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San Jacinto Unified School District New Course Proposal

Google Forms <forms-receipts-noreply@google.com>
To: sseward@sanjacinto.k12.ca.us

Mon, Dec 2, 2019 at 11:18 AM

Thanks for filling out San Jacinto Unified School District New Course Proposal

Here's what we got from you:

*non-cte
personal
Finance*

[EDIT RESPONSE](#)

San Jacinto Unified School District New Course Proposal

For more information on how to complete this form please contact:

Janet Covacevich
Director, Secondary C & I
(951)929-7700 ext. 4263
jcovacevich@sanjacinto.k12.ca.us

Your email address (sseward@sanjacinto.k12.ca.us) was recorded when you submitted this form.



Signature Page must be printed and wet signed

Access Signature Page at this link <https://docs.google.com/a/sanjacinto.k12.ca.us/document/d/1TO2G1fXxR6WGNhinPY-oNaxtY130cZHUOjTT3Ntv5Zg/edit?usp=sharing>

School *

SJHS

New Course Proposal Submitted By: *

Seward

Course Title *

Personal Finance

Transcript Title (15 characters or less) *

Please be sure to count each character and spaces used to be no more than 15.

Pers Finance

Course Code (assigned by Data Management, extension 4221):

M0107

Academic Department *

Math

Graduation Requirement Met *

Math ▼

Honors (*note: Honors courses seeking A - G status must offer a non-Honors equivalent course) *

No ▼

Grade Level (check all that apply) *

☐ 6th

☐ 7th

☐ 8th

☐ 9th

☐ 10th

☒ 11th

☒ 12th

Pre-Requisite (list all that apply) *

Math 1, 2

Co-Requisite (list all that apply) *

n/a

Possible credits *

10 - year long class ▼

Course Learning Environment *

☒ Classroom Based

☐ Online/Hybrid

CALPADS Course Code (assigned by Data Mgt.)

9260

Career Technical Education Courses

Will this course be part of CTE Pathways? *

No ▼

Is this an Integrated Course (Academics with Career Technical Education) *

No ▼

CTE Courses Only: Indicate the Level of the Course:

▼

CTE Courses Only: Indicate the Industry Sector

▼

CTE Courses Only: Career Pathway & Code Pathway Name

Submitting Courses That are Program Status, Courses Modeled After Another Institution, or Online, or AP

Course Plans for Program Status, Online, or AP must be attached to this form.

Will this course meet any of the descriptors above? *

Program Status Courses (can be auto approved) - Name the Exact Program and Course Title:

Submitting a Course Modeled After Another Institution:

When modeling after another institution's course, you will also need to enter a course overview specific to San Jacinto Unified School District as well as course content specific to SJUSD.
Any course modeled after another institution's course will not move forward until it has been written to reflect SJUSD's unique needs.

Submitting a course modeled after another institution.

Which school and ATP code? Must state exact course title.

[Quoted text hidden]

Course Material: Primary *

Course Materials: Additional (if applicable)

A-G Courses

For courses seeking A - G status please answer the questions below

Is this course being submitted for A-G status? *

Yes ▼

Subject for A - G status

- ☐ "A" History/Social Science
- ☐ "B" English
- ☒ "C" Mathematics
- ☐ "D" Lab Science
- ☐ "E" Language Other Than English
- ☐ "F" Visual and Performing Arts
- ☐ "G" Elective

Name the Discipline (i.e. US History, LOTE, Theater, etc.)

Math

Is this an Integrated Course (Academics with Career Technical Education)

- ☐ Yes
- ☒ No

Does this course need to be retro-activated to a previous year?

No ▼

If yes, which year(s)?

- ☐ 2017-2018
- ☐ 2016-2017
- ☐ 2015-2016
- ☐ 2014-2015

Final Review

Please review your course prior to submission to ensure it meets all requirements, courses will not be moved forward until they have provided all the required information.

End of Course Submission

Before you submit, please verify that you have completed all required components for submission.

[Quoted text hidden]

Personal Finance

Yucaipa Senior High School (053820)

Basic Course Information

Title:	Personal Finance
Transcript abbreviations:	Pers Finance / 0420/20420
Length of course:	Full Year
Subject area:	Mathematics (C) / Advanced Mathematics
UC honors designation?	No
Prerequisites:	Math 1 (Required)
Co-requisites:	None
Integrated (Academics / CTE)?	No
Grade levels:	12th
Course learning environment:	Classroom Based

Course Description

Course overview:

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

students to experience the interrelatedness of mathematical topics, find patterns, make conjectures, and extrapolate from known situations to unknown situations. The mathematics topics contained in this course are introduced, developed, and applied in an as-needed format in the financial settings covered. Students are encouraged to use a variety of problem-solving skills and strategies in real-world contexts, and to question outcomes using mathematical analysis and data to support their findings. The course offers students multiple opportunities to use, construct, question, model, and interpret financial situations through symbolic algebraic representations, graphical representations, geometric representations, and verbal representations. It provides students a motivating, young-adult centered financial context for understanding and applying the mathematics they are guaranteed to use in the future, and is thusly aligned with the recommendations of the Common Core State Standards, as stated in this excerpt: "...all students should be strongly encouraged to take math in all years of high school. ...An array of challenging options will keep math relevant for students, and give them a new set of tools for their futures..." From the Common Core State Standards

Course content:

Unit 1: Discretionary Expenses

In this unit, students will use statistics to describe trends in their discretionary expenses. Since most expenses for students are not mandatory, they are "optional", or discretionary, it is a perfect unit for students to relate to on their current financial level. Additionally, the statistics has few prerequisites—a student who had trouble with geometry proofs or trig can succeed and build confidence with statistics.

The unit aligns with Common Core Standards for Mathematical Practice MP1, MP2, MP4, MP5, MP6, MP7, MP8. Common Core State Standards for Mathematical Content that are Addressed S-DI1, S-ID2, S-ID3, S-ID4, S-ID5, S-ID6, S-ID7, S-ID8, S-ID

≡ Unit Assignment(s):

Key Assignment 1.1: Using Statistics to Analyze Auto Prices Mathematics: Measures of central tendency, distribution charts Advanced Algebra with Financial Applications Second Edition Course Outline Page 27

Mathematics Learning Goals: To use measures of central tendency and distribution charts to analyze automobile prices. Students choose a make, model and year for an automobile. They use the Internet and newspaper classified ads to find 20-30 of those cars for sale. They get the price of the car and the mileage it has. They then determine the mean, median, and mode car prices and mileage amounts. Students should identify 10 price intervals which encompass all of the car prices and 10 mileage intervals which encompass all of the odometer readings at time of sale. Using these intervals, students create charts depicting the frequency, relative frequency, cumulative frequency, and relative cumulative frequency for the prices and mileages. Their results are presented to the class via PowerPoint presentation or poster presentation.

Key Assignment 1.2: Can a Basketball Team Have Normally Distributed Heights? Mathematics: Normal distribution, measures of central tendency and dispersion.

Mathematics Learning Goals: To understand shifts of the normal distribution. Are the heights of National Basketball Association (NBA) players normally distributed? Students might intuitively think not since all basketball players are tall. They will need to get the heights of all NBA players by using the Internet. They will research what a normal probability plot is and see how their calculators can create one. Then they will create a normal probability plot and interpret it.

Key Assignment 1.3: The Famous Birthday Problem . Mathematics: Surveying, relative frequencies, probabilities.

Mathematics Learning Goals: To determine why and how the answer to this problem defies mathematical intuition. A very famous problem in statistics is the “Birthday Problem.” Students will be asked to answer the problem before embarking on an empirical quest to find the answer. Students will poll classes in school and compile data on birthdates. They then need to determine what percent of the classes had matching birthdates. After the experimental approximation of the solution, students will then research, interpret, and explain the theoretical solution. They will then explain why the problem is so mathematically deceptive.

Key Assignment 1.4: Using Relative Frequency to Make Predictions Mathematics: Relative frequency, empirical probability.

Mathematics Learning Goals: To determine how random selections can lead to a prediction on the frequency of items in a population. Advanced Algebra with Financial Applications Second Edition Course Outline Page 28 Students will randomly select, with replacement, colored candy items, one at a time, from a cup. They repeat this 100 times and record their findings. They will set up a relative frequency table for each color, and use this information to predict, given the total number in the population of candies on the cup, the frequency of each colored candy in the cup.

Key Assignment 1.5: Using Regression to Predict Spending Mathematics: Bivariate data, scatterplots, regression curve of best fit, correlation.

Mathematics Learning Goals: To use regression analysis to interpret trends and make predictions about spending and expense data. In Financial Algebra Second Edition section 1-5, you learned how to use regression analysis. In the exercises 5, 6, and 12 in the Applications at the end of that section, you were offered tables of bivariate data that had to do with spending. Use any statistics website to make a list of spending data by age of the consumer, income of the consumer, year, or any other numerical factor. List at least 10 ordered pairs of data. Make a scatterplot of the data and identify any trends that you see. Then do a linear, quadratic, and cubic regression analysis to determine the curves of best fit in each situation. Finally, pick a dependent variable amount outside of the range you selected and use the regression equations to make a spending prediction based on that amount.

Unit 2: 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.

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

≡ Unit Assignment(s):

Key Assignment 2.1: How Interest Method Affects Monetary Growth Mathematics: Simple interest, compound interest

Mathematics Learning Goals: To determine how increased compounding affects growth. Students are first introduced to the meaning of compounding numerically via mathematical iteration. Before embarking on a rigorous study of limits and compound interest algebraic formulas, students are asked "How much would \$1,000 grow to, in one year, at 100% interest compounded continuously?" The 100% interest and continuous compounding often leads them to guess much higher than the actual amount. Their guesses are recorded, and a statistical analysis of their guesses is made. Outliers are carefully noted. The findings of this activity are scrutinized after students complete

Key Assignment 2.2: Deriving the Compound Interest Formula Mathematics: Inductive reasoning, exponential functions, rational functions

Mathematics Learning Goals: To use patterns and induction to generate for selected forms of compounding and adapt them to monthly, weekly, daily, and hourly compounding. Students will compute interest for each interest period over a semi-annual and quarterly compounded account for a given balance and interest rate. They will derive the general algebraic formulas for these two types of compounding. They will then look for patterns in the semi- Advanced Algebra with Financial Applications Second Edition Course Outline Page 29 annual and quarterly compound interest formulas to inductively conjecture about the general formula for compounding. They will then find formulas for monthly, weekly, daily and hourly compounding, and compute and compare the interest earned over one year for these accounts.

Key Assignment 2.3: Using Limits to Derive the Natural Base e Mathematics: Rational functions, exponential functions

Mathematics Learning Goals: To use substitution and patterns to generate a series that approaches e as x approaches infinity. Students will be introduced to the notion of limits and limit notation and apply it to the compound interest formulas previously derived. They will increase the number of compoundings by first computing interest when the compounding period is every minute, and then every second, for a given balance and interest rate. They will then let the number of compoundings 'n' approach infinity to see what happens to the annual interest as the number of compoundings approaches infinity.

Key Assignment 2.4: Future Value and College Costs Mathematics: Rational functions, regression

Mathematics Learning Goals: To estimate the cost of a college education in 18 years and determine how much needs to be saved each month to have the costs covered by the 18th year. Students pick a college and find out the cost of tuition, room and board (if necessary) and fees over the past ten years. They set up a regression line or curve of best fit. They then predict the cost of a college education in 18 years (as if they just had a child and were trying to save for college). They then

use the prevailing interest rate and the future value formula to determine the monthly periodic deposit that would be necessary to have the full college cost saved by the child's 18th birthday. They then do the problem with interest rates slightly higher than the prevailing rate.

Key Assignment 2.5: Finding The Term of an Account Using Logs Mathematics: Logarithms, common logarithms, natural logarithms

Mathematics Learning Goals: To determine the term of a systematic payment account Pick three expensive items that you might like to purchase some time in the future. Determine the total cost of each item with tax and shipping (if applicable). Determine what you think you might be able to afford each month to deposit into a savings account assuming that you would be saving for only one of the three. Find three different savings accounts offered by three different lending institutions. These accounts should compound interest monthly. Determine the APR for each account. Use the formula in section 2-10 for systematic savings to determine how long it would take to save enough money to make the purchases. Write a report on your findings.

Unit 3: Investing

Students are introduced to basic business organization terminology in order to read, interpret, chart and algebraically model stock ownership and transaction 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 Investing 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-REI2, A-REI3, A-REI4b, A-REI6, A-REI7, A-REI10, A-REI11, A-REI12 A-SSE1 F-IE4 F-IF1, F-IF4, F-IF5, F-IF7a, F-IF8, S-ID6 N-Q1, N-Q2, N-Q3, N-CN S-ID8, S-ID9, S-IC1, S-IC3, S-IC5

≡ Unit Assignment(s):

Key Assignment 3.1: Charting a Corporate Stock Mathematics: Data Analysis, regression, prediction, modeling, graphical interpretation

Mathematics Learning Goals: The goal of this assignment is to have students use mathematical modeling to chart and interpret stock market trends over a 15-day period. They will make trend predictions based on simple moving average crossover analysis as well as regression models. Each student selects a corporation traded on the New York Stock Exchange. They produce a background paper, PowerPoint presentation or poster board display on that corporation. Students chart the open, close, high, low and volume data for 15 consecutive trading days. They graph the data using two different formats and then discuss trends that the data shows. They will also calculate three different cluster-lengths of moving averages and, using those clusters, they will create superimposed line graphs. Students discuss trading implications based upon stated domains of graph pairs before and after any intersection points. Finally, they determine the

closing price curve of best fit using regression analysis. They must state the regression equation and support why their stated curve best fits the data of closing prices. Students will then use the curve of best fit to predict a closing price on the 16th trading day. They compare that predicted price with the actual closing price on the 16th day and find a percent error.

Key Assignment 3.2: Mathematically Modeling A Business Mathematics: Linear and quadratic functions, linear/linear Systems, linear/quadratic systems, regression analysis

Mathematics Learning Goals: To have students create linear and quadratic models for a startup business. They will graph and interpret systems of these regression and modeling equations in order to explore the relationship between and among expense, demand, price, revenue and profit. Students are given a market research scenario for a new product, attained from a focus group questionnaire. The research contains a list of ordered pairs in the form (p,q) where p is a potential price and q is the quantity of the product that the focus group member would purchase if it was set at that price. Using these ordered pairs, students construct a scatterplot, determine the correlation coefficient, and identify a linear regression equation in which q is the independent variable and p is the dependent variable. Then, given information about expenses, they are to set up a linear expense function in terms of the quantity demanded. The quadratic revenue and profit equations are determined and graphed on the same axes with the expense function. Students identify and interpret the breakeven points, the coordinates of the maximum point on the revenue graph, the coordinates of the maximum point on the profit graph, and the price at which the product should be sold in order to maximize profit. Finally, students are told the initial price per share for the company's stock and asked to determine the number of shares that must be sold in order to have enough money to start this business. Advanced Algebra with Financial Applications Second Edition Course Outline Page 31

Key Assignment 3.3: Creating Your Own, Original, Random Number Table Mathematics: Probability

Mathematics Learning Goals: To create a random number table to help students understand how they simulate random choice. Students use numbered ping pong balls to create a table of random digits. Aside from using their table to do problems in class, the creation of the table can help them understand that these tables represent random digits, and are not "rigged."

Key Assignment 3.4: Creating A Financial Portfolio Using Linear Programming Mathematics: Linear programming

Mathematics Learning Goals: To set up constraint inequalities and a feasible region in order to set up an optimal financial portfolio. Students should reread Application 8 in section 9-8. This application will be the model for this assignment. They are to assume that they have \$500,000 to invest. They should interview a financial advisor and ask for a recommendation of two investment plans. In addition, they should ask what the estimated return on investment for each plan would be. Ask the advisor for constraints on the investment similar to those in Application 8. Then students are to apply the linear programming process to this investing situation and determine the amount to invest in each plan that will yield an optimal return of the investment.

Key Assignment 3.5: Unbiased Estimators Mathematics: Measures of central tendency and measure of spread. Combinations.

Mathematics Learning Goals: To determine which sample statistics are unbiased estimators of population parameters. Students are given small populations of data. They then compose a table of all possible samples, some with, and some without replacement. They find sample statistics for each sample, and then average the sample statistics. This average is compared to the actual population parameter to see which of the statistics are unbiased estimators.

Unit 4: Employment and Income Taxes

Many Internal Revenue Service and Social Security Administration regulations can be modeled by using linear and polygonal functions that have different slopes over different domains. Lineby-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

Unit Assignment(s):

Key Assignment 4.1: Creating the Tax Worksheet Mathematics: Domains, piecewise functions, linear functions and graphs, point-slope form, slope-intercept form, graphs with cusps.

Mathematics Learning Goals: To derive the slope-intercept form used on the IRS tax worksheet by translating tax tables into piecewise functions. Advanced Algebra with Financial Applications Second Edition Course Outline Page 32 The tax tables give taxpayers a function in which the independent variable is the taxable income and the dependent variable is the tax. It is convoluted and has confused taxpayers for years. Within the last decade, the IRS created a worksheet that uses the slope-intercept form of the equations of a line to simplify calculations for the taxpayer. In this Key Assignment, students interpret the IRS Schedule, express the domains using compound inequality notation, and create the piecewise function that models the IRS intentions. They then covert this function, which is a translated version of point-slope form, into the slope-intercept form to create the tax worksheet.

Key Assignment 4.2: Graphing the FICA Tax Function Mathematics: Piecewise functions, slope, cusps, linear equations

Mathematics Learning Goals: To use graphs to compare the FICA tax longitudinally over a prescribed number of years. Students look up the FICA tax percents, and maximum taxable incomes to create piecewise functions for each of the last six years. They compute the maximum FICA tax, and graph all six years on the same axes, and use the graph to write a paragraph on what has happened to FICA taxes over those years. They discuss the significance of the coordinates of the cusp. They do the same for the tax years 1981-86, and compare the last six years to the years 1981-1986.

Unit 5: Automobile Ownership

Various functions, their graphs, and data analysis can be instrumental in the responsible purchase and operation of an automobile. In this unit, 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

Unit Assignment(s):

Key Assignment 5.1: Using Statistics to Negotiate Auto Transactions Mathematics: Bivariate data, correlation, regression, mean, median, mode, quartiles, interquartile range, outliers, modified box-and-whisker plots, stem-and-leaf plots, frequency distributions, scatterplots.

Mathematics Learning Goals: To use measures of central tendency and measures of dispersion to mathematically negotiate the buying and/or selling of an automobile. Students choose a make, model and year for an automobile. They use the Internet and newspaper classified ads to find 10-20 of those cars for sale. They get the price of the car and the mileage it has. They construct modified box-and-whisker plots and describe the frequency distribution. They pair each car's price with its mileage to create a scatterplot. They classify the association as positive or negative. They find the regression line and correlation coefficient and interpret the relationship as strong, moderate or weak, and discuss its linearity. Their results are presented to the class via PowerPoint presentation or poster presentation.

Key Assignment 5.2: Automobile Cost and Depreciation Advanced Algebra with Financial Applications Second Edition Course Outline Page 33 Mathematics: Exponential regression, graphing linear and exponential functions, rational functions, linear/exponential systems, systems of linear equations, slope-intercept form. Mathematics Learning Goals: To use graphing techniques to compare the value of a car to the expense of purchasing it throughout its lifetime. Using the monthly payment rational function, students graph the cost C of purchasing a new car, using the down payment as the y -intercept, and the monthly payment as the slope. They then investigate three types of depreciation: straight-line, exponential, and historical bath tub graphs. They graph the cost and depreciation functions on the same set of axes to find the month at which the total cost C of owning the car surpasses its value V as it depreciates. They identify and interpret the domains on which $C > V$ and $C < V$. Key

Assignment 5.3: Linear Depreciation and the IRS Mathematics: Linear equations, arithmetic sequences

Mathematics Learning Goals: To model linear depreciation situations using linear equations and arithmetic sequences. Do an online search for IRS Publication 946 "How To Depreciate Property". The IRS uses a method known as "straight line depreciation". Research the depreciation conditions for business use of an automobile. How does the IRS depreciation

automobiles that are used for business use? Go to an automobile sales website and select a car for business use. Determine the price for that car. Apply the IRS depreciation equation to determine the car value for 5 years. Model the car values using an arithmetic sequence. Write the general term for the arithmetic sequence.

Key Assignment 5.4: The Physics of Driving Mathematics: Quadratic equations, radical functions, arc length, geometry of the circle.

Mathematics Learning Goals: To use the mathematics listed to determine braking distances and to gather data from accidents scenes. Students use formulas to determine reaction distance, braking distance, and figure out the speed a car was going based on its skid marks. The braking-distance formula is a quadratic function, with speed as the independent variable. The skid speed formula is an irrational function that has three independent variables. Students also use the geometry of the circle to compute the radius of a given yaw mark, which is a curved skid mark, and use the radius and friction factor to find the speed the car was going when it began to skid. The students then prepare a PowerPoint or poster presentation for the driver's education class in their school.

Key Assignment 5.5: Exponential Auto Depreciation. Mathematics: Exponential equations and geometric sequences

Mathematics Learning Goals: To use the mathematics listed to model automobile depreciation. Although the IRS uses linear depreciation for reporting purposes, in reality, items usually depreciate by a certain percentage each year. Select three different car makes and models. Do Advanced Algebra with Financial Applications Second Edition Course Outline Page 34 research on historical depreciation of these cars. In other words, try to find the depreciation percentage (common ratio). Write a geometric series equation for each car. Graph each function. What implications can you make from the graphs?

Unit 6: Consumer Credit

Becoming familiar with credit terminology and regulations is critical in making wise credit decisions. Credit comes at a price and in this unit students learn how to use mathematics to make wise credit choices that fit their needs, current financial situation, and future goals.

The problems, activities, and key assignments in this Consumer Credit Unit offer students opportunities to learn, explore, and use the CCSS Mathematical Practices MP1, MP2, MP4, MP5, MP6, MP7. Common Core State Standards for Mathematical Content that are Addressed A-CED3 A-REI11 A-SSE1, A-SSE2, A-SSE3 F-IF7e, F-IF8b F-BF1a, F-BF5 F-LE4, F-LE5 N-Q1, N-Q2 S-ID6a

≡ Unit Assignment(s):

Key Assignment 6.1: Can I Afford This Loan? Mathematics: Exponential functions, logarithmic functions, system of exponential and linear functions, modeling, graphical interpretation

Mathematics Learning Goals: To use three modalities to determine the affordability of a loan: exponential formula evaluation, logarithmic formula evaluation, and interpreting an exponential/linear system. To use technology (graphing utility and/or spreadsheet) to make the determinations required and justify their responses. Students are given a scenario in which a family must make a decision about the affordability of a loan based on the principal, the loan-length, the APR and the maximum affordable monthly payment the family is able to make towards loan debt reduction. Students determine the affordability of the loan in three different ways: using the monthly payment function, interpreting the graphs of the system of equations defined by the exponential monthly payment function and the linear maximum affordable monthly payment, and using the logarithmic loan length function. They are then asked to construct two spreadsheets: a monthly payment spreadsheet that charts the monthly payment as loan length time varies from 1 to 20 years, and a loan length spreadsheet that charts time as monthly payments vary from \$100 to \$1000. Finally, students must write up a summary analysis for this situation explaining how the algebraic modeling by the spreadsheet formulas supports their prior work.

Key Assignment 6.2: Mathematically Modeling a Credit Card Statement Mathematics: Algebraic modeling and spreadsheet formula creation

Mathematics Learning Goals: To algebraically model a month of activity on a person's credit card. Students create a 21-day credit calendar that depicts algebraic representations of daily balances based upon an opening balance of Y dollars, an X-dollar purchased on the 8th day, a Z dollar payment on the 13th day, and a W-dollar purchased on the 20th day. Using these representations from the calendar, they write algebraic expressions for the sum of the daily balances, the average daily balance, and the finance charge for this 21-day period given that the APR on this credit card is P%. Students then create a spreadsheet that models the situation described above and test their spreadsheet for a given data set.

Key Assignment 6.3: How Much Will That Student Loan Really Cost You? Mathematics: exponential and rational functions
Advanced Algebra with Financial Applications Second Edition Course Outline Page 35

Mathematics Learning Goals: Students will employ the simple interest formula, the monthly payment formula and the simplified interest formula to determine the total cost of a student loan. Students should select three different two-year colleges, four-year colleges or universities, or a career school. Go on the websites of those selected and determine the tuition cost for the upcoming school year. Assume that for each of the schools selected, the student will be financing the entire tuition costs. Go to websites such as <https://studentaid.ed.gov/sa/types/loans> to determine the terms and the interest rate for a 10-year Federal loan to pay off the first year of tuition. Go to websites such as <http://www.finaid.org/loans/privatestudentloans.phtml> to determine the terms and interest rate for a 10-year private loan. Determine how much it will cost over the life of the loan at each institution in each of the following situations: Federal subsidized loan, Federal unsubsidized loan - payment starts after graduation, Federal unsubsidized loan - interest only paid while in school then full payments made after graduation, private loan - full payments made while in school. Students are to make a presentation about their findings.

Unit 7: Independent Living

In this unit, students work their way through the mathematics that models moving, renting, and purchasing a place to live. They also explore the geometric demands of floor plans and design, and discover the relationship between area and probability.

The problems, activities, and key assignments in this Independent Living Unit offer students opportunities to learn, explore, and use the CCSS Mathematical Practices MP1, MP4, MP5. Common Core State Standards for Mathematical Content that are Addressed A-APR6 A-CED2, A-CED3 A-LE1 A-REI6 A-SSE1 F-BF1 G-C5 G-MG3 S-ID6a, S-ID6c, S-ID8 G-SRT2, G-SRT6, G-SRT7, G-SRT8

Unit Assignment(s):

Key Assignment 7.1: Areas of Irregular Plane Figures Mathematics: Probability, ratios, random integers, graphing, random number table

Mathematics Learning Goals: To use the Monte Carlo method to find the area of any regular or irregular plane figure. Students superimpose a grid on an irregular plane figure that is part of a landscape design. They outline the irregular figure with a rectangle and use a random number generator from a calculator, or a random number table, to generate 500 points, which they plot on their rectangular grid. As they plot each point, they note if it is inside or outside of the irregular region. They find the percent of random points that landed in the irregular region and take that percent of the area of the enclosing rectangle to approximate the area of the irregular region.

Key Assignment 7.2: Areas of Shaded Regions Mathematics: Area formulas

Mathematics Learning Goals: To determine areas of plane figures that have sections removed from them. As part of a unit on floor plans and interior design, students compute areas of floors to find the cost of new flooring. They also compute the cost of paint by taking the areas of the walls and subtracting window and door areas. They employ the area of a circle, square, triangle, rectangle, trapezoid, and parallelogram, and create a poster display on what a specific room cost to redo.

Key Assignment 7.3: The Apothem and the Area of a Regular Polygon Mathematics: Inscribed circles, area of a triangle, perimeter, congruence.

Mathematics Learning Goals: To derive a formula for the area of any regular polygon. Advanced Algebra with Financial Applications Second Edition Course Outline Page 36 Students use the area of a triangle to find the area of a regular polygon. They divide a regular polygon into triangles, by connecting the center to each vertex. They draw in the altitude, which is renamed the apothem, and find the area of the triangle. They discuss the congruence of the n triangles formed in the regular n -gon, and multiply to find the area of the polygon. They then model this algebraically, and use the commutative property of multiplication to derive the formula that the area is half the product of the apothem and the perimeter of the regular polygon.

Key Assignment 7.4: How Increased Payments Affect Mortgages Mathematics: Rational functions

Mathematics Learning Goals: To determine the reduction in interest that extra mortgage payments result in. Students use the monthly payment formula to compute the monthly payment for a hypothetical mortgage amount over 15 and 30 years. They compute the total payments, based on 12 monthly payments each year, and the total interest for the entire loan. They then use a mortgage calculator to assume an extra, 13th payment is made each year, so payments are made once every 4 weeks instead of once each month. They compute the interest and new total repayment period and compare the total interest to the original conventional mortgage to see the savings in total years and interest. Key Assignment 7.5: Buying Points Go to three lending institutions and find information about their APR for 15 and 30-year mortgages, and the cost of buying traditional and negative points. Calculate the effect that buying 1, 2 and 3 points will have on the lifetime cost of a \$400,000 mortgage.

Unit 8: Retirement Planning and Budgeting

The focus of this unit 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. Additionally, students are asked to call upon the knowledge acquired in all of the preceding units 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 and 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-CED3 A-REI10 A-SSE1 F-BF1 F-IF4, F-IF5, F-IF7a, F-IF7b, F-IF8b N-Q1, N-Q2 N-VM6, N-VM7, N-VM8, N-VM-9, N-VM10 S-MD1, S-MD2, S-MD4, S-MD5

≡ Unit Assignment(s):

Key Assignment 8.1: How Do Life Insurance Companies Earn a Profit? Mathematics: Expected value, random variables, probability distributions

Mathematics Learning Goals: To use probability distributions and mortality tables to compute the profit earned on a five-year term life insurance policy. Students use the probability inherent in mortality tables and life insurance annual premiums to compute the expected profit for a life insurance company's term policy. They create probability distributions for the random variable profit and compute expected profit by summing the products of the individual profits and probabilities for each year of the policy. They compute the minimum annual premium the company must charge to earn a profit.

Key Assignment 8.2: Planning For Retirement Mathematics: Exponential equations, expected value, data analysis, modeling and predicting

Mathematics Learning Goals: To apply prior knowledge from the banking unit to make decisions about the feasibility of a retirement plan. Advanced Algebra with Financial Applications Second Edition Course Outline Page 37 Students are given financial information about a prospective retiree and asked to act as a financial retirement planner. The prospective retiree

has also supplied the planner with desired monetary goals in retirement. Based upon information about savings plans, social security benefits, pensions, and life insurance policies, and using formulas learned in this unit, the planner is to write up a financial plan for the prospective retiree that includes at least two ways of meeting the goals and has mathematical justification for the recommendations made.

Key Assignment 8.3: Cash Flow, Net Worth and Debt Reduction Mathematics: Algebraic ratios, modeling, linear equations

Mathematics Learning Goals: To create a spreadsheet that calculates cash flow, net worth, and debt to income ratio. Students are given a budget spreadsheet that contains the headings of income, fixed expenses, variable expenses, and non-monthly expenses. There are sub-headings under each of these listing specific categories relating to the heading. Students are given a full accounting of a person’s financial status and asked to build a spreadsheet that calculates that person’s cash flow. In addition, the students are given information about the person’s assets and liabilities and are asked to add it to the spreadsheet and determine the net worth. Finally, based upon the calculation of the debt-to-income ratio, students are asked to develop a debt reduction plan for the individual if necessary.

Key Assignment 8.4 Budget Line Equations Mathematics: Linear equations, domain, range, constraints, modeling,

Mathematics Learning Goals: To construct and interpret a graphical representation of a particular aspect of a budget. A budget line graph allows the user to interpret many combinations of product usage based upon given constraints. The interpretation of the combinations allows the user to make decisions about affordability. Students are given information about a particular aspect of a personal budget. This data contains prices and budgeting constraints. Students are asked to construct a budget line equation of the form where costs are related to two budgeted items, x and y , and B is the budgeted amount. They then examine the regions above, on, and below the budget line to identify points representing affordability data. Students make recommendations for this budget item based upon the interpretation of the budget line graph.

ourse Materials

Textbooks

Title	Author	Publisher	Edition	Website	Primary
Financial Algebra	Gerber, Robert and Sgroi, Richard	CENGAGE Learning	2018	[empty]	Yes

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California



New Course Signature/Approval Page

- I. Suggested Course Title: Personal Finance
- II. Department(s): Math
- III. School: SJHS
- IV. School Committee Members:
- | | |
|-----------------------------------|-------------------------------------|
| a. Name: <u>Erika Gardner</u> | Signature: <u>Erika Gardner</u> |
| b. Name: <u>Justin Carmichael</u> | Signature: <u>Justin Carmichael</u> |
| c. Name: <u>S. Seward</u> | Signature: <u>S. Seward</u> |
| d. Name: <u>Lloyd Sheppard</u> | Signature: <u>Lloyd Sheppard</u> |
| e. Name: _____ | Signature: _____ |
- V. Committee Meeting Date(s): 11/5, 11/6, 11/7, 11/19
- VI. Department Chair Signature:
- | | | |
|----------------------------|------------------------------|-----------------------|
| a. Name: <u>K. Cochran</u> | Signature: <u>K. Cochran</u> | Date: <u>12/10/19</u> |
| b. Name: _____ | Signature: _____ | Date: _____ |
- VII. Principal Signature:
- | | | |
|-------------------------------|---------------------------------|-----------------------|
| a. Name: <u>Courtney Hall</u> | Signature: <u>Courtney Hall</u> | Date: <u>12/10/19</u> |
|-------------------------------|---------------------------------|-----------------------|
- VIII. Course Proposal Reviewed by Educational Services:
- | | | |
|--|------------------------------------|-----------------------|
| a. Director, Educational Services: <u>Janet Covacevich</u> | Signature: <u>Janet Covacevich</u> | Date: <u>12-19-19</u> |
| b. Assistant Superintendent of Educational Services: _____ | Signature: _____ | Date: <u>2/2/2020</u> |
- IX. Course Proposal Approved by the Board of Trustees:
- | | | |
|---|------------------|-------------|
| a. SJUSD Board of Trustees President: _____ | Signature: _____ | Date: _____ |
|---|------------------|-------------|

