FINANCIAL ALGEBRA Curriculum Guide

Kansas City, Kansas Public Schools Schools – Inspiring Excellence: Every Grownup, Every Child, Every Day

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Intent of the Course

The financial literacy focus of this course provides a real-life framework to apply upper-level mathematics standards. Financial Algebra is meant to teach students how to apply various mathematical skills and concepts to real-life financial applications. In some units, students explore using statistics to understand spending, while in others they utilize formulas to calculate loans. The course is **not** about mastery of a particular Kansas State Standard, but rather **the course is about the implementation of the Standards of Mathematical Practice and the application of mathematical skills to solve real-life scenarios.** Financial Algebra is designed for students who have completed Algebra 1 and Geometry. The course would be a bridge to upper-level mathematics such as Algebra 2 and Mathematics for College Readiness. "

Integration of Technology

The use of spreadsheets is utilized throughout the course to add real-life context to applications of the content. Students should be able to demonstrate mastery of the content with and without the use of technology. Spreadsheet programs such as Microsoft Excel or Apple Sheets are highly recommended. Teachers should not teach the use of these programs.

❖ Microsoft Excel

In 2017, the state of Kansas released the new **Kansas Mathematics Standards**. The previous standards were reviewed and revised over multiple years, and finally released. Within the changes, some standards were reworded for clarity and emphasis, removed due to redundancy, and/or shifted to different grade levels for cohesiveness. These changes are represented within this curriculum guide and specifically highlighted in the **standards comparison document** created by the state. It is imperative that teachers are aware of the shift in standards for the growth of their students' learning.

❖ MindTap

- ➢ *Getting Started Links, videos and guides: https://www.cengage.com/coursepages/NGL_MindTapTEACHER*
- ➢ *Overall support: https://ngl.cengage.com/support/*
- ➢ *Quick Start Guide: Getting a Student Logged In*

Project-Based Learning

Each unit of study includes alternative assessments called "Reality Check." Teachers should utilize one or more of these projects as a means of students applying the mathematics practiced in each section. Though content standards are listed in each section, the overall learning goal of the course is applying various mathematical concepts to real-life situations, not necessarily the same style of mastery of a content standard like in previous grades.

Financial Algebra Overview

The Financial Algebra curriculum provides mathematical principles and concepts that develop problem-solving opportunities through an exploration of five major domains of mathematics: number systems, ratios and proportions, expressions and equations, geometry, and statistics and probability. The Financial Algebra program is aligned with the Kansas College and Career Readiness Standards. The curriculum also takes into account the eight Standards for Mathematical Practice which describes how a student should approach mathematics.

STANDARDS OF MATHEMATICAL PRACTICE

The Eight Standards of Mathematical Practice are identified and embedded in the wording of every mathematics standard. A Guide to the Standards of Mathematical Practice was developed to assist teachers in gaining an understanding of the depth and instructional significance of the eight Standards of Mathematical Practice identified in the 2017 Kansas College and Career Readiness Standards for Mathematics. The Standards of Mathematical Practice are both strategically planned teacher actions during instruction and focused learning opportunities provided to students to engage in mathematics in a meaningful way. The instructional strategies and techniques for each Standard of Mathematical Practice address necessary grade-level literacy components (reading, writing, speaking, and listening) that should be present in every lesson, high-leverage questions to engage students in academic discourse, developmental social-emotional learning (SEL) components, and engagement strategies. **Implementation of the Standards of Mathematical Practice must be addressed during planning, instruction, and assessment of every mathematics lesson.**

➢ GRADE LEVEL FOCUS

By using the **KSDE Grade Level Focus (GLF)** documents provide an **approximate** 70-20-10 breakdown of instruction time by categorizing standards in the three levels, **Major**, **Supporting**, and **Additional**. **The level of the standard is color coded in the GVC.** These numbers are not hard numbers and will fluctuate given the material contained in the various clusters at each grade level. There are times that the content within the Major clusters for a grade level call for more than 70% of the instructional time. Likewise, there are times where there is very little material in the Supporting clusters thus calling for less than 20% of the instructional time. With this in mind, use the 70-20-10 breakdown as estimates in your planning time.

It is important to note that while the three levels are mutually exclusive in the sense that each cluster belongs to one and only one level, in classroom implementation, the levels can and SHOULD work together to support the priorities of the grade. For example, teachers can view the Additional and Supporting levels in relation to the Major level by pulling the lower-priority material into a lesson that is centrally about more important ideas or topics; e.g., surface area and volume application in Math 7 could be positioned in direct support of multiplication of rational numbers and writing and solving two-step word problems.

➢ PRIORITY STANDARDS IN MATHEMATICS

At every level in mathematics there are intricate, challenging, and necessary concepts that serve as prerequisites for the next level's respective intricate, challenging, and necessary concepts. Due to COVID-19, the state of Kansas developed a document, Navigating Change, which gave guidance to address instructional needs of students due to the fall out of COVIS-19.. The 2017 Kansas Math Standards were built out of the mathematics learning progressions, so priorities were chosen focusing on significant developmental competencies in the standards. Priority standards, indicated by blue highlight, in each unit of study simply provide guidance for focusing on instructional time so students can achieve the basic level mastery of critical areas of grade level standards. It is important to note that even though a standard is not listed as a priority, it DOES NOT MEAN that standard should not be explored, taught, and mastered by students in a course. ***All standards, regardless of priority or grade level focus, will be assessed on the KAP Interims, the state assessment (KAP) and the ACT in either the Math or Science test (see KSDE ACT Connections)***

Coherence and Vertical Alignments

Steps are based on documents and research from Learning Sciences Institutes (LSI) and on the Marzano Focused Model of Instruction

***This page addressed how to access and utilize the* STANDARDS COHERENCE & VERTICAL ALIGNMENT MAP from Achieve the Core**

Navigating the COHERENCE MAP platform.

- Choose Grade Level
- Choose Standard Cluster (2nd two letters of a standard)
- Choose Standard
  - Standards are identified by their **Common Core coding, which can be significantly different than Kansas College and Career Readiness Codes especially for GEOMETRY. Links to the correct page of the coherence mapare in each respective unit of study**
  - Recommend using this crosswalk for assistance to find the corresponding Kansas College and Career Readiness standard.
- Click Green Button that says "Map Standard"
- Using the COHERENCE Map, you can see a mapping of all the foundational standards from previous grade levels that are directly related to the grade-level standard. This will provide you with detailed information on which foundational standards to cover during your **'Spiral Review'**
- Using the COHERENCE Map, you can also see the vertical alignment of this standard through all grade levels.

Additional Resources in the COHERENCE MAP platform.

- Progressions
  - Detailed summary of the progression of the cluster from Grade 6 through High School
- Grade-Level Tasks
  - Detailed example problems that address the standard at the correct level of taxonomy. The task provides examples for student interaction with a particular standard. Similar to descriptions found in the KSDE Flip Books.
- Prior-Grade Level Tasks
  - Detailed example problems that address the foundational standards directly linked to the content standard.
- Assessment Items
  - Example assessment level questions that are similar to questions on the Kansas Mathematic Assessment.
- Grade-Level Focus
  - Two-page summary of the vertical alignment and grade-level focus of the cluster across grade levels as well

EMBEDDED STANDARDS

The embedded standards, or **ALL** STANDARDS, are standards that are to be taught and included in all units of instruction for the appropriate standard cluster. These standards are associated with conceptual understandings and modeling of the **Major**, **Supporting**, and **Additional** standards.

Model of Instruction: Planning Standards-Based Units and Lessons in Mathematics

Steps are based on documents and research from Learning Sciences Institutes (LSI) and on the Marzano Focused Model of Instruction

Step 1 - Identify daily learning target(s). Refer to your GVC.

- These can come directly from the performance scale and should be included in the plan for reference to ensure lesson activity alignment.

Step 2 - Sequence targets to scaffold from simpler to more complex across the lesson.

- The GVC addresses both Learning and Foundational Targets as well as taxonomy for each unit.
- The KCKPS Unit Planner in the Curriculum Resource section of each unit GVC assists you in sequencing learning and foundational targets.

Step 3 - Identify critical content for each 'chunk' of the learning progression.

- Identify the 2-3 checkpoints during the lesson where students will pause to demonstrate some aspect of the learning target.
- The curriculum resource provides examples of critical content 'chunks' for each lesson.

Step 4 - Plan instructional strategies for each 'chunk' of critical content.

A. Are you introducing students to new content? (Introducing New Knowledge)
   - Identifying Critical Content from the Standards
   - Previewing New Content
   - Helping Students Process New Content

B. Are you deepening students' understanding of previously taught, familiar, or repeating concepts? (Deepening or Practicing)
   - Using Questions to Help Students Elaborate on Content
   - Reviewing Content
   - Helping Students Practice Skills, Strategies, and Processes
   - Helping Students Examine Similarities and Differences
   - Helping Students Examine Their Reasoning

C. Are you asking students to clarify, expand on, or apply their knowledge to test hypotheses? (Generating and Testing Hypotheses)
   - Helping Students Revise Knowledge
   - Helping Students Engage in Cognitively Complex Tasks

Step 5 - Choose the technique(s) you will implement.

- The techniques used to implement the strategies that will best help students learn, deepen, and utilize the critical content should be planned.
- Multiple strategies and techniques might be necessary to help students demonstrate mastery of the learning target.
- The level of student autonomy required for the strategy and the time required for the activity or task should be determined and documented.
- Materials, resources, and technology should be considered and planned as well.

Step 6 - Plan to monitor for desired effect of instructional strategies.

- **Monitoring techniques s**hould be planned for each strategy used in the lesson.
- Identify what student evidence(s) will be collected to show progress toward the learning target.

Step 7 - Plan for potential adaptations based on student evidence.

- Potential adaptations to support or extend student learning should be planned in advance, with attention to students with individual learning needs including English Learners, those students with individualized learning plans, and any appropriate cultural considerations.

Step 8 - Plan to collect evidence of student participation in the instruction and student achievement of the desired effect.

- Have a system to be able to quickly record: who did and did not participate in the learning activities AND record individual results from any formative assessments

Model of Instruction: Mathematics Lesson Structure

The following is a best practice recommendation for a daily lesson structure to utilize the GVC and curriculum resources.

Part 1: Review & Assess Practice

- ❏ *Teachers review students for questions from the previous day's independent practice they would like to review.*
- ❏ *A summative assessment (1-5 questions) directly from the assignment students complete with class notes could be administered.*
- ❏ *Students are provided an opportunity to engage in the **spiral review** foundational standards while other students finish their assessment.*

Part 2: Activate Prior Knowledge

- ❏ *A '**Do Now**' is a quick, independent or collaborative activity that typically involves no (or minimal) guidance from the teacher. A '**Do Now**' can be used to activate students learning for the **lesson**, surface prior knowledge, and familiarize students with **lesson** vocabulary - Lemov, Teach Like a Champion (2014)*
- ❏ ***Spiral Review -*** opportunity to practice key concepts and skills **daily**, which helps them maintain foundational skills throughout the school year that they need for higher level learning opportunities and build automaticity

Part 3: Daily Instruction

- ❏ ***'Chunking' -** Lessons should be separated into small portions (20-25 minutes) where students engage in Inquiry, Explicit Direct Instruction, Individual or Partner practice, and Formative Assessment. - Lemov, Teach Like a Champion (2014)*
- ❏ ***Inquiry -** Teacher provides a learning activity that allows for students to productively struggle while making connections, asking questions, and testing ideas.*
- ❏ ***Explicit Direct Instruction (EDI) -** Teacher models the procedures, strategies, or presents information students will need to be successful in the lesson.*
- ❏ ***Individual or Partner Practice -** Meaningful practice of procedures, strategies, or applications of information learned during EDI.*
- ❏ ***Formative Assessment** - Checks for Understanding that quickly evaluate students ability to perform procedures, strategies, or retrieve information. (Should be recorded)*

Part 4: Independent Practice & Intervention

- ❏ *Based on the recorded feedback from formative assessments*, teachers should split students into groups for either independent practice or group intervention.
- ❏ ***Independent or Partner Practice*** - Students should engage in meaningful practice problems of both skill and application for that day's learning goal. Practice can be scaffolded based on student evidence from formative assessments. Individual Practice must be completed during class.
- ❏ ***Small Group Intervention*** - *S*tudents that are still struggling with a portion of the lesson should be grouped to receive intervention from the classroom teacher while the other students engage in independent practice. Teachers provide assistance in completing the independent practice or reteach options.
- ❏ ***Large Group Intervention*** - If all students are struggling with the same cycle, then a teacher may decide to engage in whole class intervention or reteach.

Part 5: Debrief (Exit Ticket)

- ❏ An **'exit ticket'** is perhaps one or two questions from each 'chunk' of the daily instruction for students to answer quickly at the end of class.
  - ❏ Completing the independent practice could be used as an exit ticket.
  - ❏ This is an opportunity to provide students with feedback directly linked to the daily instruction. Should be evaluated and given back to students promptly.
- ❏ *Each exit ticket should provide a teacher with the following data about their students:*
  - ❏ *(1) Percentage of students that did and did not master the content - can be used for determining students for later intervention*
  - ❏ *(2) Which "chunks" of the daily instruction students struggled with in the lesson - (Ex: They did well on part A, but struggled with part B) Reteach options*

Meaningful Take-Home Practice: Teachers have the option to provide meaningful practice for students to complete after a lesson. *This is seperate from the individual or partner practice students completed during the lesson.* The assignment development guide in the curriculum resource provides guidance on how to differentiate practice for students. Practice should contain new content (both skill and application) from the current lesson as well as a **'Spiral Review'** of grade-level standards. The practice should contain some questions that require students to engage in the literacy components of the Standards of Mathematical Practice.

UNIT 1

Discretionary Expenses

Recommended Time Frame: 10 instructional days

Unit Summary:

Often, most of a teenager's expenses are discretionary expenses. Learning to discretionary expenses from essential expenses can be harder for some individuals. 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.

Focused Math Topic(s): Statistics

- (1-1) Discretionary vs. Essential Expenses - measures of central tendency
- (1-2) Travel Expenses - cumulative frequency, relative frequency, percentiles
- (1-3) Entertainment Expenses – range, mean deviation, mean absolute deviation, variance, standard deviation
- (1-4) Vacation Destination Expenses - normal curve and z-scores, finding raw scores and percentiles
- (1-5) Personal Expenses - correlation, causation, scatterplots, regression

Unit Standards:

S.ID.1 (9/10) Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.2: (9/10) Interpret differences in shape, center, and spread in the context of the data sets using dot plots, histograms, and box plots, accounting for possible effects of extreme data points (outliers).	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.3: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.4: (9/10) Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.5: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.7:. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.ID.8. Distinguish between correlation and causation.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

UNIT 1
Discretionary Expenses
Recommended Time Frame: 10 instructional days

Learning Goal Targets:

- Solve equations in one variable and give examples showing how extraneous solutions may arise in context of real-world applications . **(*Analysis*, A.REI.3)**
- Examine the mean and standard deviation of a data set to fit it to a normal distribution. Utilize sigma notation in the formula (***Analysis,*** **S.ID.1**, **S.ID.2** , **S.ID.3)**
- Use frequency tables and data displays to examine measures of center and variance. (***Analysis,*** **S.ID.4**, **S.ID.5** , **S.ID.7)**
- Use correlation to describe the strength, form, and direction of a linear relationship based on a scatter plot (***Analysis***, **S.ID.8)**
- Use percentiles and z scores to describe relative standing (***Analysis***, **S.ID.8**)

Foundational Learning Targets:

- Perform basic operations and mathematical methods to solve equations **(*Comprehension,*A.REI.3*)***
- Compute measures of central tendency and variability **(*Comprehension,*All*)***
- Simplify an expression to solve for an unknown variable. **(*Comprehension,* All*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: statistics, data, measures of central tendency, mean, median, mode, subscript, outlier, skewed data set, bimodal, frequency distribution, relative frequency, spreadsheet, cell, frequency, percentile, percentile rank, range, mean deviation, mean absolute deviation, variance, standard deviation, raw data, normal curve, standard score, z-score, normal distribution, bell curve, univariate data, bivariate data, scatter plot, trend, correlation, linear regression equation, independent variable, dependent variable, domain, correlation coefficient

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 1.1 - 1.5, pg. 2-62
- MindTap, Ch 1
- KCKPS Unit 1 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner
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Additional Resources:

Common Evidences/Assessments:

- Reality Check Project Ch1, pg. 55
- Applications Ch1, pg. 59

Common Unit Assessments

UNIT 2
Banking Services
***Recommended Time Frame*: 10 instructional days**

Unit Summary:
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. 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.

Focused Math Topic(s): Equations and Expressions

- (2-1) Checking Accounts - basic operations, literal equations, extensions
- (2-2) Reconcile a Bank Statement - basic operations, literal equations, inequalities
- (2-3) Savings Accounts - simple interest formula, ordering fractions/decimals, literal equations, spreadsheets, arithmetic sequences
- (2-4) Explore Compound Interest - compound interest calendar, iteration
- (2-5) Compound Interest Formula - compound interest formula derivation, substitution into an exponential equation, calculator keystrokes, comparing APR to APY
- (2-9) The Term of a Single Deposit Account - logarithms, exponential form, logarithmic form, construct and use exponential and logarithmic models of a situation,
- (2-10) The Term of a Systematic Deposit Account - demonstrate use of the change-of-base formula, explain and apply the One-to-One Property

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise. ❑ **A.REI.3a** Solve rational, absolute value and square root equations. Limited to simple equations such as, $2\sqrt{x-3}+8=16$, $(x+3)/(2x-1)=5$, $x \neq 1/2$.	MP1, MP2, MP3
F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ❑ **F.IF.7c:** Graph logarithmic functions, emphasizing the inverse relationship with exponentials and showing intercepts and end behavior.	MP3, MP4, MP5, MP6
F.BF.1: Use functions to model real-world relationships. ❑ **F.BF.1b** Determine an explicit expression, a recursive function, or steps for calculation from a context.	MP1, MP2, MP3, MP7, MP8
F.IF.8c: Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, and classify them as representing exponential growth or decay.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
F.BF.5: Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
F.LQE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Embedded Standards
F.IF.1*, *F.IF.2*, *F.IF.4*, *F.IF.5*, *F.IF.9*, *A.CED.1*, *A.CED.2*, *A.CED.3*, *A.CED.4*, *A.REI.2

UNIT 2
Banking Services
Recommended Time Frame: 10 instructional days

Learning Progression

Learning Goal Targets:

- Solve equations in one variable and give examples showing how extraneous solutions may arise in context of real-world applications . **(*Analysis*, A.REI.3)**
- Determine if a solution is viable in a given context ***(Analysis,* A.REI.3a*)***
- Model and solve real-world applications involving equations with logarithms and exponents ***(Analysis,* F.BF.1 ,F.IF.8c, F.BF.5 *)***
- Model and solve real-world applications involving graphs of logarithms and exponents ***(Analysis,* F.BF.1 ,F.IF.8c, F.BF.5 *)***
- Investigate relationship between logarithms and natural logarithms and perform calculations involving both ***(Analysis,* F.BF.5, F.LQE.1 *)***

Foundational Learning Targets:

- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,* A.REI.3a*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: interest, single account, joint account, debit, credit, interest rate, simple interest, simple interest formula, principle, arithmetic sequence, finite, infinite, compound interest, compound interest formula, compounding times (annual, monthly, quarterly, daily), annual percentage yield, continuously compounding interest, function, logarithm, base e, exponent, natural log

Curriculum & Instruction Resources

Curriculum Resources:

- ***Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition***
  - Sections 2.1 - 2.5, 2.9, and 2.10 pg. 64 - 145
  - Omit Sections 2.6 and 2.7
- MindTap, Ch 2
- KCKPS Unit 2 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project Ch2, pg. 55
- Applications Ch2, pg. 59

Common Unit Assessments

UNIT 3
Consumer Credit
***Recommended Time Frame*: 10 instructional days**

Unit Overview
In this unit, students will learn about the requirements and regulations involving loans and credit cards. Unit 3 examines loans, credit legislation, debtors and creditor responsibilities, and reading a credit card statement. Unit 3 continues to dig deeper into the application of exponential and logarithmic functions. The unit also introduces the use of quadrations. 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.

Focused Math Topic(s): Functions

- (3-1) Introduction to Credit—down payments, monthly payments, credit scores, spreadsheets
- (3-2) Loans—monthly payment formula substitution, monthly payment tables, ordering percents, decimals, and fractions, converting fractions to equivalent decimals
- (3-3) Student Loans - calculate payment and interest due in various student loan situations, apply the simplified daily interest formula
- (3-4) Loan Calculations and Regression—logarithms as inverse calculator operations to find exponents, cubic regression, scatterplots
- (3-5) Credit Cards- literal equations, percent, finance charges
- (3-6) Credit Card Statement—finance charges, interpreting statements
- (3-7) Average Daily Balance—computing average daily balance

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise.	MP1, MP2, MP3
A.REI.5: Solve quadratic equations and inequalities ❑ **A.REI.5b** Solve quadratic equations with complex solutions written in the form $a \pm bi$ for real numbers a and b. ❑ **A.REI.5c** Use the method of completing the square to transform and solve any quadratic equation in x into an equation of the for that has the same solutions.	MP2, MP7, MP8
F.BF.1: Use functions to model real-world relationships.	MP1, MP2, MP3, MP7, MP8

Embedded Standards
F.IF.1, F.IF.2, F.IF.4, F.IF.5, F.IF.9, A.CED.1, A.CED.2, A.CED.3, A.CED.4, A.REI.2

UNIT 3
Consumer Credit
***Recommended Time Frame*: 10 instructional days**

Learning Progression

Learning Goal Targets:

- Solve equations in one variable and give examples showing how extraneous solutions may arise in context of real-world applications . **(*Analysis*, A.REI.3)**
- Solve exponential, logarithmic and quadratic equations in context of real-world application **(*Analysis*, A.REI.3a)**
- Model and solve real-world applications involving graphs of logarithms and exponents **(*Analysis*, F.BF.1)**
- Model and solve quadratic equations in context of real-world application **(*Analysis*, A.REI.5)**

Foundational Learning Targets:

- Solve quadratic equation using multiple techniques (factoring, quadratic formula, completing the square) **(*Comprehension*, A.REI.5)**
- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,* A.REI.3a*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: principle, annual percentage rate, quadratic, cubic function, cubic regression, average, rate,

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 3.1 - 3.7, pg.146-207
- MindTap, Ch 3
- KCKPS Unit 3 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project Ch3, pg. 201
- Applications Ch3, pg. 205

Common Unit Assessments

UNIT 4
Automobile Ownership
Recommended Time Frame: 10 instructional days

Unit Overview:
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. Students will continue to expand on their work of functions, exponents and solving various equation types. Students will revisit measures of central tendency and percentiles from Unit 1 in context of car ownership This unit introduces concepts of conditional probability to the students as a decision-making tool. 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.

Focused Math Topic(s): Functions, Probability, Exponential Functions

- (4-1) Classified Ads - percent, piecewise functions, domains as inequalities, cusp
- (4-2) Automobile Transactions - measures of central tendency, range, quartiles, interquartile range, outliers
- (4-3) Automobile Insurance - basic calculations, literal equations and inequalities
- (4-4) Probability- The Basis of insurance - two-way tables, conditional probability, independent events, Venn Diagrams
- (4-5) Linear Automobile Depreciation - straight line depreciation equation, slope, linear expense function, system of linear depreciation and expense functions
- (4-6) Historical and Exponential Depreciation - exponential depreciation equation, system of exponential depreciation and linear expense functions, geometric sequences

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise.	MP1, MP2, MP3
F.BF.1: Use functions to model real-world relationships.	MP1, MP2, MP3, MP7, MP8
S.ID.7:. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.CP.1 (+) Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.CP.2 (+) Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.CP.3 (+) Understand the conditional probability of A given B as P(A and B)/P(B) , and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
S.CP.4 (+) Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Embedded Standards
F.IF.1, F.IF.2, F.IF.4, F.IF.5, F.IF.9, A.CED.1, A.CED.2, A.CED.3, A.CED.4, A.REI.2

UNIT 4
Automobile Ownership
Recommended Time Frame: 10 instructional days

Learning Progression

Learning Goal Targets:

- Solve equations in one variable and give examples showing how extraneous solutions may arise in context of real-world applications . **(*Analysis*, A.REI.3)**
- Model and solve real-world applications involving graphs of linear, logarithms and exponential functions **(*Analysis*, F.BF.1)**
- Use frequency tables and data displays to examine measures of center and variance. (***Analysis,* S.ID.7)**
- Determine if two events are mutually exclusive, and how to interpret not, or, and and in the context of an event/events **(*Analysis*, S.CP.1 (+), S.CP.2 (+)**)
- Compute conditional probabilities using conditional probability rules (Probability of E given F) **(*Analysis*, S.CP.3 (+))**
- Model and interpret two-way frequency tables of data in context of real-world applications **(*Analysis*, S.CP.4 (+))**

Foundational Learning Targets:

- Calculate and model the measures of center and variance. **(*Comprehension,* S.ID.7)**
- Model and interpret categorical data into appropriate data displays **(*Comprehension,*S.CP.1 (+), S.CP.2 (+) , S.CP.3 (+), S.CP.4 (+) *)***
- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,* A.REI.3a*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: domain, piecewise function, cusp, measures of central tendency, interquartile range, box plots, modified box plots, probability, event, two-way table, frequency, conditional probability, independent events, associated events, associated events, Venn Diagrams,

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 4.1 - 4.6, pg.208-257
  - Omit Sections 4.7, 4.8,
  - 4.9 Accident Investigation Data is optional for enrichment or extension
- MindTap, Ch 4
- KCKPS Unit 4 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project Ch4, pg. 283
- Applications Ch4, pg. 286

Common Unit Assessments

UNIT 5
Employment Basics
Recommended Time Frame: 10 instructional days

Unit Overview:
Using credit is a tremendous responsibility. Students need to learn all of the requirements and regulations involving loans and credit cards. Unit 3 examines loans, credit legislation, debtors and creditor responsibilities, and reading a credit card statement. The mathematical focus of this unit involves topics of equations, expressions, and functions. 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.

Focused Math Topic: Functions

- (5-1) Look For Employment—piecewise functions, percent decrease,
- (5-2) Pay Periods and Hourly Rates—literal equations, rational functions, spreadsheets
- (5-3) Commissions, Royalties, and Piecework Pay—commission, piecewise functions
- (5-4) Employee Benefits--literal equations, measures of central tendency
- (5-5) Social Security and Medicare--slope, graphs with cusps, piecewise functions, discontinuities

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise.	MP1, MP2, MP3
A.REI.6: Analyze and solve pairs of simultaneous linear equations. ❏ **A.REI.6c**: Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	MP1, MP4, MP6, MP7
F.BF.1: Use functions to model real-world relationships.	MP1, MP2, MP3, MP7, MP8
F.IF.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ❏ **F.IF.7a:** Graph linear, quadratic and absolute value functions and show intercepts, maxima, minima and end behavior. . ❏ **F.IF.7d:** Graph piecewise-defined functions, including step functions.	

Embedded Standards
A.CED.1*, *A.CED.2*, *A.CED.3*, *A.CED.4*, *A.REI.2

UNIT 5
Employment Basics
Recommended Time Frame: 10 instructional days

Learning Goal Targets:

- Model real-world situations using equations in both one and two variables and solve for an unknown. **(*Analysis*, A.REI.3a)**
- Evaluate algebraically and graphically a linear, rational and piecewise functions for an unknown in context of a real-world application **(*Analysis*, F.IF.7)**
- Solve literal equations for a given variable in context of a real-world application **(*Analysis*, A.REI.6)**
- Model and define key elements of the graph of a function in context of a real-world application **(*Analysis*, F.BF.1)**

Foundational Learning Targets:

- Interpret the solution to linear equations and inequalities ***(Comprehension,* All*)***
- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,* A.REI.3a*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: piecewise function, literal equation, percent decrease, percent increase, variable, input, output, function, ordered pairs

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 5.1 - 5.6, pg. 292-329
- MindTap, Ch 5
- KCKPS Unit Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project Ch5, pg.325
- Applications Ch5, pg. 323

Common Unit Assessments

UNIT 6
Income Taxes
***Recommended Time Frame*: 10 instructional days**

Unit Overview:
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.

Focused Math Topic: Inequalities, Functions, Expressions

- (6-1) Tax Tables, Worksheets, and Schedules - domains, inequalities, compound inequality notation, inequality notation, calculations
- (6-2) Modeling Tax Schedules - tax piecewise functions, cusp, graphing piecewise functions
- (6-3) Income Statements - basic calculations working with forms
- (6-4) Forms 1040EZ and 1040A- the mathematics of filing tax forms
- (6-5) Form 1040 and Schedules A and B - the mathematics of filing tax forms (number sense)

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise.	MP1, MP2, MP3
A.REI.6: Analyze and solve pairs of simultaneous linear equations. ❑ A.REI.6c: Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	MP1, MP4, MP6, MP7
F.BF.1: Use functions to model real-world relationships.	MP1, MP2, MP3, MP7, MP8

Embedded Standards
A.CED.1*, *A.CED.2*, *A.CED.3*, *A.CED.4*, *A.REI.2

UNIT 6
Income Taxes
Recommended Time Frame: 10 instructional days

Learning Progression

Learning Goal Targets:

- Model real-life situations equations, inequalities, and compound inequalities in one variable using context. ***(Analysis,*** F.BF.1, A.REI.3a)
- Model real-life situations using piecewise functions ***(Analysis,*** F.BF.1, A.REI.6)
- Determine when each strategy is appropriate, based on the initial form of the equation. ***(Analysis,*** A.REI.3a***)***

Foundational Learning Targets:

- Interpret the solution to linear equations and inequalities ***(Comprehension,*** All***)***
- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,*** A.REI.3a***)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,*** All***)***

Vocabulary: tax, constraint, inequality constraint, proportion, credit, debit

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 6.1 - 6.5, pg.330-389
- MindTap, Ch 6
- KCKPS Unit 6 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project ChX, pg. 385
- Applications ChX, pg. 388

Common Unit Assessments

UNIT 7
Independent Living
***Recommended Time Frame*: 10 instructional days**

Unit Overview:
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, MP2, MP3, MP4, MP5, MP6, and MP7.

Focused Math Topic: Systems of Equations, Modeling with Geometry and Trigonometry

- (7-1) Find a Place to Live—systems of equations
- (7-2) Read a Floor Plan—area, perimeter, volume, subtraction of areas, apothem, Monte Carlo method
- (7-3) Mortgage Application Process—monthly payment formula substitution, literal equations
- (7-4) Purchase a Home—interest, spreadsheets
- (7-5) Mortgage Points - discount points, breakeven date, negative
- (7-6) Rentals, Condominiums, and Cooperatives— spreadsheets, scatterplots, regression
- (7-7) Home Maintenance and Improvement - Pythagorean Theorem, trigonometry.

Unit Standards:

A.REI.3: Solve equations in one variable and give examples showing how extraneous solutions may arise.	MP1, MP2, MP3
A.REI.6: Analyze and solve pairs of simultaneous linear equations. ❏ A.REI.6c: Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	MP1, MP4, MP6, MP7
F.BF.1: Use functions to model real-world relationships. ❏ F.BF.1b: Determine an explicit expression, a recursive function, or steps for calculation from a context.	MP1, MP2, MP3, MP7, MP8
S.ID.5: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ❏ S.ID.5a: Use a given linear function to solve problems in the context of data . ❏ S.ID.5b: Fit a linear function to data and use it to solve problems in the context of the data.	
F.TF.7: Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
G.MG.1: Use geometric shapes, their measures, and their properties to describe objects	MP4, MP5, MP7
G.MG.3 Apply geometric methods to solve design problems (e.g. designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	MP1, MP4, MP5
G.SRT.9: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	MP1, MP4, MP5

Embedded Standards
A.CED.1*, *A.CED.2*, *A.CED.3*, *A.CED.4*, *A.REI.2

UNIT 7
Independent Living
***Recommended Time Frame*: 10 instructional days**

Learning Goal Targets:

- Model real-life situations using a system of equations. ***(Analysis,*** A.REI.3, F.BF.1, A.REI.6) ***)***
- Model real-life situations using properties of geometric shapes and solids. ***(Analysis,*** G.MG.1, G.MG.3, G.SRT.9***)***
- Model real-life situations using properties of right triangle trigonometry ***(Analysis,*** F.TF.7, G.MG.3, G.SRT.9***)***
- Model real-life situations using scatterplots and lines of best fit to make inferences in context. ***(Analysis,*** F.BF.1, S.ID.5, G.SRT.9***)***

Foundational Learning Targets:

- Interpret the solution to linear equations and inequalities ***(Comprehension,*** All***)***
- Solve equations and inequalities in one variable and give examples showing how extraneous solutions may arise. ***(Retrieval-Executing,*** A.REI.3a***)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,*** All***)***

Vocabulary: square footage, deposit, scale, area, congruent, perimeter, apothem, Monte Carlo method, volume, British Thermal Units, tax, rate, ratio, interest, discount, break-even point, trigonometry, legs, hypotenuse, pitch, rise, run, similar, proportion, means, extremes, angle of elevation, tangent ,sine, cosine, inverse trigonometric functions

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 7.1 - 7.7.X, pg.390-461
- MindTap, Ch 7
- KCKPS Unit 7 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

- **CENGAGE LESSON PLANS**
- **CENGAGE POWERPOINTS**

Common Evidences/Assessments:

- Reality Check Project ChX, pg. 455
- Applications ChX, pg. 458

Common Unit Assessments

UNIT 8
Prepare a Budget
***Recommended Time Frame*: 10 instructional days**

Unit Overview:
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.

Focused Math Topic: Inequalities, Functions, Expressions

- (11-1) Utility Expenses - basic calculations, rational functions, average cost rational function
- (11-2) Electronic Utility Expenses - basic calculations, piecewise functions, greatest integer function
- (11-3) Charting a Budget - line, bar, circle graphs, charting, determining and graphing budget line equations
- (11-4) Cash Flow and Budgeting - spreadsheets, ratios,
- (11-5) Budget Matrices - matrix addition, matrix subtraction, scalar multiplication, matrix multiplication

Unit Standards:

N.VM.6: Use matrices to represent and manipulate data, (e.g. represent information in a linear programming problem as a matrix or rewriting a system of equations as a matrix.)	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
N.VM.7: Multiply matrices by scalars to produce new matrices, (e.g. as when all of the payoffs in a game are doubled.)	MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8
N.VM.8: Add, subtract, and multiply matrices of appropriate dimensions; find determinants of 2 × 2 matrices.	MP1, MP2, MP63, MP7
A.REI.9: Solve an equation $f(x) = g(x)$ by graphing $y = f(x)$ and $y = g(x)$ and finding the x-value of the intersection point. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. For (9/10) focus on linear, quadratic, and absolute value.	MP2, MP4, MP5, MP6,
F.BF.1: Use functions to model real-world relationships. ❑ **F.BF.1c:** Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.	MP1, MP2, MP3, MP7, MP8

Embedded Standards
A.CED.1*, *A.CED.2*, *A.CED.3*, *A.CED.4*, *A.REI.2

UNIT 8
Prepare a Budget
***Recommended Time Frame*: 10 instructional days**

Learning Goal Targets:

- Model real-life applications with systems of equations by graphing (linear, quadratic, absolute value). ***(Analysis,* F.BF.1, A.REI.9*)***
- Model real-life applications with systems of inequalities by graphing (linear, quadratic, absolute value). ***(Analysis,* F.BF.1, A.REI.9*)***
- Justify the method (graphing, simultaneous, substitution, elimination) chosen to solve various systems of equations and inequalities ***(Analysis,* F.BF.1, A.REI.9*)***
- Model real-life applications with three or more variables and using matrices. ***(Analysis,* N.VM.6, N.VM.7, N.VM.8*)***

Foundational Learning Targets:

- Perform operations with matrices (addition, subtraction, multiply). ***(Comprehension,* N.VM.6, N.VM.7, N.VM.8*)***
- Solve matrix equations by using properties of addition, subtraction and multiplication. ***(Comprehension,* N.VM.6, N.VM.7, N.VM.8*)***
- Model bivariate data using a data display ***((Comprehension,* All*)***
- Recognize and recall specific vocabulary-see below ***(Retrieval-Recognizing/Recalling,* All*)***

Vocabulary: volume, circle graph, line graph, , bar graph, budget line graph, sectors, central angles, frequency, ratio, array, rectangular array, matrix, budget matrix, dimensions, entry, element, zero matrix, corresponding elements, scalar, scalar multiplication

Curriculum & Instruction Resources

Curriculum Resources:

- Financial Algebra: Advanced Algebra with Financial Applications, Gerver & Sgori, (2018), 2nd edition
  - Sections 11.1 - 11.5, pg.660 - 717
- MindTap, Ch 11
- KCKPS Unit 11 Worksop: (pdf) (video)
- Cengage: Financial Algebra Standards Correlation
- Cengage: Preparing for Instruction
- Cengage: Using the Reality Check Projects
- Cengage: Financial Algebra Unit Planner

Additional Resources:

Common Evidences/Assessments:

- Reality Check Project ChX, pg. 711
- Applications ChX, pg. 715

Common Unit Assessments