

# ***FINANCIAL ALGEBRA Second Edition***

## **Suggested Syllabus**

To The Teacher:

The syllabus below contains section by section information you can use when planning your course. Like most mathematics textbooks, there are more topics than would fit in a year-long course. It is up to your district, your math department and you to decide what topics are to be included in your *Financial Algebra* course. The lesson durations included in this document are approximate and can vary depending upon the depth of coverage, class discussions, student questions, and the general ability level of the group.

## CHAPTER 1: DISCRETIONARY EXPENSES

Often, most of a teenager's expenses are discretionary expenses. Students usually do not have the responsibility of essential expenses, especially at a younger age. This chapter highlights these two types of expenses in the context of using statistics to make sense of personal financial situations. The problems, activities and projects inherent in studying discretionary and essential expenses are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP2, MP4, MP3, MP4, MP5, MP6, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

F-IF1, F-IF7a, F-IF8

S-ID1, S-ID2, S-ID4, S-ID6, S-ID7, S-ID8, S-ID9

N-Q1, N-Q2, N-Q3

A-CED2

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
1-1 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• differentiate between essential and discretionary expenses</li><li>• determine the mean of a data set.</li><li>• determine the median of a data set,</li><li>• determine the mode of a data set.</li><li>• use sigma notation to represent the mean of a data set.</li><li>• create an interprets a frequency distribution table.</li><li>• determine the mean, median, and mode of a data set presented as a frequency distribution table.</li></ul>
1-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine and interpret cumulative frequency.</li><li>• determine and interpret relative frequency.</li><li>• determine and interpret relative cumulative frequency.</li><li>• model a distribution using a spreadsheet.</li><li>• determine and interpret percentiles.</li></ul>
1-3 (4 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• state the difference between measures of central tendency and measures of dispersion.</li><li>• compute the range for a data set.</li><li>• compute the mean deviation for a data set.</li><li>• compute the absolute mean deviation for a data set.</li><li>• compute the variance for a data set.</li><li>• compute the standard deviation for a data set.</li></ul>

<p>1-4 (4 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• measure dispersion using the standard deviation as a unit.</li> <li>• find percentages and percentiles using the normal distribution.</li> <li>• compute and interpret z-scores.</li> <li>• compute raw scores using z-scores.</li> </ul>
<p>1-5 (5 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• state the difference between univariate and bivariate data.</li> <li>• Interpret trends based in bivariate data.</li> <li>• construct a scatter plot.</li> <li>• fit a linear regression line to a scatterplot.</li> <li>• find the equation of a linear regression line.</li> <li>• compute and interpret the correlation coefficient.</li> <li>• use extrapolation and interpolation to make predictions based on regression lines.</li> </ul>

## CHAPTER 2: BANKING SERVICES

In this chapter, 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. They use logarithms, common logarithm and natural logarithms to determine the term of a variety of bank accounts. The problems, activities and projects inherent in studying banking are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP4, MP5, MP6, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED4

A-SSE1a, A-SSE1b, A-SSE3

F-IF4, F-IF8b

F-BF1a, 2, 5

N-RN1, N-RN2

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
2-1 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• make checking account transactions.</li><li>• determine the balance in a check register.</li></ul>
2-2 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• reconcile a bank statement and a check register.</li><li>• model the reconciliation process using variables.</li><li>• reconcile a bank statement and check register using a spreadsheet.</li></ul>
2-3 (1 day)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• write the general form for an arithmetic sequence.</li><li>• find the common difference in an arithmetic sequence.</li><li>• order percentages.</li><li>• make savings account calculations.</li><li>• use the simple interest formula to find the interest given the principal, rate, and time.</li><li>• use the simple interest formula to find the principal given the interest, rate, and time.</li><li>• use the simple interest formula to find the time given the principal, rate, and interest.</li><li>• use the simple interest formula to find the rate given the principal, interest, and time.</li></ul>
2-4 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• apply the compound interest formula.</li><li>• explore annual, semiannual, quarterly, monthly, and daily iteration using the simple interest formula.</li><li>•</li></ul>

<p>2-5 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• use iteration to develop the formula for compound interest.</li> <li>• use the compound interest formula to find the ending balance given the principal, rate and time.</li> <li>• use the compound interest formula to find the rate given the principal, time and the balance.</li> <li>• use the compound interest and simple interest formulas to determine the APY.</li> </ul>
<p>2-6 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• given a polynomial function in terms of <math>x</math>, determine <math>f(x)</math> as <math>x</math> approaches infinity.</li> <li>• given a rational function in terms of <math>x</math>, determine <math>f(x)</math> as <math>x</math> approached infinity.</li> <li>• given an exponential function in terms of <math>x</math>, determine <math>f(x)</math> as <math>x</math> approaches infinity.</li> <li>• given <math>f(x) = \left(1 + \frac{1}{x}\right)^x</math>, determine the limit as <math>x</math> approaches infinity of <math>f(x)</math>.</li> <li>• develop a working knowledge of <math>e</math>.</li> <li>• determine the balance using the compound interest formula.</li> </ul>
<p>2-7 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine the balance in an account using the future value of a periodic deposit investment formula.</li> <li>• determine the interest earned on an account using the future value of a periodic deposit investment formula.</li> <li>• graph and interpret the graph of the future value of a periodic investment formula.</li> </ul>
<p>2-8 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• derive the formula for the present value of a single deposit investment from the compound interest formula.</li> <li>• use the present value of a single deposit investment formula to determine the principal that must be invested.</li> <li>• derive the formula for the present value of a periodic deposit investment from the future value of a periodic deposit investment formula.</li> <li>• use the present value of a periodic deposit investment formula to determine the amount to be deposited periodically.</li> <li>• graph and interpret the graph of the present value of a periodic deposit investment function.</li> </ul>
<p>2-9 (3 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• after inputting values for <math>B</math>, <math>P</math>, <math>r</math>, and <math>n</math>, the compound interest formula, determine the interest rate.</li> <li>• develop both a conceptual and working understanding of a logarithm in the context of the term (maturity) of an account.</li> <li>• rewrite an exponential equation as an equivalent logarithmic equation.</li> </ul>

	<ul style="list-style-type: none"> <li>• rewrite a logarithmic equation as an equivalent exponential equation.</li> <li>• use the change-of-base formula where appropriate to make computations with logarithms easier to perform.</li> <li>• use logarithms to determine the term of a single deposit investment account when given the principal, monetary goal, rate, and compounding period.</li> <li>• recognize the relationship between logarithms, common logarithms and natural logarithms.</li> <li>• express an exponential equation with base <math>e</math> in terms of an equivalent natural log equation.</li> <li>• express a natural logarithm equation in terms of an exponential equation with base <math>e</math>.</li> </ul>
<p>2-10 (3 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• demonstrate use of the change-of-base formula.</li> <li>• explain and apply the One-to-One Property of logarithms.</li> <li>• explain and apply the Power Property of logarithms.</li> <li>• determine the term of systematic savings.</li> <li>• determine the term of a systematic withdrawal.</li> </ul>

## CHAPTER 3: CONSUMER CREDIT

Using credit is a tremendous responsibility. Students need to learn all of the requirements and regulations involving loans and credit cards. Chapter 3 examines loans, credit legislation, debtors and creditor responsibilities, and reading a credit card statement. The problems, activities and projects inherent in studying credit are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP2, MP4, MP3, MP4, MP5, MP6, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

A-SSE1, A-SSE1b, A-SSE2, A-SSE3, A-SSE3c, A-CED3

F-BF1a, F-IF8b, F-LE5

N-Q1, N-Q2

S-ID6a

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
3-1 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• understand the basic vocabulary necessary to use credit responsibly.</li><li>• identify different types of lending institutions.</li><li>• compute how long it takes to save for items when credit is not used.</li><li>• compute finance charges for installment purchases.</li><li>• understand layaway plan fees.</li><li>• understand deferred payment plans.</li><li>• understand credit scores</li><li>• compute how credit scores can affect the cost of credit.</li></ul>
3-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• compute monthly payments using a monthly payment table.</li><li>• compute monthly payments using the monthly payment formula.</li><li>• compute finance charges on loans.</li><li>• model finance charges algebraically.</li></ul>
3-3 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• explain options available for student loans.</li><li>• calculate interest on a student loan.</li><li>• apply the simplified daily interest formula.</li></ul>
3-4 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• model loan payments</li><li>• understand how monthly payments are partially interest and partially payments towards principle.</li><li>• use natural logarithms to compute loan lengths.</li><li>• use quadratic and cubic regression to fit scatterplots to curves.</li></ul>

<p>3-5 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• understand the vocabulary of credit card usage.</li> <li>• compute liabilities under the Truth in Lending Act.</li> <li>• compute monthly interest rates based on APR.</li> <li>• compute the average daily balance on a credit card.</li> <li>• model average daily balances algebraically.</li> <li>• understand credit legislation.</li> </ul>
<p>3-6 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• verify entries on a credit card statement.</li> <li>• understand the Schumer Box.</li> <li>• understand how interest accumulates when only the minimum payment is paid monthly.</li> </ul>
<p>3-7 (3 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• create an average daily balance calendar based on interpreting a credit card statement.</li> <li>• understand how purchases at different points in the billing cycle affect average daily balance.</li> <li>• compute average daily balance.</li> <li>• find errors in credit card statements.</li> <li>• calculate and/or verify finance charges on a credit card statement.</li> </ul>



## CHAPTER 4: AUTOMOBILE OWNERSHIP

Various functions, their graphs, and data analysis can be instrumental in the responsible purchase and operation of an automobile. In this chapter, students will examine the mathematics of automobile advertising, sales and purchases, insurance, depreciation, safe driving, and accident reconstruction. The problems, activities, and key assignments in this Automobile Ownership Unit offer students opportunities to learn, explore, and use the CCSS Mathematical Practices MP1, MP2, MP3, MP4, MP5, MP6.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED2, A-CED3, A-CED4

A-REI2, A-REI11

A-SSE1b, A-SSE3

F-IF1, F-IF2, F-IF3, F-IF4, F-IF6, F-IF7a, F-IF7b, F-IF7e, F-IF8b, F-IF9

F-BF2, F-BF5

F-LE1b, F-LE1c, F-LE2, F-LE4, F-LE5

G-C5

S-ID1, S-ID2, S-ID3, S-ID4, S-ID6, S-ID7

S-CP1, S-CP2, S-CP-3, S-CP4

S-MD1, S-MD2, S-MD4

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
4-1 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine the sales tax on an automobile purchase.</li><li>• determine the cost of a classified auto advertisement.</li><li>• model a classified ad pricing schedule using a piecewise function.</li><li>• find and interpret the cusp of a piecewise function.</li></ul>
4-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine the quartiles of a data set.</li><li>• determine the interquartile range of a set of data.</li><li>• identify any outliers in a set of data.</li><li>• create a frequency distribution from a set of data.</li><li>• use box-and-whisker plots and stem-and-leaf plots to display information.</li></ul>
4-3 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• calculate an insurance policy surcharge.</li><li>• determine insurance deductibles.</li><li>• determine an insurance payout from a claim.</li></ul>
4-4 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine the probability of an event.</li></ul>

	<ul style="list-style-type: none"> <li>• Interpret and explain two-way tables.</li> <li>• determine conditional probabilities.</li> <li>• Determine if two events are independent.</li> <li>• model a situation using Venn Diagrams.</li> <li>• use a Venn Diagram to solve a conditional probability problem.</li> <li>• convert a raw score to a z-score.</li> </ul>
4-5 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine the intercepts of a depreciation equation.</li> <li>• determine the slope of a depreciation equation.</li> <li>• model an automobile depreciation situation using a linear equation.</li> <li>• use a linear depreciation equation to determine the value of a car after a specified period of time.</li> <li>• use a linear depreciation equation to determine depreciation time.</li> <li>• write an automobile expense function.</li> <li>• create and graph the system of equations composed of the linear automobile expense function and the linear depreciation function.</li> <li>• interpret the domains and the intersection point for the expense/depreciation system of equations.</li> </ul>
4-6 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• model a time/value situation using an exponential depreciation function.</li> <li>• determine the depreciation percentage.</li> <li>• determine the depreciation rate.</li> <li>• use a linear/exponential system to model automobile expense and depreciation.</li> <li>• create and graph the system of equations composed of the linear automobile expense function and the exponential depreciation function.</li> <li>• interpret the domains and the intersection point for the expense/depreciation system of equations.</li> <li>• use logs to determine the age of a car given its value at that time.</li> <li>• use geometric sequences to model car values over time.</li> <li>• determine the common ratio in a geometric sequence.</li> </ul>
4-7 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• use the distance formula.</li> <li>• determine average speed.</li> <li>• determine mpg and Kpg.</li> <li>• use exchange rates to find the value of world currencies.</li> </ul>
4-8 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine reaction distance.</li> <li>• determine braking distance.</li> <li>• determine total stopping distance.</li> <li>• use the stopping distance formula for metric measures.</li> </ul>
4-9 (3 days)	<p>After completing this section, students should be able to:</p>

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|  | <ul style="list-style-type: none"><li>• use the skid speed square root formula to determine the minimum speed of a car when entering a skid.</li><li>• use the square root skid speed formula for yaw marks.</li><li>• determine the radius of a circle given the length of a chord and a middle ordinate drawn to that chord.</li><li>• use the accident reconstruction formulas and data taken from the scene of an accident to determine driving speed at the time of an accident.</li><li>• use projectile motion equations to model an accident situation.</li></ul> |
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## CHAPTER 5: EMPLOYMENT

High school students are on the brink of joining the labor force, even if on a part-time, after school, or summer level. They need to fully understand the nuances of finding a job, salaries, labor laws, paystub deductions, and benefits. The problems, activities and projects inherent in studying employment are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP4, MP5, MP6, MP7, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED1, A-CED2, A-CED4

A-REI3

F-IF2, F-IF4, F-IF7b, F-BF1, F-LE1

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
5-1 (1 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• compute periodic salary based on annual contract salary.</li><li>• compute employment agency fees.</li><li>• interpret abbreviations in classified ads.</li><li>• express classified ad prices as piecewise functions.</li></ul>
5-2 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• compute weekly, semimonthly, and biweekly earnings given annual salary.</li><li>• compute hourly pay.</li><li>• compute overtime pay at different overtime rates.</li><li>• model payment procedures algebraically.</li><li>• compute hourly rates from total paycheck that include overtime.</li></ul>
5-3 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• compute pay based on percent commission.</li><li>• compute piecework pay.</li><li>• model payment procedures algebraically.</li><li>• understand advantages and disadvantages of incentive-based pay.</li></ul>
5-4 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• understand the value of pensions and health care insurance, stock ownership plans, paid vacations, and child care.</li><li>• model vacation time using linear functions.</li><li>• compute the costs of purchasing employee benefits.</li><li>• understand unemployment insurance.</li><li>• Compute final average salaries for pensions.</li><li>• compute pensions.</li></ul>

5-5 (3 days)	After completing this section, students should be able to: <ul data-bbox="406 189 1185 472" style="list-style-type: none"><li>• compute paycheck deductions for Social Security.</li><li>• express Social Security payments as piecewise functions.</li><li>• compute paycheck deductions for Medicare.</li><li>• compute historical trends in Social Security deductions.</li><li>• graph Social Security deduction functions.</li><li>• find coordinates of cusps in Social Security graphs.</li><li>• compute excess Social Security taxes paid.</li></ul>
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## CHAPTER 6: INCOME TAXES

Many Internal Revenue Service and Social Security Administration regulations can be modeled by using linear and polynomial functions that have different slopes over different domains. Line-by-line instructions for IRS forms can also be algebraically symbolized. The problems, activities and projects inherent in studying employment and income taxes are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP4, MP5, MP6, and MP7.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED1, A-CED2, A-CED3, A-CED4

A-REI3

A-SSE1

F-BF1, F-BF2

F-IF1, F-IF2, F-IF4, F-IF7b, F-IF8

F-LE1

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
6-1 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• express taxable income ranges using compound inequality notation.</li><li>• express taxable income ranges using interval notation.</li><li>• determine the tax owed using a linear tax function.</li><li>• use a tax schedule to determine the tax owed.</li><li>• use a tax worksheet to determine the tax owed.</li></ul>
6-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• model a tax schedule taxable income amounts in both interval notation and compound inequality notation</li><li>• model tax owed calculations on a given interval using a linear equation.</li><li>• model tax owed for different filing statuses using a piecewise function.</li><li>• evaluate a piecewise function for a given taxable amount.</li><li>• graph a tax owed piecewise function.</li><li>• identify the cusps of a tax owed piecewise function.</li></ul>
6-3 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine net pay given gross pay.</li><li>• analyze an income statement.</li><li>• identify data contained on a W-2 form.</li><li>• identify data contained on a 1099 form.</li></ul>

6-4 (4 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine a taxpayer's taxable income given information contained on W-2 and 1099 forms</li><li>• complete a 1040EZ form.</li><li>• complete a 1040A form.</li><li>• apply standard deductions.</li><li>• determine whether a taxpayer gets a refund or owes the IRS money.</li></ul>
6-5 (6 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine total income from a variety of sources.</li><li>• complete Schedule B - Interest and Ordinary Dividends.</li><li>• determine and apply adjustments to income.</li><li>• complete Schedule A - Itemized Deductions.</li><li>• complete a 1040 tax form.</li></ul>

## CHAPTER 7: INDEPENDENT LIVING

Most students do not have a full grasp of the big picture when it comes to the financial demands of “moving out.” There are so many expenses involved in purchasing and maintaining a home, or renting an apartment. Students will examine all of the expenses that comprise independent living. The problems, activities and projects inherent in studying independent living are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP4, MP3, MP4, MP5, MP6, and MP7.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED2, A-CED3, A-REI6, A-SSE1, A-APR6

F-BF1, F-LE1, F-TF7

G-C5, G-MG3, G-SRT5, G-SRT8, G-GMD

S-ID6a, S-ID6c, S-ID8

Financial Algebra 2E Sections	Section Learning Objectives
7-1 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• calculate the affordability of monthly rent.</li> <li>• use regression to determine the relationship between square footage and monthly rent.</li> <li>• determine lease signing costs.</li> <li>• calculate and compare moving expenses.</li> <li>• use simultaneous equations to model moving costs.</li> </ul>
7-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• compute the perimeter of a polygon.</li> <li>• compute the area of a regular polygon using its apothem.</li> <li>• convert scale drawing measurements to actual measurements.</li> <li>• use subtraction of areas to find the areas of irregular regions.</li> <li>• use probability and the Monte Carlo Method to compute the area of irregular regions.</li> <li>• compute volumes of rectangular solids.</li> <li>• use volume to compute BTU requirements for air-conditioning.</li> </ul>
7-3 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• understand the vocabulary used in mortgages and promissory notes.</li> <li>• compute front-end ratios</li> <li>• compute back-end ratios</li> <li>• compute balloon payments.</li> <li>• compute monthly payment using the monthly payment formula.</li> <li>• compute the total interest on a home purchase.</li> <li>• compute property taxes based on square footage and assessed value.</li> </ul>



<p>7-4 (4 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• understand the vocabulary of closing on a home.</li> <li>• estimate closing costs.</li> <li>• create an amortization table for a fixed mortgage.</li> <li>• investigate amortization tables for adjustable rate mortgages.</li> </ul>
<p>7-5 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• calculate the discount points for a mortgage.</li> <li>• determine the breakeven time for discount points.</li> <li>• calculate negative points.</li> </ul>
<p>7-6 (2 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• understand the difference between cooperatives and condominiums.</li> <li>• Compute the costs of purchasing a cooperative or condominium.</li> </ul>
<p>7-7 (5 days)</p>	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• find missing sides of right triangles using the Pythagorean Theorem.</li> <li>• use the converse of the Pythagorean Theorem.</li> <li>• find the slope of a line.</li> <li>• describe proportions in similar triangles.</li> <li>• find missing sides of right triangles using trigonometry.</li> <li>• find missing angles in right triangles using inverse trigonometric functions.</li> </ul>

## CHAPTER 8: THE STOCK MARKET

Students are often intrigued by the investment world. Many of them will end up working for a business and this section allows them to learn about different types of business organizations. The section uses algebra and graphs to explore how businesses raise capital through stock sales and how stock trades and dividends allow investors to make money. The problems, activities, and key assignments in the Stock Market unit offer students opportunities to learn, explore, and use the CCSS Mathematical Practices MP1, MP2, MP3, MP4, MP5, MP6.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED1, A-CED2, A-CED4,  
A-REI3  
A-SSE1  
N-Q1, N-Q2, N-Q3

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
8-1 (1 day)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• understand the basic vocabulary of business organizations</li><li>• express parts of a whole as ratios</li><li>• compute financial responsibility of business ownership based on ratio and proportion</li></ul>
8-2 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• use stock data to follow the daily progress of a corporate stock.</li><li>• use net change to compute closing prices.</li><li>• use closing prices to compute net change.</li><li>• compute the volume of shares traded from a stock table.</li><li>• express net changes as percents of closing prices.</li><li>• create spreadsheet formulas to model stock share progress.</li></ul>
8-3 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• interpret a stock bar chart.</li><li>• create a stock bar chart.</li><li>• interpret a stock candlestick chart</li><li>• create a stock candlestick chart.</li><li>• compute net changes from bar charts and candlestick charts.</li></ul>
8-4 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• understand how data is smoothed.</li><li>• calculate simple moving averages using the arithmetic average formula.</li><li>• calculate simple moving averages using the subtraction and addition method.</li><li>• graph simple moving averages using a spreadsheet.</li><li>•</li></ul>

8-5 (1 day)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• interpret stock market ticker displays.</li> <li>• determine the value of a trade form ticker output.</li> <li>• determine trade volumes from ticker displays.</li> </ul>
8-6 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• understand the basic vocabulary of buying and selling shares of stock.</li> <li>• compute gross capital gains and losses from stock trades.</li> <li>• express capital gain as a percent of purchase price.</li> </ul>
8-7 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• compute the fees involved in buying and selling stocks.</li> <li>• compare percent commissions to flat fees.</li> <li>• understand the basic vocabulary of stock trading.</li> </ul>
8-8 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• calculate the post-split outstanding shares and share price for a traditional split.</li> <li>• calculate the post-split outstanding shares and share price for a reverse split.</li> <li>• calculate the fractional value amount that a shareholder receives after a split.</li> </ul>
8-9 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• understand the concept of shareowners splitting the profit of a corporation they own.</li> <li>• compute dividend income.</li> <li>• compute the yield for a given stock.</li> <li>• model yield computations algebraically.</li> <li>• compute yields after stock splits.</li> <li>• compute the interest earned on corporate bonds.</li> </ul>

## CHAPTER 9: MODELING A BUSINESS

Students are introduced to basic business organization terminology in order to read, interpret, chart and algebraically model ownership, production, and sales data. Statistical analysis plays a very important role in the modeling of a business. Using linear, quadratic, and regression equations in that process assists students in getting a complete picture of supply, demand, expense, revenue, and profit as they model the production of a new product. The problems, activities, and key assignments in this unit offer students opportunities to learn, explore, and use the CCSS Mathematical Practices MP1, MP2, MP3, MP4, MP5.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED1, A-CED2, A-CED3, A-CED4

A-REI1, A-REI2, A-REI3, A-REI4b, A-REI6, A-REI7, A-REI10, A-REI11, A-REI12, A-SSE1  
F-IF1, F-IF4, F-IF5, F-IF7a, F-IF8, F-IE4

S-ID6

N-Q1, N-Q2, N-Q3, N-CN

S-ID3, S-ID4, S-ID5, S-ID6, S-ID7, S-ID8, S-ID9, S-IC1, S-IC3, S-IC5, S-CP1, S-CP3,  
S-IC3, S-IC4, S-IC5

N-CN1, N-CN7

Financial Algebra 2E Sections	Section Learning Objectives
9-1 (5 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• analyze survey questions looking for question-wording bias.</li> <li>• determine how to select a sample in order to maximize the chance that it is a representative sample of the population.</li> <li>• use a random number table.</li> <li>• use a random number table to avoid bias in sampling.</li> <li>• determine whether or not a test is fair.</li> <li>• create and use a completely randomized design.</li> <li>• create and use a matched pairs design.</li> <li>• create and use an observational study.</li> <li>• create and use a hypothesis test.</li> <li>• determine, interpret and use z-scores</li> </ul>
9-2 (5 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• calculate sample sizes.</li> <li>• take a simple random sample.</li> <li>• take a stratified random sample.</li> <li>• compare and contrast methods of sampling.</li> <li>• calculate and interpret an unbiased estimator.</li> <li>• determine whether the sample range is an unbiased estimator of the population range.</li> </ul>
9-3 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• calculate a retail price after a markup.</li> <li>• interpret the graph of a supply and demand system of equations.</li> </ul>

	<ul style="list-style-type: none"> <li>• given bivariate data in the form of (price, demand), determine the linear regression demand function that models the data.</li> </ul>
9-4 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• represent expenses as a function of quantity produced.</li> <li>• determine average cost.</li> <li>• given a demand function expressed in terms of price, <math>p</math>, and expense function expressed in terms of demand, write the expense function in terms of price.</li> <li>• determine the breakeven point for a revenue and expense function both graphically and algebraically.</li> </ul>
9-5 (3 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• create a linear expense function.</li> <li>• graph a linear expense function.</li> <li>• create a revenue function as the product of the price and quantity demanded.</li> <li>• graph a revenue function.</li> <li>• interpret the graph of a revenue function.</li> <li>• interpret the zeros of a revenue function.</li> <li>• interpret the breakeven points of a revenue function.</li> <li>• use the method of completing the square to factor a quadratic.</li> </ul>
9-6 (2 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine breakeven points using the quadratic formula.</li> <li>• evaluate revenue and expense at breakeven points.</li> <li>• set up and use a spreadsheet to determine breakeven points.</li> </ul>
9-7 (3 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine the quadratic profit equation given a linear expense equation and a quadratic revenue equation.</li> <li>• determine the maximum point of a quadratic equation.</li> <li>• use the axis of symmetry to determine the maximum point of a quadratic profit equation.</li> <li>• interpret the maximum point of a quadratic profit equation.</li> <li>• find the complex roots of a quadratic equation.</li> </ul>
9-8 (4 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• determine the expense <math>E</math> for production of an item when the price <math>p</math>, expense equation, and demand equation are given.</li> <li>• create a summary analysis of a business model.</li> </ul>
9-9 (4 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• recognize when to use linear programming.</li> <li>• set up inequality constraints.</li> <li>• graph inequalities.</li> <li>• construct a polygonal region.</li> <li>• create and interpret a feasible region.</li> <li>• determine the coordinates of the vertices of a feasible region.</li> <li>• create and test an objective function.</li> <li>• create and interpret a boundless feasible region.</li> </ul>

## CHAPTER 10: RETIREMENT

The focus of this chapter is on the mathematics of fiscal plans that workers can make years ahead of their retirement date. This involves a detailed study of retirement savings plans, both personal and federal, employee pension programs, and life insurance. The problems, activities and projects inherent in studying retirement planning are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP2, MP4, MP5, MP6, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

A-CED1, A-CED3

A-SSE1,

F-BF1

F-IF7d, F-IF8b, F-LE2

S-MD1, S-MD2, S-MD4, S-MD5

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
10-1 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine the balance of a retirement savings account into which monthly deposits are made.</li><li>• determine the tax benefit of using a pre-tax retirement savings account.</li><li>• determine the principal in a periodic deposit retirement. account in order to meet a specified monetary goal at the end of a given number of years.</li><li>• determine the penalty and extra taxes incurred by making an early withdrawal from an IRA.</li><li>• calculate the monetary benefits of an employer matching pension plan.</li></ul>
10-2 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine Social Security tax overpayment from working two jobs in a given year.</li><li>• calculate Social Security credits.</li><li>• calculate Social Security benefits.</li><li>• calculate income taxes on Social Security benefits</li><li>• report Social Security benefits on form 1040.</li><li>• calculate Medicare premium costs</li></ul>
10-3 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• determine the monthly pension benefits under a variety of pension benefit plans.</li><li>• use a spreadsheet to calculate pension benefits.</li></ul>
10-4 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• calculate insurance premium costs.</li></ul>

	<ul style="list-style-type: none"><li>• express percent increase as a literal expression.</li><li>• read and interpret a mortality table.</li><li>• determine an insurance company's profit on a given plan using expected value.</li></ul>
10-5 (2 days)	After completing this section, students should be able to: <ul style="list-style-type: none"><li>• compare investment returns using linear and exponential functions.</li><li>• chart investment plans.</li></ul>

## CHAPTER 11: PREPARE A BUDGET

Students are asked to call upon the knowledge acquired in all of the preceding chapters in order to create and chart a responsible personal budget plan, to mathematically analyze cash flow, and to determine net worth. The problems, activities and projects inherent in studying budgeting are a natural forum for all eight CCSS Mathematical Practice standards, but this unit highlights MP1, MP2, MP4, MP5, MP6, and MP8.

### Common Core State Standards for Mathematical Content that are Addressed

A-APR

A-CED

A-REI10

A-SSE1

F-IF4, F-IF5, F-IF7a, F-IF7b, F-IF7d

N-Q1, N-Q2

N-VM6, N-VM7, N-VM8, N-VM-9, N-VM10

<b>Financial Algebra 2E Sections</b>	<b>Section Learning Objectives</b>
11-1 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• read and interpret a water meter.</li> <li>• read and interpret an electric meter.</li> <li>• determine electric of an appliance cost based on wattage requirements, time used, and the kilowatt-hour charge.</li> <li>• determine the monthly utility amount in a balanced billing account.</li> <li>• calculate energy savings.</li> <li>• recognize the general form of a rational function and the limitations on its domain.</li> <li>• set up and interpret an average utility cost function.</li> </ul>
11-2 (4 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• read and interpret a cell phone plan bill</li> <li>• determine the cost of a pay phone call.</li> <li>• use the greatest integer and piecewise functions to represent a phone cost</li> <li>• use the greatest integer and piecewise functions to represent data usage costs on a cell phone plan.</li> <li>• make cell phone data usage approximations.</li> <li>• calculate text message charges.</li> <li>• calculate monthly cable costs.</li> <li>• compare average monthly costs of two different cell phone plans using an average cost rational function.</li> <li>• graph and interpret a system of two average cost rational functions.</li> </ul>
11-3 (3 days)	After completing this section, students should be able to: <ul style="list-style-type: none"> <li>• set up and interpret a budget matrix.</li> </ul>



	<ul style="list-style-type: none"> <li>• set up and interpret a budget pie chart.</li> <li>• set up and interpret a budget bar graph.</li> <li>• set up and interpret a budget line graph.</li> <li>• set up and interpret a budget line equation.</li> <li>• use budget constraints to analyze a budget situation.</li> </ul>
11-4 (3 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• create a cash flow analysis spreadsheet.</li> <li>• Use cash flow information to verify if spending is within stated guidelines.</li> <li>• create and interpret a frequency budget plan.</li> <li>• create and interpret a frequency budget spreadsheet.</li> <li>• calculate and interpret net worth.</li> <li>• create a debt reduction plan.</li> <li>• calculate the debt-to-income ratio.</li> </ul>
11-5 (5 days)	<p>After completing this section, students should be able to:</p> <ul style="list-style-type: none"> <li>• define a matrix.</li> <li>• define the dimension of a matrix.</li> <li>• identify the dimensions of a given matrix.</li> <li>• define a budget matrix.</li> <li>• use a matrix to model a budget situation.</li> <li>• determine if two matrices can be added or subtracted.</li> <li>• add and subtract matrices.</li> <li>• use addition and subtraction of budget matrixes to model a budget situation.</li> <li>• define a scalar.</li> <li>• perform scalar multiplication.</li> <li>• use scalar multiplication to model a budget situation.</li> <li>• determine if two matrices can be multiplied together.</li> <li>• multiply matrices.</li> <li>• use multiplication of budget matrices to model a budget situation.</li> </ul>