNTAIN	BARTOW SENIOR	PASSAIC	SELAH HIGH SCHOOL	SELAH WA
PHOENIX UN	Not Specified	PHILIPSE	MEAD HIGH SCHOOL	SPOKANE WA
SIERRA UN	AMUNDSEN HIGH SCHOOL	RED BAN	Not Specified	-
SUNNYSLO	SOUTH TECH CM	PHILIPSE	SUMNER SCHOOL DISTRICT 320	SUMNER WA
THUNDERB	SOUTH TECH CM	RED BAN	MOUNT RAINIER LUTHERN HS	TACOMA WA
WASHINGTON	MANATEE HIGH S	RUMSON	TACOMA SCHOOL DISTRICT 10	TACOMA WA
WILSON CH	MANATEE TECHN	UNION CO	TACOMA SCHOOL DISTRICT 10	TACOMA WA
SIERRA VIS	BRANFORD HIGH	MONTGO	TOLEDO HIGH SCHOOL	TOLEDO WA
DYSART UN	CENTRAL HIGH S	JONATHA	VANCOLIVER SCHOOL DISTRICT 37	VANCOLIVER WA
DYSART UN	HERNANDO HIGH	WESTFIE	WALLA WALLA SCHOOL DIST 140	WALLA WALLA WA
WILLOW CA	NATURE COAST	Not Spec	WARDEN SCHOOL DISTRICT 146-161	WARDEN WA
CORONA D	STAR EDUCATION	ALBUQUIC	WASHOUGAI SCHOOL DIST 112-6	WASHOUGAI WA
EDUCATION	COACHMAN ELUNI	ALBUQUIC	WENATCHEE SCHOOL DISTRICT 246	WENATCHEE WA
WESTVIEW	COUNTRYSIDE HI	CIBOLA H	WINLOCK HIGH SCHOOL	WINLOCK WA
TOLLESON	COCOA HIGH SCH	FREEDOM	A C DAVIS HIGH SCHOOL	YAKIMA WA
ASS SUPT	SPACE COAST JR	LA CUEV	D D EISENHOWER SENIOR HIGH SCH	YAKIMA WA
JE F ANNE	SPACE COAST JR	LOS PUEN	WEST VALLEY SCH DISTRICT 208	YAKIMA WA
ALHAMBRA	SPACE COAST JR	ARCHWA	YAKIMA SCHOOL DISTRICT 7	YAKIMA WA
ALISO NIGL	COCOA BEACH JR	ANIMAS I	YEI M CMTY SCHOOL DISTRICT 2	YEI M WA
ANAHEIM U	Not Specified	GADSDEN	YEI M HIGH SCHOOL	YEI M WA
BANNING U	MONARCH HIGH S	ARTESIA	TOMORROW RIVER SCHOOL DISTRICT	AMHERST WI
HARBOR LE	DIXIE CO HIGH SC	ARTESIA	MOSINEFF HIGH SCHOOL	MOSINEFF WI
RIVER VALL	PASCO HIGH SCH	BEL EN CO	D C EVEREST SENIOR HIGH SCHOOL	SCHOFIELD WI
ALHAMBRA	RIDGE COMM HIGH	CLUBA INT	SOLOON SPRINGS SCHOOL DISTRICT	SOLOON SPRINGS WI
ALHAMBRA	MAINLAND HIGH	GRANTS	SUN PRAIRIE AREA SCH DISTRICT	SUN PRAIRIE WI
ALISO NIGL	SEABREEZE HIGH	CENTRAL	KANAWHA CO SCHOOL DISTRICT	CHARLESTON WV
ANAHEIM U	DEL AND HIGH SC	V SUF CI	GRANT CO SCHOOL DISTRICT	PETERSBURG WV
BANNING U	DEL TONA HIGH S	WHITE PINE CO	KEYS SCHOOL DISTRICT 6	PARK HILL OK
HARBOR LE	PINE RIDGE HIGH	PERSHING CO	PERKINS-TRYON SCHOOL DIST 56	PERKINS OK
RIVER VALL	TRINITY CHRISTIA		MERIDIAN TECHNOLOGY CENTER	STILLWATER OK
ALHAMBRA	HOPEDALE JR SR HIGH SCHOOL			
ALHAMBRA	ST MARY'S JR-SR HIGH SCHOOL			
ALHAMBRA	MANCHESTER ESSEX REGIONAL HS			
SACRAMENTO CO OFC OF ED	RICHARD MILBURN ACADEMY			
CAPISTRANO VALLEY HIGH S	STONEHAM SCHOOL DISTRICT			
MARANATHA HIGH SCHOOL	NORFOLK CO AGRICULTURAL HS			
NATOMAS CHARTER SCHOOL	MINNECHAUG REG HIGH SCHOOL			
SAN BERNARDINO CITY USD	WINCHESTER HIGH SCHOOL			
BONITA UNIFIED SCHOOL DISTRICT				
SAUGUS HIGH SCHOOL				



“WHEN ARE WE
EVER GOING
TO USE THIS?”

“THE REST
OF YOUR
LIFE!”



Advanced Algebra with Financial Applications COURSE PROPOSAL

Advanced Algebra with Financial Applications DESCRIPTION FOR HIGH SCHOOL COURSE CATALOG

Advanced Algebra with Financial Applications COURSE PURPOSE

Advanced Algebra with Financial Applications is a mathematical modeling course that is algebra-based, applications-oriented, and technology-dependent. The course addresses core preparatory mathematics topics from Advanced Algebra, Statistics, Probability, Precalculus, and Calculus under seven financial umbrellas: Banking, Investing, Credit, Employment and Taxes, Automobile Ownership, Independent Living, and Retirement Planning and Household Budgeting. The course allows students to experience the interrelatedness of mathematics

Advanced Algebra with Financial Applications KEY ASSIGNMENTS

The Key Assignments presented in this section are well-aligned with the CCSS Standards for Mathematical Practice. The assignments are all verbal problem solving activities that relate to the unit being studied. Students must represent the verbal situation symbolically, manipulate those symbols to arrive at an answer, and then interpret that answer in the context of the problem. This offers students opportunities to make sense of quantities and their relationships within these problem-solving settings through multiple representations. Students can approach access, a manipulate students required

The previous mathematics and explain regularity

Advanced Algebra with Financial Applications ASSESSMENT METHODS

A variety of formative and summative assessment methods are used throughout Advanced Algebra with Financial Applications in order to assess student learning. The assessments are aligned with the course purpose and the instructional strategies used, and with the Common Core Standards for the development of mathematically proficient students. In the activities listed below, students are offered assessment opportunities to address mathematics as a sense-making tool, problem solve, reason, construct arguments, offer mathematics-justified critiques of arguments, model, use appropriate tools, use precision, look for and make use of structure, and look for and express regularity in repeated reasoning. The assessment grading percentages contributing to the student's quarter course grade are offered in parentheses next to the assessment name.

FORMATIVE ASSESSMENTS (30%)

CLASS PARTICIPATION (15%)

IS THERE A COURSE PROPOSAL AVAILABLE?

YES!!

Advanced Algebra with Financial Applications COURSE OUTLINE

Unit 1: Banking Services

In this unit, students use exponential functions to compute compound interest and compare it to simple interest. They derive formulas and use iteration to compute compound interest. They apply their findings to short-term, long-term, single deposit and periodic deposit accounts.

Mathematics Topics

- Derivation of the compound interest formula
- Exponential functions
-
-

Advanced Algebra with Financial Applications INSTRUCTIONAL METHODS AND STRATEGIES

Instructional strategies used throughout this course are varied, targeted, and rooted in the Standards for Mathematical Practice. Just as the Standards are interrelated, the methods of this course are. Together, the practices referenced in this section serve to build mathematical confidence, interest and strength.

The Advanced Algebra with Financial Applications program's instructional strategies cover the following umbrellas:

Motivational Unit Openers
Essential Questions
Scaffolding
Discussion/interaction
Presentation of model problems
Extensions and problem solving
Differentiation of instruction
Experiential learning
Use of technology

COMMON CORE STATE STANDARDS

HOW DOES THE CONTENT ALIGN?

HOW DO THE MATHEMATICAL PRACTICES ALIGN?

HOW DO THE TECHNOLOGY RECOMMENDATIONS ALIGN?

From the Common Core State Standards for Mathematics Appendix A: Designing HS Math Courses Based on the CCSS

“A menu of challenging options should be available for students after their third year of math—and all students should be strongly encouraged to take math in all years of high school. Traditionally... students are expected to take precalculus. This is a good and worthy goal, but should not be the only option...An array of challenging options will keep math relevant for students, and give them a new set of tools for their futures...”





FINANCIAL ALGEBRA

Common Core State Standards for Mathematical Content

Common Core State Standards for Mathematical Practice

**Advanced Algebra
with
Financial Applications**

Financial Algebra aligns to the

Common Core State Standards for Mathematical Content

The CCSS provide 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.

Teach a parent the terms "supply and demand" and you've got an economist.
Thomas Carlyle, Philosopher

Supply and Demand 2-3

Key Terms <ul style="list-style-type: none">• supply• wholesale price• markup• retail price• equilibrium• shift	Objectives <ul style="list-style-type: none">• Understand the slopes of the supply and demand curves.• Find points of equilibrium.
Common Core <ul style="list-style-type: none">• A-CED, F-1F1, F-1F4, F-1F5, F-1F7a, F-1F8, S-ID8, S-ID9	

Determine the sign (+ or -) of the slope of each graph.

CCSS Warm-Up

- $3y = 9 - 4x$
- $3y = 4x - 9$
- $4x + 3y = 9$

HOW DO MANUFACTURERS DECIDE THE QUANTITY OF A PRODUCT THEY WILL PRODUCE?

The CCSS Domains and Standards covered in each lesson are listed.

Refresh your memory with **CCSS Warm-Ups**

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

Conceptual Categories

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

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

www.cengage.com/community/financialalgebra

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MATH TOPICS

Candlestick charts	Mean - arithmetic average
Fractions, decimals, and percents	Percent increase and decrease
Line graphs	Ratios and proportions
Linear equations	Simple moving averages
Literal equations	Spreadsheets and formulas

COMMON CORE

N-Q Reason quantitatively and use units to solve problems	A-CED Create equations that describe numbers or relationships
A-SSE Interpret the structure of expressions	A-RE Solve equations and inequalities in one variable

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MATH TOPICS

Causal relationships	Quadratic formula
Functions - domain and range	Scatterplots and correlation
Linear equations - slope-intercept form	Spreadsheets and formulas
Linear regression	Transitive property of dependence
Parabolas - vertex and axis of symmetry	

COMMON CORE

N-Q Reason quantitatively and use units to solve problems	F-IF Understand the concept of a function and use function notation
A-CED Create equations that describe numbers or relationships	F-IF Interpret functions that arise in applications in terms of the context
A-RE Understand solving equations as a process of reasoning and explain the reasoning	F-IF Analyze functions using different representations
A-RE Solve equations and inequalities in one variable	S-ID Summarize, represent, and interpret data on two categorical and quantitative variables
A-RE Solve systems of equations	S-ID Interpret linear models
A-RE Represent and solve equations and inequalities graphically	

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MATH TOPICS

Exponential base (e)	Linear equations and inequalities
Exponential functions	Order of operations
Exponential growth and decay	Recursive and iterative thinking: patterns, growth, decline, compound interest
Formulas	
Limits	

COMMON CORE

N-RN Extend the properties of exponents to rational numbers	A-CED Create equations that describe numbers or relationships
A-SSE Interpret the structure of expressions	F-IF Interpret functions that arise in applications in terms of the context
A-SSE Write expressions in equivalent forms to solve problems	F-IF Analyze functions using different representations

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MATH TOPICS

Cubic regression	Natural logarithms, base e
Exponential growth and decay	Percents
Linear equations and inequalities	Quadratic regression
Linear regression	Spreadsheets and formulas
Measures of central tendency	

COMMON CORE

N-Q Reason quantitatively and use units to solve problems	F-IF Analyze functions using different representations
A-SSE Interpret the structure of expressions	F-LE Construct and compare linear, quadratic, and exponential models and solve problems
A-SSE Write expressions in equivalent forms to solve problems	S-ID Summarize, represent, and interpret data on two categorical and quantitative variables
A-CED Create equations that describe numbers or relationships	

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MATH TOPICS

Circles (radius, diameter, chord)	Range
Distance Formula	Read and interpret data: frequency tables, stem-and-leaf plots, box plots
Exponential growth and decay	Slope, slope-intercept form
Linear and exponential functions	Spreadsheets and formulas
Linear equations and inequalities	Square root equations
Measures of central tendency	Straight line equations (depreciation)
Metric System	Systems of linear equations and inequalities in two variables
Natural logarithms	
Percents and Proportions	
Piecewise functions	
Quartiles	

COMMON CORE

A-SSE Interpret the structure of expressions	F-IF Analyze functions using different representations
A-SSE Write expressions in equivalent forms to solve problems	F-LE Construct and compare linear, quadratic, and exponential models and solve problems
A-CED Create equations that describe numbers or relationships	G-C Find arc lengths and areas of sectors of circles
A-RE Understand solving equations as a process of reasoning and explain the reasoning	S-ID Summarize, represent, and interpret data on a single count or measurement variable
F-IF Understand the concept of a function and use function notation	S-ID Summarize, represent, and interpret data on two categorical and quantitative variables
F-IF Interpret functions that arise in applications in terms of the context	S-ID Interpret linear models



FINANCIAL ALGEBRA

is aligned with the

NATIONAL COMMON CORE STATE STANDARDS



Financial Algebra by Gerver & Sgroi		Common Core Standard
<p><i>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.</i></p>		<p>Mathematics High School Modeling★ Modeling Standards <i>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 (★).</i></p>
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. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> 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.

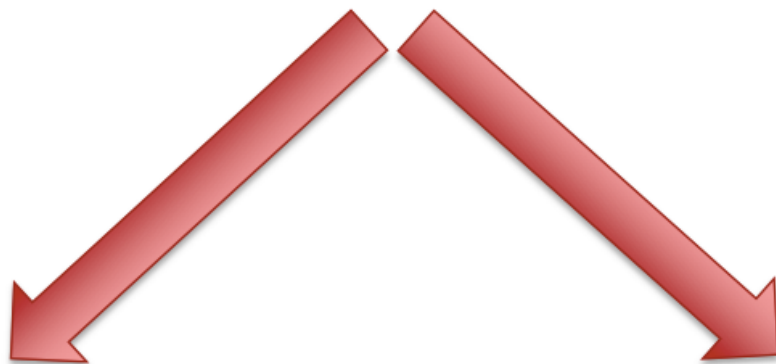
Common Core State Standards Mathematical Practices

•The problems we encounter in the “real world”—our work life, family life, and personal health—don’t ask us what chapter we’ve just studied and don’t tell us which parts of our prior knowledge to recall and use. In fact, they rarely even tell us exactly what question we need to answer, and they almost never tell us where to begin. They just happen. To survive and succeed, we must figure out the right question to be asking, what relevant experience we have, what additional information we might need, and where to start.

Education Development

Center

PRACTICE MAKES PERFECT!



Mathematics

Practice

Repeated experiences that
build mastery of skills
and competencies

Mathematical

Practice

CCSS habits of mind
and action
for problem solving

Common Core State Standards Mathematical Practices

P: Problem solving (MP1)

R: Reasoning (MP2)

A: Apply and model (MP4)

C: Construct arguments (MP3)

T: Tools (MP5)

I: Investigate patterns and structure (MP7)

C: Calculate/communicate with Precision (MP6)

E: Explore/express regularity in repeated reasoning (MP8)

S: **SUCCESS** Through Content/Practice Standards

Mathematical Practice Standards	Examples
P Problem solving perseverance (MP1)	Loan Calculations, Regression, and Credit Cards (Lessons 4-3; 4-4)
R Reasoning (MP2)	Employee Benefits, Social Security and Medicare (Lessons 6-4; 6-5)
A Apply and model with mathematics (MP4)	Graphing Fixed and Variable Expenses (Lessons 2-4; 2-5)
C Construct arguments and critique reasoning(MP3)	Driving Safety Data and Accident Investigation (Lessons 5-7; 5-8)
T Tools are used strategically (MP5)	Reconcile a checking account by using a spreadsheet (Lessons 3-2)
I Investigate patterns and structure (MP7)	Charting a Budget and Cash Flow (Lessons 10-3; 10-4)
C Calculate and communicate with precision (MP6)	Pensions and Life Insurance (Lessons 9-3; 9-4)
E Explore and express regularity in repeated reasoning (MP8)	Compound Interest Formula (Lessons 3-5; 3-6)



USING TECHNOLOGY in



FINANCIAL ALGEBRA

From The Common Core State Standards Document

Algebra - Reasoning with Equations and Inequalities

Represent and solve equations and inequalities graphically

Find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.

Functions - Interpreting Functions

Analyze functions using different representations

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Statistics and Probability - Interpret categorical and Quantitative Data

Interpret Linear Models

Compute (using technology) and interpret the correlation coefficient of a linear fit.

Fall 2011: NYS Journal Article on Financial Algebra

New York State

Mathematics Teachers' Journal

Financial Algebra: Real-World, Real Math, Real Numbers

Robert Gerver
North Shore HS
Glen Head, NY

Richard Sgroi
Fox Lane HS (retired)
Bedford, NY

Most Americans aren't fluent in the language of money...It's clear that most of us need some help, preferably starting when we're still in school...All of this raises the question: How many schools even broach the topic? As it turns out, for a country that prizes personal responsibility, we're doing very little. - NY Times, April 9, 2010

What do we know? What should we know? What does the average person remember? We have given surveys to over a thousand adults and teenagers over the past few years, and received enlightening, but not surprising, answers to questions such as:

- What team won the last World Series?
- What famous Hollywood actress recently got married?
- What rock band played at the last Super Bowl?



December 2011: CA Journal Article



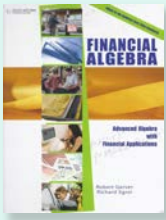
It's Time for a New "New Math"

by Robert Gerver, North Shore High School, New York
rgerver@optonline.net

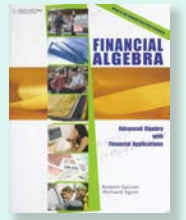
In 1957, the Soviet Union christened the exploration of space by launching Sputnik I. Feeling relatively inadequate in science, the U.S. nervously reacted and, by the 1960s, the "new math" was instituted to upgrade mathematics education in the United States. (If you are too young to remember this, do an Internet search!) Parents struggled to help



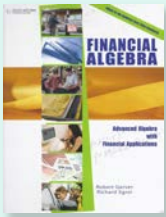
figuring out the future value of a periodic \$200 monthly deposit over 18 years, or finding the cusps of the graph of an absolute value function? Can we replace rigorous mathematics



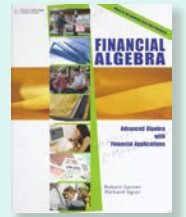
Two Key Approvals!



- **NCAA:** *Financial Algebra/Advanced Algebra with Financial Applications* has received NCAA approval as a “core” mathematics course, and can be used in a college-preparatory mathematics sequence by potential NCAA college applicants. ***We have paperwork to help any school apply!***



Two Key Approvals!



- **UC a - g: *Advanced Algebra with Financial Applications* using FINANCIAL ALGEBRA** has received University of California “a – g” approval as a ‘c’ level, core mathematics course. ***We have paperwork to help any California school apply!***

UC University of California *It starts here*

a-g Course Lists

Search Course Lists

Other Options

Results: 2 Schools or Programs offering course.

Course Title	School / Program	Subject Area (Category)	CTE
Advanced Algebra with Financial Applications	King City High School	Mathematics (Algebra 2; Yr 2 of 2)	
Advanced Algebra with Financial Applications	Bonita High School	Mathematics (Algebra 2)	

[Begin a New Search](#)

[Return to Doorways Home Page](#)

[Return to UC Home Page](#)

**WHAT ARE THE ESSENTIAL ELEMENTS OF THE
FINANCIAL ALGEBRA (AAWFA) CLASSROOM?**

HOW IS IT THE SAME?

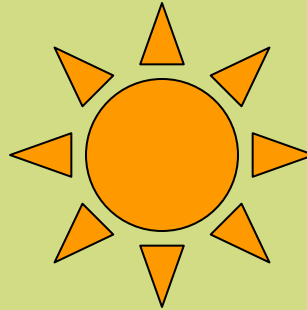
HOW DOES IT DIFFER?



DISCUSSION



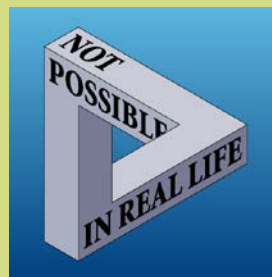
HIGHLIGHTING



PROJECTS



QUOTES



**REAL WORLD
REAL MATH**



**ESSENTIAL
QUESTIONS**



**OUTSIDE
RESOURCES**



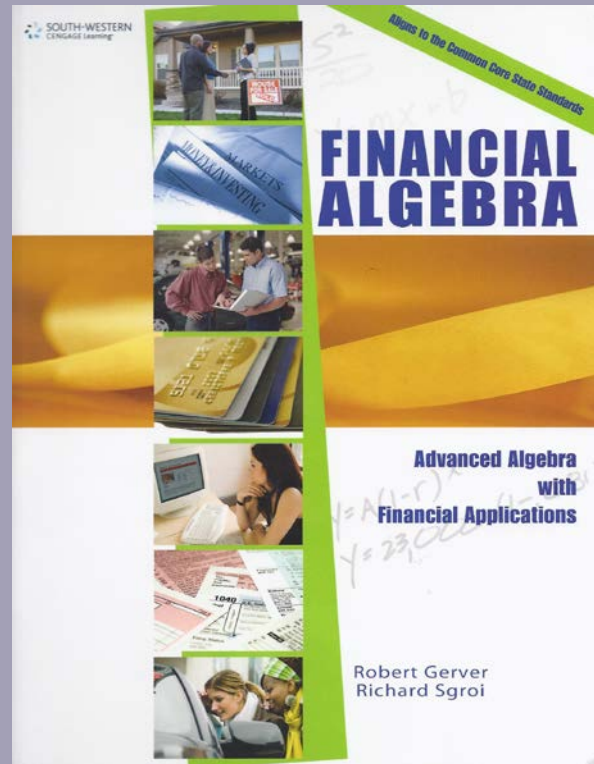
READING

ADMIT IT!!

“I don't know, but I'll find out!”



HOW IS THE TEXTBOOK STRUCTURED?



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

- 1-1 Business Organization
- 1-2 Stock Market Data
- 1-3 Stock Market Data Charts
- 1-4 Simple Moving Averages
- 1-5 Stock Market Ticker
- 1-6 Stock Transactions
- 1-7 Stock Transaction Fees
- 1-8 Stock Splits
- 1-9 Dividend Income

What do you think Frank Hubbard meant in this quote?

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.

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

TEACHING RESOURCES

Instructor's Resource CD
ExamView® CD, Ch. 1
e-Homework, Ch. 1
www.cengage.com/school/math/financialalgebra

NATIONAL GEOGRAPHIC

LEARNING

www.cengage.com/community/financialalgebra

OUR FOCUS IS YOU!

How might these quotes stimulate mathematics conversation?

- *“The safe way to double your money is to fold it over once and put it in your pocket.”* *Chapter 1 The Stock Market*
- *“Never try to walk across a river just because it has an average depth of four feet.”* *Section 1-4 Simple Moving Averages*
- *If the automobile had followed the same development cycle as the computer, a Rolls-Royce would today cost \$100 [and] get a million miles per gallon.”*
Section 5-5 Linear Automobile Depreciation
- *“To make a million, start with \$900,000.”* *Section 3-5 Compound Interest*
- *“Our forefathers made one mistake. What they should have fought for was representation without taxation.”* *Section 7-5 Form 1040 and Schedules A and B*
- *“Budget: A mathematical confirmation of your suspicions.”*
Section 10-4 Cash Flow and Budgeting



Common Core State Standards Identified in the Table of Contents and on the First Page of Each Section

Contents

Chapter 1 The Stock Market 2

1-1	Business Organization	4
1-2	Stock Market Data	9
1-3	Stock Market Data Charts	16
1-4	Simple Moving Averages	22
1-5	Stock Market Ticker	29
1-6	Stock Transactions	35
1-7	Stock Transaction Fees	40
1-8	Stock Splits	45
1-9	Dividend Income	51

MATH TOPICS

Candlestick chart	Percent increase and decrease
Fractions, decimals, percents	Ratio and proportion
Linear equation	Line graphs
Literal equation	Simple moving average
Mean-arithmetic average	Spreadsheets and formulas

COMMON CORE

A-CED	Creating equations that describe numbers or relationships.
A-REL	Solve equations and inequalities in one variable.
A-SSE	Interpret the structure of expressions.
N-Q	Reason quantitatively and use units to solve problems.

Chapter 2 Modeling a Business 62

2-1	Interpret Scatterplots	64
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2-5	Graphs of Expense and Revenue Functions	86
2-6	Breakeven Analysis	91
2-7	The Profit Equation	97
2-8	Mathematically Modeling a Business	103

MATH TOPICS

Causal relationship	Quadratic formula
Function-domain, range	Scatterplots and correlation
Slope-intercept form	Spreadsheets and formulas
Linear regression	Transitive property of dependence
Parabola-vertex, axis of symmetry	

COMMON CORE

A-CED	Creating equations that describe numbers or relationships.
A-REL	Understand solving equations as a process of reasoning and explain the reasoning
A-REL	Solve equations and inequalities in one variable.
A-REL	Solve systems of equations
A-REL	Represent and solving equations and inequalities graphically.
A-SSE	Interpret the structure of expressions.
F-LF	Understand the concept of a function and use function notation.
F-LF	Interpret functions that arise in applications in terms of the context.
F-LF	Analyze functions using different representations.
N-Q	Reason quantitatively and use units to solve problems.
S-ID	Summarize, represent, and interpret data on two categorical and quantitative variables.
S-ID	Interpret linear models

Chapter 3 Banking Services 114

3-1	Checking Accounts	116
3-2	Reconcile a Bank Statement	123
3-3	Savings Accounts	131
3-4	Explore Compound Interest	137

MATH TOPICS

Exponential functions	Linear equations and inequalities
Exponential base (e)	Order of operations
Exponential growth and decay	Recursive and iterative thinking: patterns growth, decline, compound interest
Formulas	
Limits	

Financial Algebra aligns to the

Common Core State Standards Initiative - Mathematics

The Common Core State Standards provide clear and consistent guidelines so students, teachers, administrators, and parents have an awareness of the mathematics proficiencies expected. The standards are designed to be rigorous and relevant to the real world, reflecting the knowledge and skills that students need for future success.

Teach a parrot the terms "supply and demand" and you've got an economist.

Thomas Carlyle, Philosopher

Supply and Demand 2-3

Key Terms

- widget
- function
- demand function
- demand
- supply
- wholesale price
- markup
- retail price
- equilibrium
- shift

Objectives

- Understand the slopes of the supply and demand curves.
- Find points of equilibrium.

Common Core

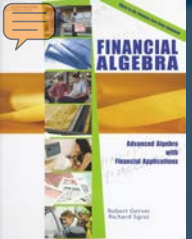
A-CED2, F-IF1, F-IF4, F-IF5, F-IF7a, F-IF8, S-ID6, S-ID8

HOW DO MANUFACTURERS DECIDE THE QUANTITY OF A PRODUCT THEY WILL PRODUCE?

The CCSS Domains and Standards covered in each lesson are listed for your convenience.

A complete correlation of *Financial Algebra* to the Common Core State Standards for Mathematics is available on the community website.

www.cengage.com/community/financialalgebra



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?

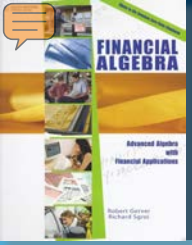
5-9 Accident Investigation Data

WHAT DATA MIGHT A CAR LEAVE BEHIND AT THE SCENE OF AN ACCIDENT?

6-4 Employee Benefits

WHAT ARE THE BENEFITS OF A JOB?

www.cengage.com/community/financialalgebra



Instructional Model: Chapter Opener & Closer

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.

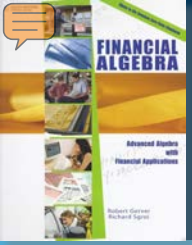
eBay was created by Pierre Omidyar, who originally wanted to use the name Echo Bay. The name was already taken by a gold mining company, so he shortened it to eBay.

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



Really!





Instructional Model: Introducing Terms Through Reading in Context

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

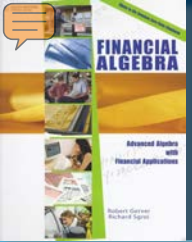
How Do You Buy and Sell Stock?

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.





Instructional Model: Graduated, Sequential Model Problems

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.

• $\text{Fee} \times \text{Number of trades} \quad (2)(\$12) = \$24$

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

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

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

• $\text{Fee} + \text{Total purchase price} \quad \$5,456 + \$24 = \$5,480$

• 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?

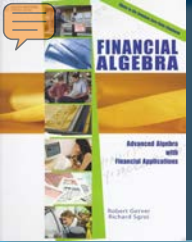
EXAMPLE 2

- 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.





Instructional Model: Frequent Checkpoints of Student Progress

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

Extend Your Understanding
provides an opportunity to
solve a more challenging
problem, based on the new
skill.

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. $\$12,300 - \$10,481 = \$1,819$

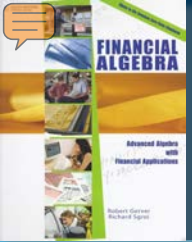
Jessica's gross capital gain was \$1,819.

■ 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: Plenty of Practice Problems

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

Applications

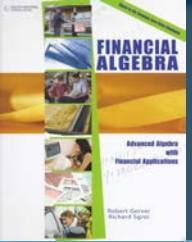
I believe non-dividend stocks aren't much more than baseball cards. They are worth what you can convince someone to pay for them.

Mark Cuban, Billionaire businessman

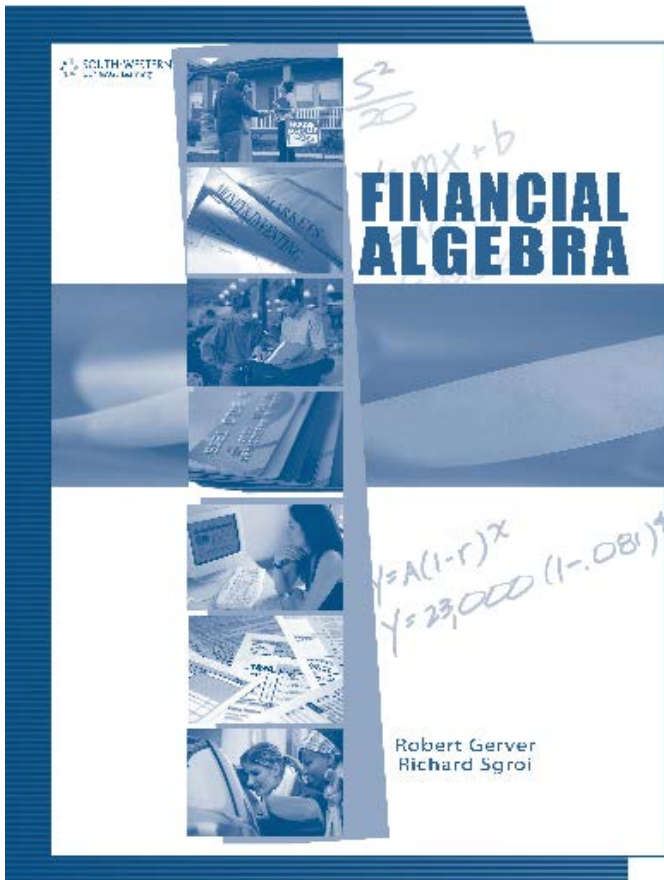
- Based on what you learned about dividends, why are non-dividend stocks compared to baseball cards?
- Years ago, Home Depot had an annual dividend of \$0.90. If you owned 4,000 shares of Home Depot, how much did you receive annually in dividends?
- Barnes and Noble had a \$1.00 annual dividend during 2008. If you owned 500 shares of Barnes and Noble, how much did you receive on a quarterly dividend check?
- If you owned r shares of a stock that had an annual dividend of p dollars, express the amount of your quarterly dividends algebraically.
- 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?
- 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?
- Jean owned x shares of a corporation and received a quarterly dividend check for y dollars. Express the annual dividend for one share algebraically.
- The Walt Disney Company paid a \$0.35 annual dividend on a day it closed at a price of \$33.86 per share.
 - What was the annual dividend for 500 shares?
 - What was the quarterly dividend for 500 shares?
 - Express the yield as a fraction.
 - What was the yield, rounded to the nearest tenth of a percent?
- You own k shares of a stock that is selling for $\$x$ per share. The quarterly dividend is $\$y$ per share.
 - Express the annual dividend for one share algebraically.
 - Express the annual dividend for all k shares algebraically.
 - Express the yield as an algebraic fraction.
- The spreadsheet can be used to compute the yield. Write the formula that can be used to compute the yields in cell C2.

	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	





WORKBOOK—Aligned with Textbook!



Name _____ Date _____

1-5 Stock Market Ticker

Exercises

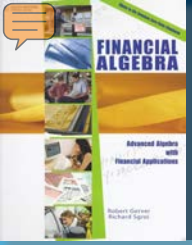
Use the following ticker to answer Exercises 1 - 6. The stock symbols represent the corporations: C, CitiGroup Inc; BAC, Bank of America; F, Ford Motor Corp; and MOT, Motorola.

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





Instructional Model: Routine and Non-Routine Graphs

CHAPTER

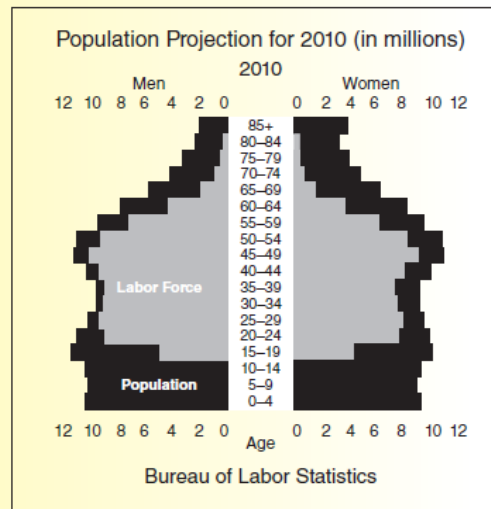
9

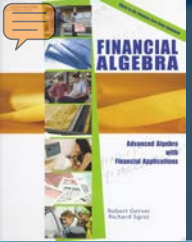
Assessment

Real Numbers

You Write the Story!!

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



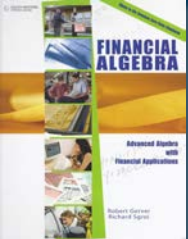


Instructional Model: Projects, Research, and Field Work

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: Updatable Features

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



Dollars and Sense

Your Financial News Update

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

Instructional Model: Chapter-Ending Problems

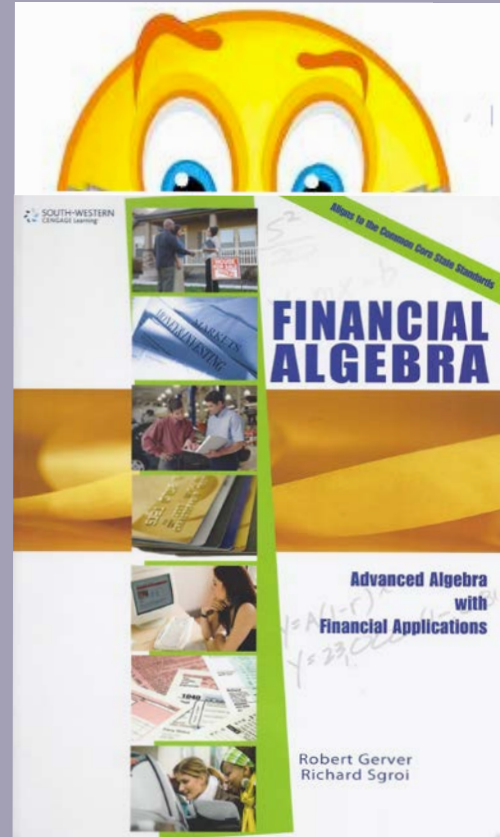
Meaningful applications at the end of each chapter require students to apply concepts that were taught throughout the chapter.

Applications

- 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.
 - How much money did each invest?
 - What percent of the business was owned by Matt? Round to the nearest tenth of a percent.
- 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?
- 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.
- 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.
- A local hairdresser bought 450 shares of a cosmetics corporation for \$33.50 per share. He sold them for \$39.01 per share.
 - What was the percent increase in the price per share? Round to the nearest tenth of a percent.
 - What was the total purchase price for the 450 shares?
 - What was the total selling price for the 450 shares?
 - What was the percent capital gain for the 450 shares? Round to the nearest tenth of a percent.
- 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.
- 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?
- Aaron owned x shares of a corporation and received an annual dividend of y dollars. Express the quarterly dividend for one share algebraically.



WHAT CAN YOU DO TO PREPARE TO TEACH EACH CHAPTER

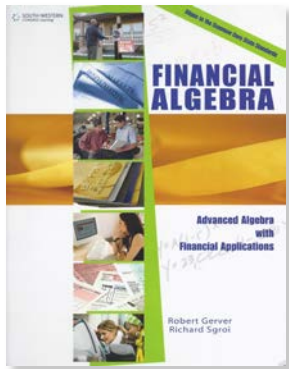


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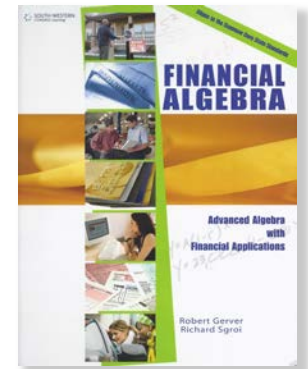
“Making The Case For Financial Algebra”

Pre-planning: What can you do to prepare to teach each chapter?

- **TEACHING A CHAPTER OPENER**
- **TEACHING A TYPICAL SECTION**
- **ASSESSMENT AT THE END OF EACH CHAPTER**



WEBINARS



- Each of the ten units has a 45-minute webinar that goes through the entire unit. A great way to orient yourself before you start the unit.
- There is also a general overview webinar.

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INSTRUCTOR'S COMPANION WEBSITE: CHAPTER BY CHAPTER WEBINARS

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5. Automobile Ownership

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Professional Development Webinars

Chapter 5, Automobile Ownership – *How not to be driven crazy!*

The Professional Development recorded webinars are conducted by the authors of *Financial Algebra*, Dr. Rich Sgroi and Dr. Robert Gerver. These professional development webinars provide mathematics teachers with background information on the real-world and business topics discussed in each chapter.

Duration: 44 minutes

Streaming recording link:

<https://cengage.webex.com/cengage/ldr.php?AT=pb&SP=MC&rID=40655802&rKey=59e6e6ae41a671d3>

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Mac users: [ZipIt](#)

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5 AUTOMOBILE OWNERSHIP

- 5-1 Classified Ads
- 5-2 Buy or Sell a Car
- 5-3 Graph Frequency Distributions
- 5-4 Automobile Insurance
- 5-5 Linear Automobile Depreciation

5 AUTOMOBILE OWNERSHIP

- 5-6 Historical and Exponential Depreciation
- 5-7 Driving Data
- 5-8 Driving Safety Data
- 5-9 Accident Investigation Data

5-1

CLASSIFIED ADS

OBJECTIVES

Compute the cost of classified ads for used cars.

Compute the cost of sales tax on automobiles.

Key Terms

- sales tax
- domain
- piecewise function
- split function
- cusp

How do buyers and sellers use classified ads for automobiles?

- What are common car options that might be listed in a classified ad?
 - What are their abbreviations?

Example 1

Kerry purchased a used car for \$7,400 and had to pay $8\frac{1}{2}\%$ sales tax. How much tax did she pay?

CHECK YOUR UNDERSTANDING

The sales tax rate in Mary Ann's state is 4%. If she purchases a car for x dollars, express the total cost of the car with sales tax algebraically.

The car has become an article of dress without which we feel uncertain, unclad, and incomplete.

Marshall McLuhan, Canadian Educator and Philosopher

- 5-1** Classified Ads
- 5-2** Buy or Sell a Car
- 5-3** Graph Frequency Distributions
- 5-4** Automobile Insurance
- 5-5** Linear Automobile Depreciation
- 5-6** Historical and Exponential Depreciation
- 5-7** Driving Data
- 5-8** Driving Safety Data
- 5-9** Accident Investigation Data

What do you think Marshall McLuhan meant in his quote?

What do you think?

Answers might include that the car is much more than a means of transportation. It has become a mode of self-expression as well as a mode of transportation. People pride themselves in automobile ownership; many even see it as a status symbol.

TEACHING RESOURCES

Instructor's Resource CD
Exam View® CD, Ch. 5
eHomework, Ch. 5
www.cengage.com/school/math/financialalgebra

The automobile is part of the American way of life. Many people commute to jobs that require them to own a car. Some students drive several miles to school. Stores and businesses are clustered in central locations often not near residential neighborhoods. When there is no mass transit system readily available to you, an automobile can provide convenient and necessary transportation.

Owning an automobile is a tremendous responsibility. The costs of gas, repairs, and insurance are high. Driving an automobile can also be dangerous. As a driver, you have a responsibility to yourself, your passengers, pedestrians, and other motorists. So, before embarking upon that first automobile purchase, you need to be aware of the physics and finances of operating a car. Being equipped with this knowledge will make your years on the road safer, less expensive, and more enjoyable.

Really?

How much does it cost to fill your car's gas tank today? Did your parents ever tell you stories about gas prices when they were young? Can you imagine people in gas lines in 1973, furious that gas prices had risen to over 50 cents per gallon?

The table shows the average price per gallon of gasoline from 1950–2005. Gas prices vary from region to region. They even differ from gas station to gas station, depending on the services the station provides and the neighborhood in which it is. Therefore, use the table as a general guide to gas prices.

Imagine what it would cost to fill a tank in any of the years listed in the table. Imagine what new cars cost! The first Corvette, the 1953 model, had a base price of \$3,498. There were only 300 of these cars manufactured. It cost about \$5 to fill its 18-gallon gas tank! The 1953 Corvette buyer had an easy time picking a color. The car came in one color only—white.

Year	Price per Gallon (\$)
1950	0.27
1955	0.30
1960	0.31
1965	0.31
1970	0.35
1975	0.53
1980	1.13
1985	1.19
1990	1.13
1995	1.14
2000	1.66
2005	2.33

Source: NBC

CHAPTER OVERVIEW

This chapter offers 9 lessons pertaining to the automobile. Students explore formulas of varying degrees of mathematical sophistication as they work on pricing structures, insurance issues, automobile depreciation, and data that can assist them in making wise and safe driving decisions.

REALLY? REALLY!

The variability of gasoline prices has been of interest over the past few years. Looking at the table, students will notice a slow and small increase in prices in the early years. The seventies marked an era of increased automobile consumption and worldwide awareness of the power that oil ownership held in international relations. Prices have continued to rise. The inclusion of the data on the first Corvette, a highly desirable car, underscores how much things have changed in a relatively short period of time.



Really!

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FINANCIAL ALGEBRA:

“A field trip from cover to cover”

**USING THE
“REALITY CHECK”
PROJECTS**

RICH MATHEMATICS IN INTERESTING FINANCIAL CONTEXTS



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

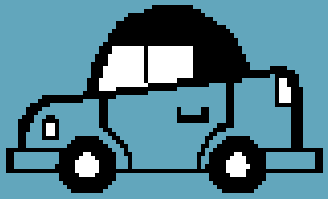
What role can statistics play in negotiating an automobile purchase or sale?

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

IS THERE A CORRELATION BETWEEN X AND Y?

USING REGRESSION ANALYSIS TO MAKE PREDICTIONS



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?



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. Later that day she is mailed a \$34 check, 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

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

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

Sharon deposits \$8,000 in a one year CD at 3.2% interest, compounded daily. What is Sharon's annual percentage yield (APY) to the nearest hundredth of a percent?

SOLUTION Find the APY using the compound interest formula and the simple interest formula.

Use the compound interest formula. $B = p\left(1 + \frac{r}{n}\right)^{nt}$

Substitute. $B = 8,000\left(1 + \frac{0.032}{365}\right)^{365 \times 1}$

Simplify. $B = 8,260.13$

Subtract the principal from the new balance.

$$I = 8,260.13 - 8,000 = 260.13$$

Use the simple interest formula.

$$I = prt$$

Solve for r .

$$r = \frac{I}{pt}$$

Substitute.

$$r = \frac{260.13}{8,000 \times 1}$$

Simplify.

$$r \approx 0.0325 = 3.25\%$$

The annual percentage yield is 3.25%.

APY can also be found by using the formula $APY = \left(1 + \frac{r}{n}\right)^n - 1$, where r is the interest rate and n is the number of times interest is compounded per year.

Use the APY formula. $APY = \left(1 + \frac{r}{n}\right)^n - 1$

Substitute. $APY = \left(1 + \frac{0.032}{365}\right)^{365} - 1$

Simplify. $APY \approx 0.0325 = 3.25\%$

The annual percentage yield is 3.25%, which is the same as the previous answer.

APR



APY

CREDIT: Promissory note terms, loan interest, lending institutions, loans, credit ratings, computing average daily balances and finance charges on a credit card, credit worthiness.

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

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

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**AN ALTERNATIVE
TO THE
LOAN LENGTH FORMULA
(p. 189)**

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?

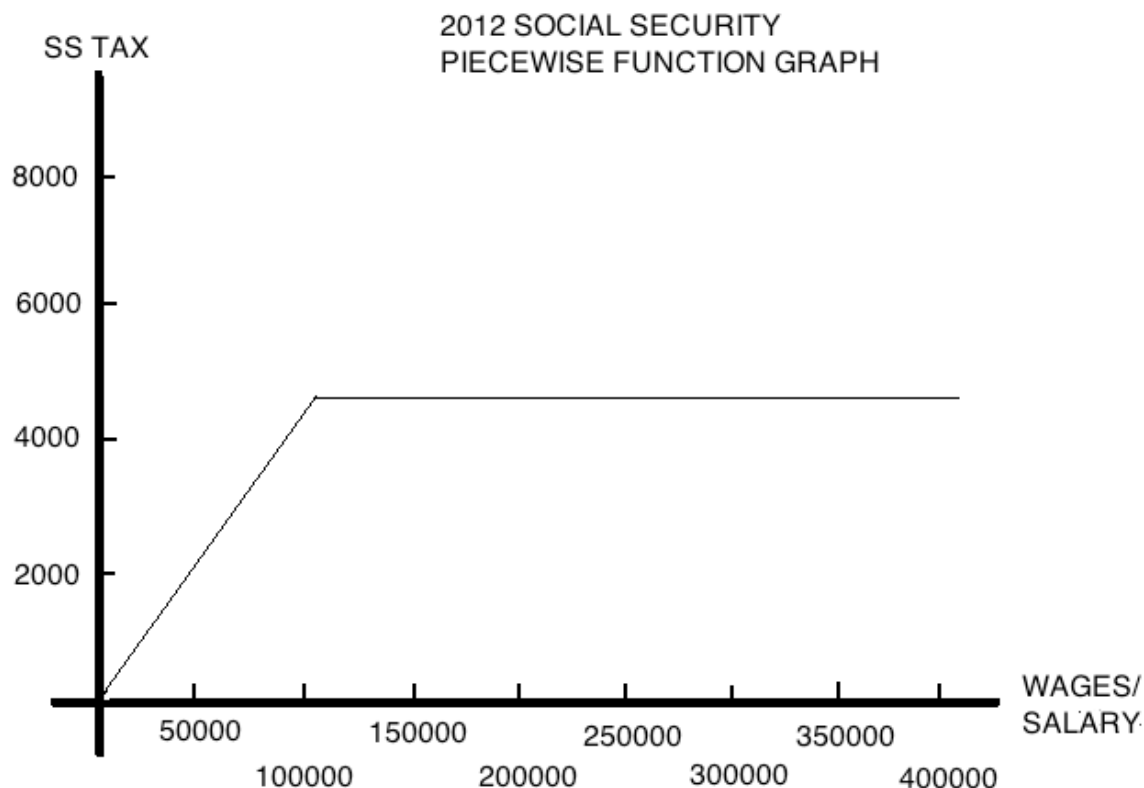
SOCIAL SECURITY & MEDICARE PAYROLL TAXES

For 2012, the Social Security Tax maximum salary is \$110,100. The tax rate for 2012 is 4.2% of all gross earnings up to this maximum,

- a) Express the 2012 Social Security Tax as a piecewise function.
- b) Draw the graph of this function.
- c) Identify and interpret the coordinates of the cusp.

2012 SOCIAL SECURITY PIECEWISE FUNCTION

$$f(x) = \begin{cases} 0.042x & \text{if } x \leq 110100 \\ 4624.40 & \text{if } x > 110100 \end{cases}$$



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



How can we 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:

$$f(x) = \left. \begin{array}{ll} 0.10x & 0 < x \leq 15100 \\ 1510 + 0.15(x - 15100) & 15100 < x \leq 61300 \\ 8440 + 0.25(x - 61300) & 61300 < x \leq 123700 \\ 24040 + 0.28(x - 123700) & 123700 < x \leq 188450 \\ 42170 + 0.33(x - 188450) & 188450 < x \leq 336550 \\ 91043 + 0.35(x - 336550) & x > 336550 \end{array} \right\}$$

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	\$

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**ORIENTING YOURSELF
TO**

SECTION 7-2:

MODELING TAX SCHEDULES

WHAT'S NEW IN 2013?

Dollars and Sense

CHAPTER 7 DOLLARS AND SENSE YOUR FINANCIAL NEW UPDATE

New for 2013

The payroll tax cut that was in effect for 2011 and 2012 has expired. The Internal Revenue Service has reinstated the Social Security contribution rate of 6.2% for 2013 earnings up to a payroll maximum of \$113,700. This reflects a \$3600 increase from the 2012 maximum amount of \$110,000.

This activity will help you stay current on financial issues related to Chapter 7. You can use the internet or any print media (newspapers, magazines, and so on) to answer the questions. After you have completed your research and answered the questions, print out a copy of the materials you used and highlight the important points.

In this activity, you are going to examine the Medical Expense section of Form 1040, Schedule A.

1. Go to the Internal Revenue website, www.irs.gov
2. Search for Publication 17: Your Federal Income Tax for the most recently completed tax year.
3. Look through the contents for Medical Expenses. Click on Medical Expenses. Skim through the Medical Expenses section to answer questions 3a – 3i.



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

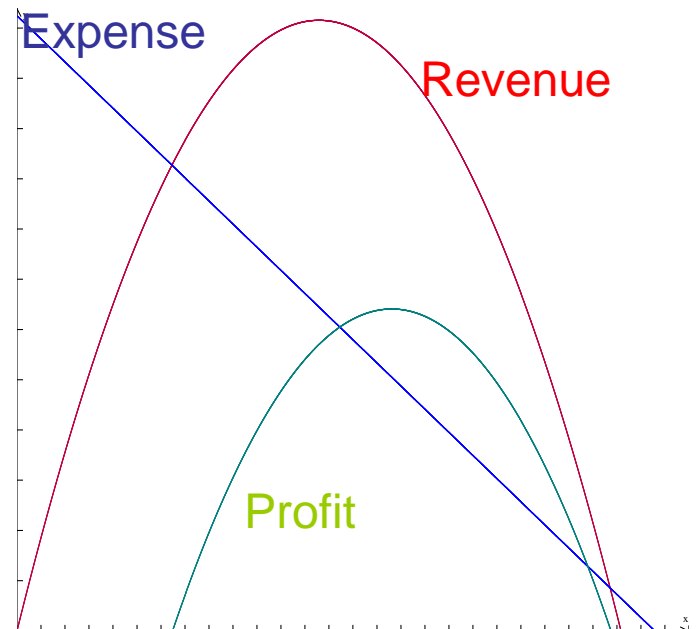
The accounting department has calculated that this new widget could be the biggest product to hit the market in years!

- 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)

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

$$\text{Profit} = \text{Revenue} - \text{Expense}$$

Students get q in terms of p from the demand function, combine like terms, and view the profit parabola algebraically and graphically as the difference between revenue and profit.



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?

$$\text{BTU rating} \approx \frac{\textit{while}}{60} \quad \begin{array}{l} l, w, h = \text{length, width, height} \\ i = \text{insulation (an index)} \\ e = \text{exposure (an index)} \end{array}$$

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.

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

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

LIFE INSURANCE



MORTALITY TABLES

Joe is an insurance agent. Zach, a 45 year-old man, inquires about a life insurance policy. How can Joe assess the risk his company is taking on when they offer a life insurance policy to Zach.

Exact Age	Mortality Table for Males	
	Death Probability	Life Expectancy
41	0.002629	36.36
42	0.002863	35.46
43	0.003127	34.56
44	0.003418	33.67
45	0.003732	32.78
46	0.004967	31.90
47	0.004424	31.03
48	0.004805	30.17
49	0.005208	29.31
50	0.005657	28.46

The Umbrella State Insurance Company sells a five-year term insurance policy with a face value of \$150,000 to a 41 year-old man for an annual premium of \$648. What is the profit the company receives from selling this policy for each age of death?

EXPECTED VALUE

Companies take on a great risk when they sell a policy. The mortality rates and amount of profit are shown in the chart at the right. If the company sold 10,000 of the same policies, what would their expected profit be for the 10,000 policies?

Age at death	41	42	43	44	45	Age \geq 46
Profit at end of each year	-149,352	-148,704	-148,056	-147,408	-146,760	\$3,240
Mortality rate	0.0026	0.0029	0.0031	0.0034	0.0037	0.9843

Express the expected profit algebraically for this mortality table.

Profit	x	y	p
Probability	0.7	0.1	0.2

TECHNOLOGY RESOURCES, REFERENCES, AND TOOLS

- THE FINANCIAL ALGEBRA COMMUNITY WEBSITE
- THE INSTRUCTOR'S COMPANION WEBSITE
- THE GRAPHING CALCULATOR
- GRAPHING WEBSITES
- SPREADSHEETS



FINANCIAL ALGEBRA

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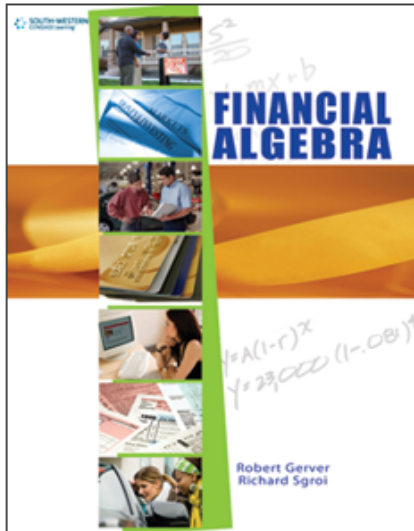
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Financial Algebra, Student Edition, 1st Edition

Robert K. Gerver - North Shore High School, Long Island, New York
Richard J. Sgroi - Bedford Central School District, Bedford, New York (Retired)
ISBN-10: 0538449675 ISBN-13: 9780538449670
576 Pages Hardcover
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 - 1.7 Stock Transaction Fees
 - 1.8 Stock Splits
 - 1.9 Dividend Income

MATH TOPICS

Candlestick chart
Fractions, decimals, and percents
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Literal equation
Mean – arithmetic average
Percent increase and decrease
Ratio and proportion
Read, interpret, and create bar and line graphs
Simple moving average
Spreadsheets and formulas

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$$y = A(1-r)^x$$
$$y = 23,000$$

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Financial Algebra Companion Website offers a wealth of learning and teaching resources to ensure your students understand and can apply algebraic concepts to financial and business challenges.
www.cengage.com/school/math/financialalgebra

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Professional Development Opportunities

The Professional Development recorded webinars are conducted by the authors of *Financial Algebra*, Dr. Rich Sgroi and Dr. Robert Gerver. Ten chapter-specific webinars provide mathematics teachers with background information on the real-world and business topics discussed in each chapter.

Chapter 1, The Stock Market

Duration: 39 minutes

[Streaming recording link](#)

[Download recording link](#)

Chapter 2, Modeling a Business

Duration: 41 minutes

[Streaming recording link](#)

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Chapter 3, Banking Services

Duration: 35 minutes

[Streaming recording link](#)

[Download recording link](#)

Chapter 4, Consumer Credit

Duration: 35 minutes

[Streaming recording link](#)

[Download recording link](#)

Chapter 5, Automobile Ownership

Duration: 44 minutes

[Streaming recording link](#)

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Chapter 6, Employment Basics

Duration: 26 minutes

[Streaming recording link](#)

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Chapter 7, Income Taxes

Duration: 50 minutes

[Streaming recording link](#)

[Download recording link](#)

Chapter 8, Independent Living

Duration: 40 minutes

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Chapter 9, Planning for Retirement

Duration: 41 minutes

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Chapter 10, Prepare a Budget

Duration: 40 Minutes

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Author Presentation Files

- [Chocolate Math](#)
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- [Strategies For Tackling The Mathematics](#)
- [An Alternative To The Loan Length Formula \(p.189\)](#)
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- [Financial Algebra Resources and References](#)
- [Orienting Yourself to Section 7-2: Modeling Tax Schedules](#)
- [Using The Reality Check Projects](#)
- [Reality Check Project: Stock Market Research](#)
- [Pre-planning: What can you do to prepare to teach each chapter?](#)
- [Financial Algebra Website Resources](#)
- [Article: Its Time for a New "New Math"](#)
- [Article: Financial Algebra: Real-World, Real Math, Real Numbers](#)
- [Correlation of Financial Algebra to the Common Core Standards of Math](#)

Advanced Algebra with Financial Applications Course Proposal Package

This 30-page document includes a course description, course purpose, course outline, key assignments, and assessment methods.

Correlation to the National Common Core Standards for Mathematics

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.

This correlation to the National Common Core Standards will assist in demonstrating that each lesson in the *Financial Algebra* textbook addresses at least one (if not several) Common Core Standard.

Financial Algebra Course Syllabus

A course syllabus provides detailed information regarding time frames, math concepts, key terms, and objectives for each section and chapter.

“Making the Case for *Financial Algebra*” PowerPoint® Slide Deck

This presentation provides an overview of the *Financial Algebra* course and textbook, including: the who, what, why and where of Financial Algebra, examples from the text, instructional model, and supplement package information.

Author Webinar—“*Financial Algebra: Real-Life Mathematics All Students Should Know*”

Facilitated by: Authors Dr. Rich Sgroi and Dr. Robert Gerver

Wealth of Time-Saving Tools

In addition to the resources mentioned above, the *Financial Algebra* program includes a wealth of time-saving tools that provide teaching and learning support:

- Chapter Specific Training Webinars
- Financial Algebra Listserv
- Annotated Instructor’s Edition
- Instructor’s Resource CD
- Interactive Whiteboard Presentation CD
- ExamView™ Computerized Test Generator
- Solutions Manual
- Student Workbook
- Guided Practice CD
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The NCAA Eligibility Center certifies the academic and amateur credentials of all students who want to play sports at an NCAA Division I or II institution as freshmen. NCAA requires that students complete a minimum of 16 core courses (14 core courses for 2011 and 2012 graduates attending a Div II institution) to be able to practice, play, and receive a scholarship at an NCAA Division I or II college or university. Core Courses must be approved by NCAA and added to your school's approved course list.

Keep in mind that NCAA gives accreditation to courses rather than textbooks. Several schools using Financial Algebra have received NCAA approval and we can assist you with that application process. NCAA's guidelines must be adhered to in order for the course to be accepted. You will notice that the course proposed (see course proposal resources below) is well aligned with the textbook and maintains the mathematical rigor of an upper level math course. Be sure to familiarize yourself with the NCAA website and their criteria for course approval.

What is a core course?

A course must be:

- An academic course that receives high school graduation credit in one or a combination of these areas: English, mathematics, natural/physical science, social science, foreign language, nondoctrinal/comparative religion, or philosophy;
- Four-year college preparatory;
- At or above your high school's regular academic level;
- Algebra I or higher in the math area;
- Taught by a qualified instructor

To review your school's updated list, please visit www.eligibilitycenter.org.

If you are submitting a core course for approval, it is necessary to submit the following information on each course. South-Western provides many of the documents listed below; however, several of the items are school-specific and will need to be provided by the school.

- [Course syllabus and description](#) [Note: Algebra 1 is the only prerequisite for this course]
- [Table of Contents from textbooks and/or other resources](#) [Note: Include the Tables of Contents for additional reference materials, such as textbooks in the areas of Geometry, Algebra II, Precalculus, Calculus, and Statistics. This will help accurately reflect the rigor of the course.]
- [Course outline with units of instruction covered and time spent on each unit](#)
- Verification or documentation that shows the course receives graduation credit in the area submitted (school-specific)
- For all math courses, a map or diagram that shows where the submitted courses fit within your various sequences and a copy of the math section from the course selection book (school-specific)



NCAA Certification

For more information about the submission process, visit www.eligibilitycenter.org and click on "For High Schools." If you have further questions, you can contact the NCAA Eligibility Center at:

Core-Course Review/AAL

P.O. Box 7136

Indianapolis, Indiana 46207-7136

Shipping/Overnight Address:

NCAA Eligibility Center

1802 Alonzo Watford Sr. Drive

Indianapolis, Indiana 46202

Toll Free: 877-622-2321 (877-NCAA-EC1)

Fax: 317-968-5102

National Common Core Standards

Correlation of *Financial Algebra* to the [National Common Core Standards](#).

This correlation to the National Common Core Standards will assist in demonstrating that each lesson in the *Financial Algebra* textbook addresses at least one (if not several) Common Core Standards.

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.

To learn more about the Common Core State Standards Initiative, please [CLICK HERE](#).

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NYS Math Teachers Journal

"Financial Algebra: Real-World, Real Math, Real Numbers"

April 9, 2010

The New York Times

"Your Money: Working Financial Literacy in With the Three R's"

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Talk with others teaching this course. Ask questions, share ideas, and learn from your colleagues on the Financial Algebra Listserv.

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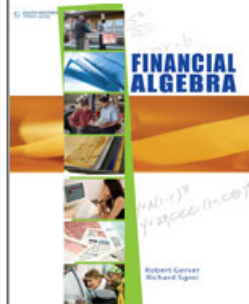
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-  [Syllabus](#)
-  [Teachers Edition](#)

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Robert K. Gerver, Richard J. Sgroi
ISBN-10: 0538449675
ISBN-13: 9780538449670
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 indicates Instructor Resource. Username and Password required.

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PC users: [WinZip](#)

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Creditors have better memories than debtors.

Benjamin Franklin

Deferred Payments

10-2A

Key Terms

- deferred payment
- Credit Card Accountability, Responsibility, and Disclosure Act of 2009

Objectives

- Understand the advantages and disadvantages of deferring a payment.

WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF DEFERRING PAYMENTS?

When you buy goods and services now and pay for them later, you are making a **deferred payment**. Deferred payments include all types of loans, such as mortgages, credit cards, and layaway plans. These were covered in Chapters 4 and 8. Many stores have deferred payment plans that allow you to buy merchandise without even a down payment. Buying a product using a deferred payment option allows you to use the item before you have enough money to purchase it. In most cases, you pay for this privilege by paying interest on your purchase.

Deferred payments can lead to overspending and tie up future income. Imagine if you had a home mortgage and a car payment every month for years. What if you lost your job or were injured and couldn't work? What if a necessary, unanticipated expense came up and you did not have enough money because so much of your money was already allocated to something else? Deferred payments are a very important part of the budgeting process. You need to consider how you will make those payments in the future.

Never invest in any idea you can't illustrate with a crayon.
Peter Lynch, American Businessperson

Investment Diversification

9-5

Key Terms

- diversify
- volatility
- aggressive investment
- conservative investment
- speculative stock
- liquidity

Objectives

- Compare different types of investments.

HOW CAN YOU GET YOUR MONEY TO WORK FOR YOU?

There are many disadvantages to keeping your money in a box. It would not be safe. It would not grow in value. It could be lost to theft or a fire. There are many different ways your money can be invested so it grows over time and provides you with more income. Some of the different ways you can invest your money are the following:

- Bank accounts
- Stocks
- Bonds
- Real estate
- Life insurance
- Starting your own business
- Collectables

Each of these investments carries a certain amount of risk and reward. For that reason, many people **diversify** their investments—they put their money into different types of investments to avoid being subject to the potential volatility of one type of investment. **Volatility** describes the ups and downs of an investment. Investments in more risky endeavors are often called **aggressive investments**. Safe investments are often referred to as **conservative investments**. **Speculative stocks** are stocks in

People are living longer than ever before, a phenomenon undoubtedly made necessary by the 30-year mortgage.

Doug Larson, Newspaper Columnist

Points

8-4A

Key Terms

- points
- breakeven time

Objectives

- Calculate discount points for a mortgage.

IS BUYING POINTS A WISE DECISION?

Points are fees that are paid to a lending institution for the purpose of buying down or lowering the mortgage interest rate. The usual cost of a point is 1% of the loan amount. When faced with the choice of whether or not buying points is a wise financial decision, it is important to do the math and compare the costs with and without the discount that comes from buying the points.

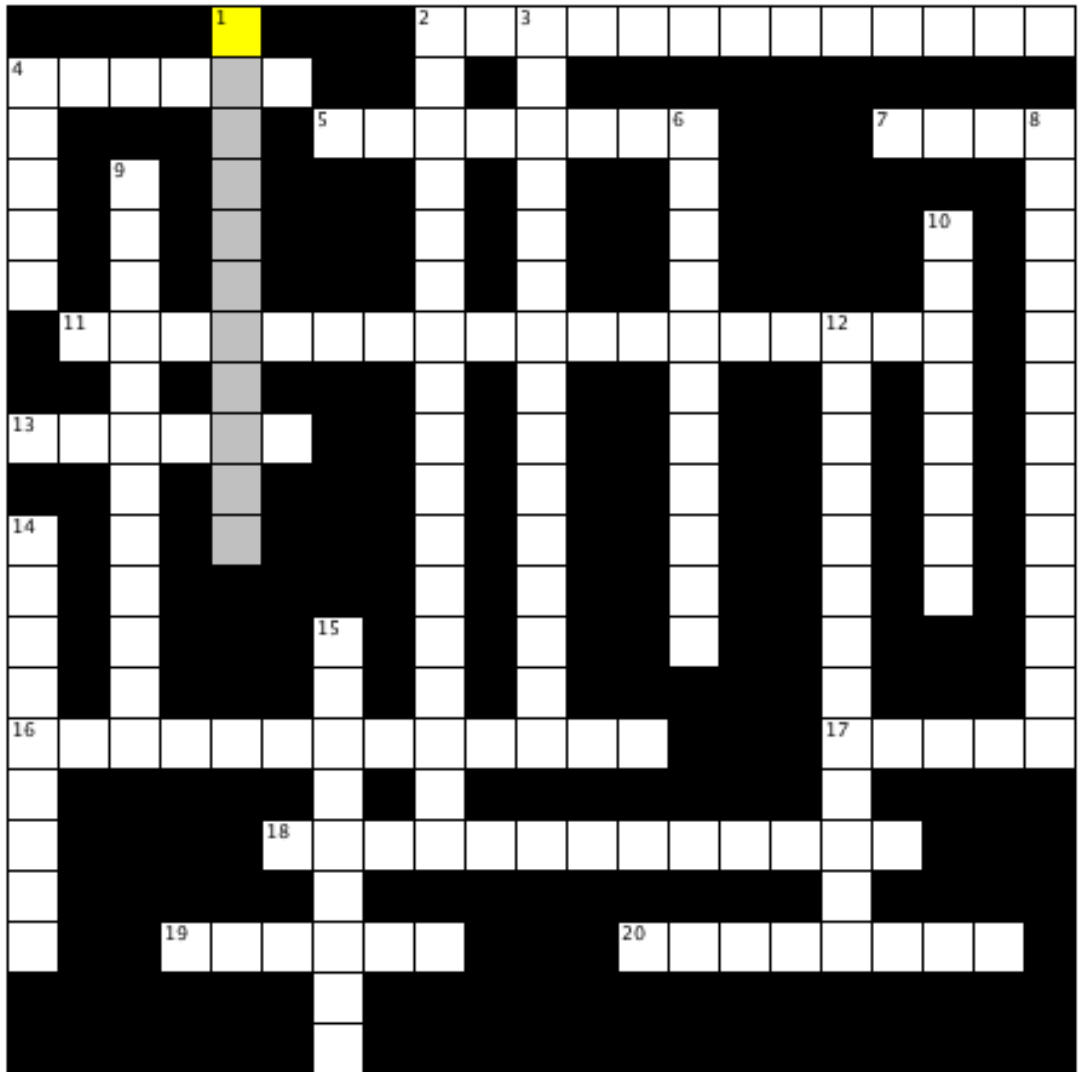
Skills and Strategies

Many factors enter into the decision for purchasing points. First and foremost is the length of time that the buyer intends to keep the loan. The cost of the lower interest rate is an upfront expense. The savings from that expense may not be realized for a while. If the buyer only intends to keep the loan for a short period of time, then the points may not be cost effective.

EXAMPLE 1

- Elizabeth and Nicholas want to buy a new home in Sunset Park. They
- need to borrow \$350,000. Their bank is offering the opportunity for
- the couple to buy down the quoted interest rate of 5.5% by 0.125%

- Revert
- Reveal
- Solution



Across

- 2. This number appears on all of checks, deposit slips, and bank statements.
- 4. The account owner of a check; the person who writes the check.
- 5. A check that has been processed so that the money is paid to the payee of a check.
- 7. The money in a bank account that is held until the issuing bank of a check pays for a check.
- 11. The same deposits made at regular intervals, such as yearly, ...

Down

- 1. Same as balancing; the process of verifying the bank's records to make sure no errors have been made.
- 2. A method for calculating interest so that it is paid once a year.
- 3. An account at a bank that allows a customer to deposit money and make withdrawals from the funds on deposit using a paper check or electronic transfer.





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- Flashcards
- Glossary
- Spreadsheets
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- Graph

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◀ Prev Card **Flip Card** Next Card ▶

average daily balance

SHUFFLE DECK
REMOVE CARD
SHOW ALL CARDS

SHOW TERM FIRST
SHOW DEFINITION FIRST

Term 5 (of 57 active)

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◀ Prev Card **Flip Card** Next Card ▶

The average amount owed per day during the billing cycle.

SHUFFLE DECK
REMOVE CARD
SHOW ALL CARDS

SHOW TERM FIRST
SHOW DEFINITION FIRST

Definition 5 (of 57 active)





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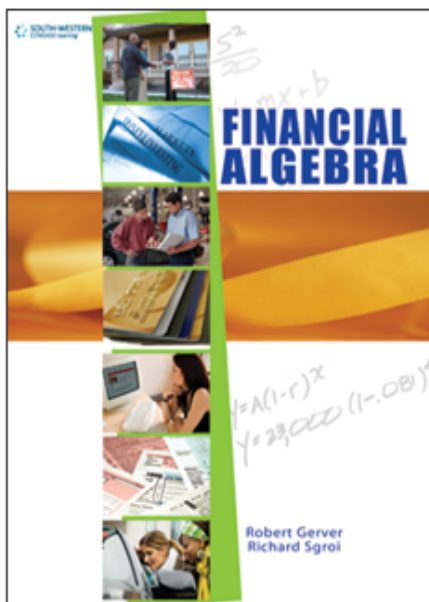
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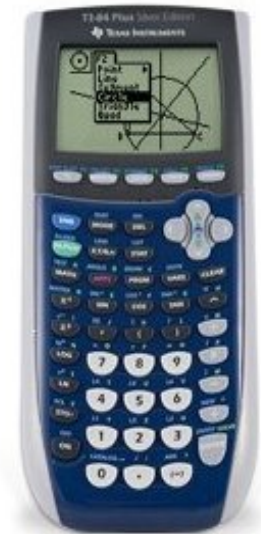
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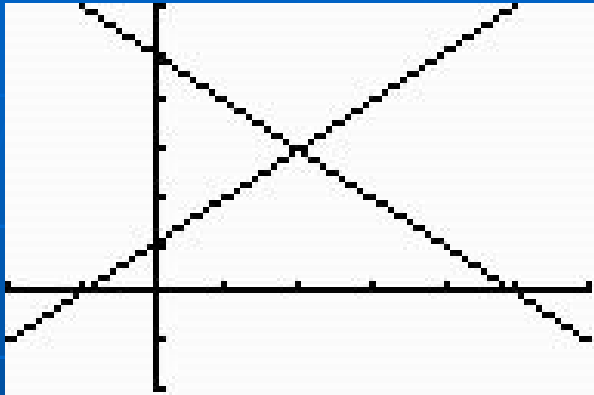
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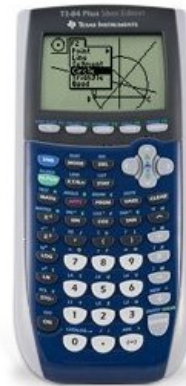


Using a Graphing Calculator



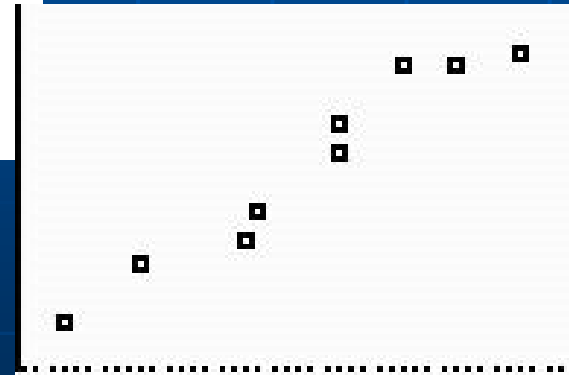
L1	L2	L3	2
1	345	-----	
2	367		
3	125		
4	898		
5	322		
6	176		
7	256		

L2(1)=345

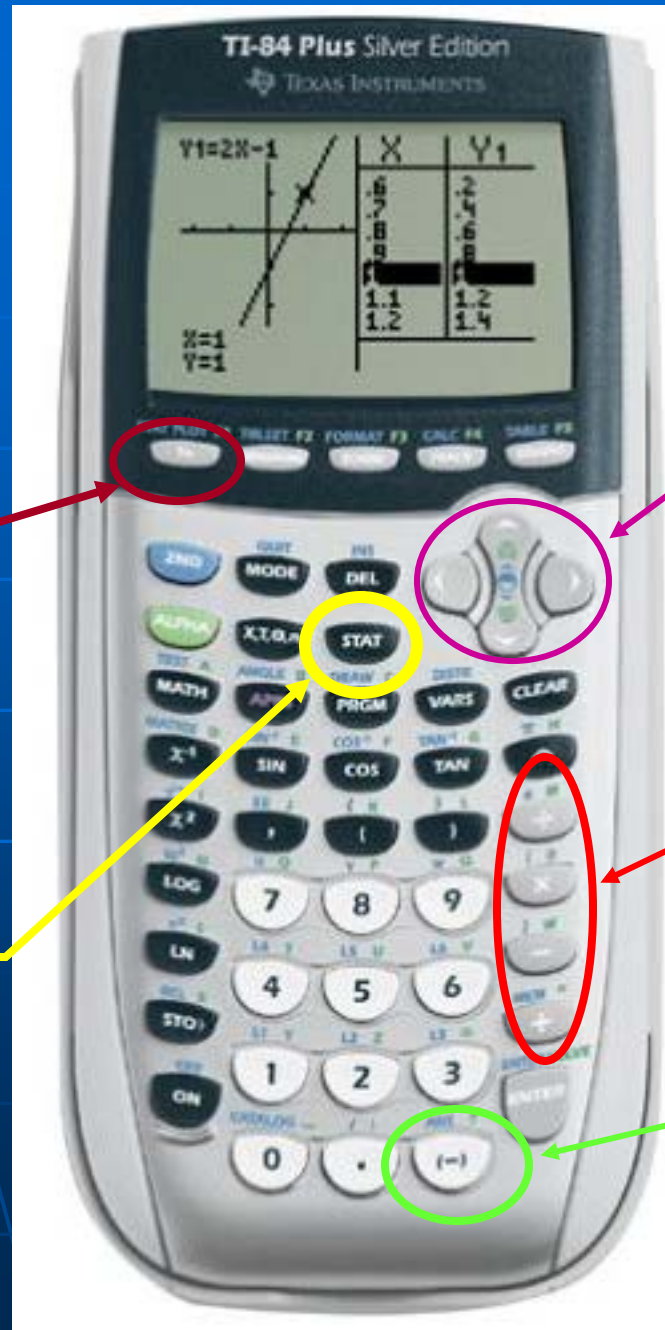


```

Plot1 Plot2 Plot3
On Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
    
```



GRAPHING CALCULATOR BASICS



Entering an Equation to be Graphed

Directional Arrows

The Statistics Menu

Four Math Functions

Negative Number Symbol

2-1

Interpret Scatterplots

Objectives

- Graph bivariate data.
- Interpret trends based on scatterplots.
- Draw lines and curves of best fit.

Key Terms

- data
- univariate data
- bivariate data
- scatterplot
- trend
- correlation
- positive correlation
- negative correlation
- causal relationship
- explanatory variable
- response variable

EXAMINE THE QUESTION

Show students how a scatterplot can depict a trend, and how trends affect business decisions.

Give students several examples of univariate and bivariate data.

CLASS DISCUSSION

Ask students to give a definition of function. Provide examples of scatterplots that are functions and scatterplots are not functions. Have students identify the differences.

HOW DO SCATTERPLOTS DISPLAY TRENDS?

Any set of numbers is called a set of **data**. A single set of numbers is called **univariate data**. When a business owner keeps a list of monthly sales amounts, the data in the list is univariate data. Data that lists pairs of numbers and shows a relationship between the paired numbers is called **bivariate data**. If a business owner keeps records of the number of units sold each month and the monthly sales amount, the set is bivariate data.

A **scatterplot** is a graph that shows bivariate data using points on a graph. Scatterplots may show a general pattern, or **trend**, within the data. A trend means a relationship exists between the two variables.

A trend may show a **correlation**, or *association*, between two variables. A **positive correlation** exists if the value of one variable increases when the value of the other increases. A **negative correlation** exists if the value of one variable decreases when the value of the other variable increases.

A trend may also show a **causal relationship**, which means one variable *caused* a change in the other variable. The variable which causes the change in the other variable is the **explanatory variable**. The affected variable is the **response variable**. While a



Skills and Strategies

You can graph a scatterplot by hand. You can also graph a scatterplot on a graphing calculator.

EXAMPLE 1

Rachael runs a concession stand at the park, where she sells water bottles. She keeps a list of each day's high temperature and the number of water bottles she sells each day. Rachael is looking for trends that relate the daily high temperature to the number of water bottles she sells each day. She thinks these two variables might be related and wants to investigate possible trends using a scatterplot. Below is the list of her ordered pairs.

(65, 102), (71, 133), (79, 144), (80, 161), (86, 191),
(86, 207), (91, 235), (95, 237), (100, 243)

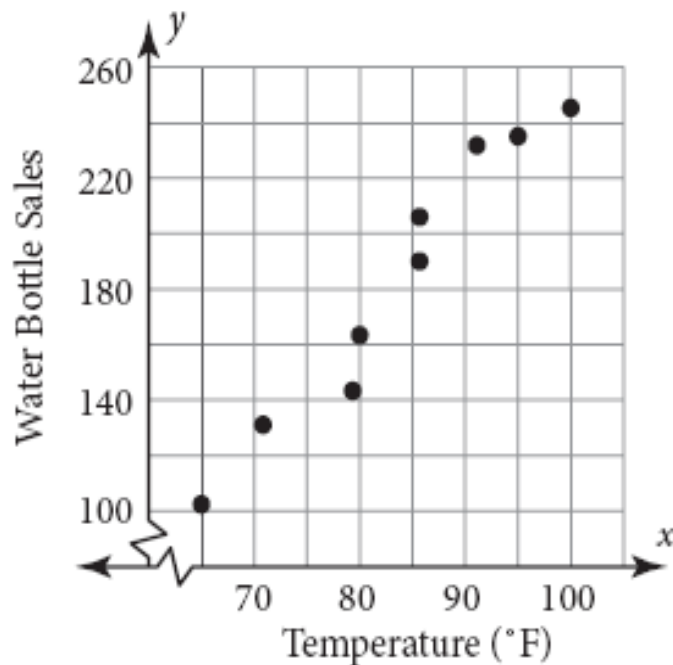
Construct a scatterplot by hand on graph paper. Then enter the data in a graphing calculator to create a scatterplot.

TEACH

As students learn about scatterplots, be sure they realize that a scatterplot is a graph of a set of ordered pairs that may or may not show a relationship. They likely remember that to show an equation, ordered pairs are graphed on a coordinate plane and then connected. Point out that points graphed on a scatterplot are not connected. The position of the points are examined to determine the existence and strength of a correlation.

Spend time discussing the difference between correlation and causation. Students need to understand that just because two sets of data have a correlation, there may or may not be a causation between the sets.

SOLUTION In each ordered pair, the first number is the high temperature for the day in degrees Fahrenheit. The second number is the number of water bottles sold. Think of these as the x - and y -coordinates. The scatterplot is drawn by plotting the points with the given coordinates.



EXAMPLE 1

Discuss with students the likelihood that this problem involves causation—the temperature is responsible for an increase in the water sales.

Compare this example to the following scenario:

As the sales of ice cream increase, the number of lifeguard rescues increases. Students should recognize that ice cream does not cause the need for rescues, but both increase as the temperature increases. When it gets hotter, more people swim (making for an increased need for lifeguard rescues), and more people eat ice cream.

The Graphing Calculator Statistics Features



PRESS

STAT

STATISTICS MENU

Press 1 to
enter data
into lists

```
EDIT | CALC TESTS  
1: Edit...  
2: SortA(   
3: SortD(   
4: ClrList  
5: SetUpEditor
```

Entering the Data

What if there is already data in the lists from a previous use of the calculator??

Clearing Old Data

L1	L2	L3	2
1	345	-----	
2	367		
3	125		
4	898		
5	322		
6	176		
7	256		

L2(1)=345

1. Old data in lists

L1	L2	L3	1
1	345	-----	
2	367		
3	125		
4	898		
5	322		
6	176		
7	256		

L1 = {1, 2, 3, 4, 5, 6...}

2. Use directional arrow buttons to highlight L1

L1	L2	L3	1
-----	345	-----	
	367		
	125		
	898		
	322		
	176		
	256		

L1(1) =

3. Press CLEAR then ENTER

L1	L2	L3	2
-----	345	-----	
	367		
	125		
	898		
	322		
	176		
	256		

L2 = {345, 367, 125...}

4. Use directional arrow buttons to highlight L2

L1	L2	L3	2
-----	-----	-----	

L2(1) =

5. Press CLEAR then ENTER

Entering the Data

(Temperature in F° , Sales)

(65, 102), (71, 133), (79, 144), (80, 161), (86, 191),
(86, 207), (91, 235), (95, 237), (100, 243)

Now, enter the temperatures into L1 and the sales into L2.

Hit ENTER after each entry to move to the next line. When you have completed the entries in L1, hit ENTER then \blacktriangleright .

This brings you to the top of L2. Enter the data in this list.

Hit ENTER after your last entry in L2.

L1	L2	L3	2
65	102	-----	
71	133		
79	144		
80	161		
86	191		
86	207		
91	235		

L2(1)=102

Displaying a SCATTERPLOT

1. Once the data is entered, press
2nd Y=

```
STAT PLOTS
1:Plot1...Off
  [ ] L1  L2  [ ]
2:Plot2...Off
  [ ] L1  L2  [ ]
3:Plot3...Off
  [ ] L1  L2  [ ]
4↓PlotsOff
```

2. Press 1 to get to the Plot 1 menu. If the plot is OFF, as shown here, go to step #3.

```
Plot1 Plot2 Plot3
On Off Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
```

3. Move the cursor over the word ON, and press ENTER
The symbols on each line should be highlighted as shown here.

```
Plot1 Plot2 Plot3
On Off Off
Type: [ ] [ ] [ ]
      [ ] [ ] [ ]
Xlist:L1
Ylist:L2
Mark: [ ] + .
```

4. Press ZOOM 9. This will display the scatterplot in a window that will fit all of the points in the list.



LINEAR EQUATIONS

$$y = mx + b$$

SLOPE

y-intercept

In Chapter 2, you used the intercepts of linear equations when graphing expense and demand functions. Recall that the horizontal intercept always has the form $(a, 0)$ and the vertical intercept always has the form $(0, b)$. In addition to intercepts, straight lines also have slope. The **slope** of the line is the numerical value for the inclination or declination of that line. It is expressed as a ratio of the change in the vertical variable over the change in the horizontal variable from one point on the line to the next. Traditionally, the horizontal axis is called the x -axis and the vertical axis is called the y -axis. Using those variable names, the slope of a line would be represented by the following ratio.

$$\text{Slope} = \frac{\text{Change in } y\text{-value}}{\text{Change in } x\text{-value}}$$

If the coordinates of the two points are (x_1, y_1) and (x_2, y_2) , then the slope can be modeled mathematically by the following ratio.

$$\text{Slope ratio} \quad \frac{y_2 - y_1}{x_2 - x_1}$$

2-2 Linear Regression

Objectives

- Be able to fit a regression line to a scatterplot.
- Find and interpret correlation coefficients.
- Make predictions based on lines of best fit.

Key Terms

- line of best fit
- linear regression line
- least squares line
- domain
- range
- interpolation
- extrapolation
- correlation coefficient
- strong correlation
- weak correlation
- moderate correlation

EXAMINE THE QUESTION

The trends shown by scatterplots can be used to predict the future. But making a prediction without a line of best fit to guide you would be arbitrary. Point out that changes could make the prediction inaccurate. However, the predictions are based on current data and are better than haphazard guessing.

CLASS DISCUSSION

Put a scatterplot on the board and point to different x -values in the domain. For each, ask students if it is an example of interpolation or extrapolation.

What can you tell about the sign of the correlation coefficient and the slope of the regression line?

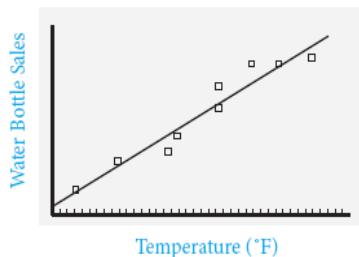
HOW CAN THE PAST PREDICT THE FUTURE?

Many scatterplot points can be approximated by a single line that best fits the scattered points. This line may be called a: **line of best fit**, **linear regression line**, or **least squares line**. This line can be used to display a trend and predict corresponding variables for different situations. It is more efficient to rely on the single line rather than the scatterplot points because the line can be represented by an equation.

Recall that the **domain** is a set of first elements of the ordered pairs, and the **range** is the set of corresponding second elements. **Interpolation** means to predict corresponding y -values, given an x -value within the domain. **Extrapolation** means to predict corresponding y -values outside of the domain.

The scatterplot shown is from Example 1 in the previous lesson. The line shown is a line of best fit because it closely follows the trend of the data points. The blue labels are included to identify the axes, but will not be shown on a calculator display. Generally, the distance the points lie from the line of best fit determines how good a predictor the line is. If most of the points lie close to the line, the line is a better predictor of the trend of the data than if the points lie far from the line. If the points lie far from the line, the line is not good for predicting a trend.

The **correlation coefficient**, r , is a number between -1 and 1 inclusive that is used to judge how closely the line fits the data. Negative correlation coefficients show negative correlations, and positive correlation coefficients show positive correlations. If the correlation coefficient is near 0 , there is little or no correlation. Correlation coefficients with an absolute value greater than 0.75 are **strong correlations**. Correlation coefficients with an absolute value less than 0.3 are **weak correlations**. Any other correlation is a **moderate correlation**.



Determining the Line of Best Fit

```
EDIT CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
```

1. Press STAT

```
EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

2. Press the right arrow
▶ to highlight CALC

```
EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

3. Press 4 for the linear regression equation

```
LinReg(ax+b) L1,
L2
```

4. The LinReg(ax+b) prompt will appear. You must now instruct the calculator as to where the data is stored. Press 2nd 1, 2nd 2

```
LinReg
y=ax+b
a=4.438247012
b=-187.6666667
```

5. The constants for the linear regression equation will appear. Round as stipulated.

Skills and Strategies

The line of best fit and the correlation coefficient can be found using a graphing calculator.

EXAMPLE 1

Find the equation of the linear regression line for Rachael's scatterplot in Example 1 from Lesson 2-1. Round the slope and y -intercept to the nearest hundredth. The points are given below.

(65, 102), (71, 133), (79, 144), (80, 161), (86, 191),
(86, 207), (91, 235), (95, 237), (100, 243)

SOLUTION Although it is possible to find the linear regression equation using paper and pencil, it is a lengthy process. Using the linear regression feature on a graphing calculator produces more accurate results.

Enter the ordered pairs into your calculator. Then use the statistics menu to calculate the linear regression equation. The equation is of the form $y = mx + b$, where m is the slope and b is the y -intercept. Rounding the slope and y -intercept to the nearest hundredth, the equation of the regression line is $y = 4.44x - 187.67$.

Note that calculators may use different letters to represent the slope or the y -intercept. Remember that the coefficient of x is the slope.

TEACH

To enter regression lines and have them graphed on the calculator's display along with the scatterplot, students need to be sure they have the scatterplot and the equation set to display on the same screen.

EXAMPLE 1

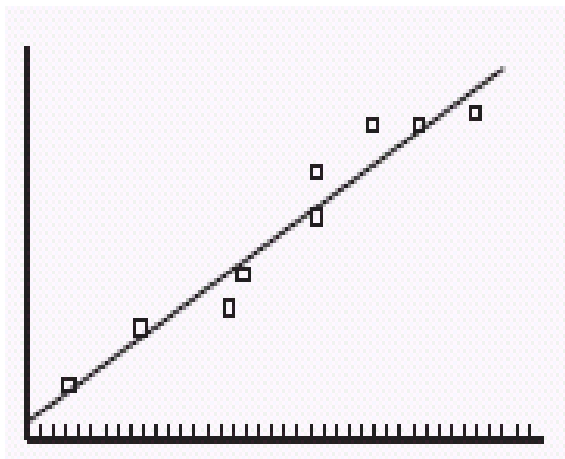
Different calculators have keys in different locations with different names, but the basic functions are similar. Remind students to input data carefully. An incorrect entry results in an incorrect answer.

Press $Y=$ and enter the equation next to $Y1$.
Then press GRAPH

Just How Good of a Fit Is IT?

Generally, the distance the points lie from the line of best fit determines how good of a predictor the line is. If most of the points lie close to the line, the line is a better predictor of the trend of the data than if the points lie far from the line. If the points lie far from the line, the line is not good for predicting a trend.

Water
Bottle
Sales



Temperature

to the line, the line is a better predictor of the trend of the data than if the points lie far from the line. If the points lie far from the line, the line is not good for predicting a trend.

The **correlation coefficient**, r , is a number between -1 and 1 inclusive that is used to judge how closely the line fits the data. Negative correlation coefficients show negative correlations, and positive correlation coefficients show positive correlations. If

the correlation coefficient is 0 , there is no correlation. Correlation coefficients with an absolute value greater than 0.75 are strong correlations. Correlation coefficients with an absolute value less than 0.3 are weak correlations. Any other correlation is a moderate correlation.

The Correlation Coefficient r

EXAMPLE 4

- Find the correlation coefficient to the nearest hundredth for the linear regression for Rachael's data. Interpret the correlation coefficient.

• **SOLUTION** Use a graphing calculator to find the correlation coefficient.

• Round r to the nearest hundredth. $r = 0.97$

• Since 0.97 is positive and greater than 0.75, there is a strong positive correlation between the high temperature and the number of water bottles sold.

When you do the linear regression analysis, your calculator will show either of these displays:

```
LinReg
y=ax+b
a=4.438247012
b=-187.6666667
```

OR

```
LinReg
y=ax+b
a=4.438247012
b=-187.6666667
r2=.9452647302
r=.9722472577
```

Notice that the correlation coefficient analysis is missing from the first display. Some calculators are programmed not to display that analysis until the “diagnostic feature” of the calculator is manually turned on. If this is the case with your calculator (or your students’) follow these steps:

2nd 0

This displays the CATALOG screen.

```
CATALOG
▶abs(
and
angle(
ANOVA(
Ans
Archive
Asm(
```

ALPHA x⁻¹

This displays the calculator functions that begin with the letter D. Scroll down to DiagnosticOn and press ENTER

```
CATALOG
Degree
DelVar
DependAsk
DependAuto
det(
DiagnosticOff
▶DiagnosticOn
```

Now repeat the regression analysis keystrokes. Your screen will show the full display.

```
DiagnosticOn
Done
```

```
LinReg
y=ax+b
a=4.438247012
b=-187.6666667
r2=.9452647302
r=.9722472577
```

For more examples of the use of technology and for an explanation of how to do regression in EXCEL go to:



www.cengage.com/community/financialalgebra

SHARE



FINANCIAL ALGEBRA

CLICK ON THE LINK

Making the Case for
Financial Algebra

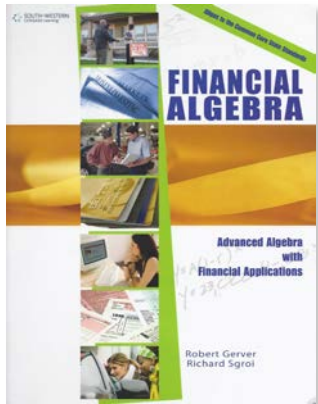
DOWNLOAD THE FILE

Making the Case for Financial Algebra

The following resources are available to help you through the course proposal process.

Author Presentation Files

- Chocolate Math
- Partner Problems
- Did you know
- Using Technology: Using a Graphing Calculator
- Strategies For Tackling The Mathematics
- An Alternative To The Loan Length Formula (p.189)
- Credit Activities



THANK YOU

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