a-g Algebra 1 (CA Standards)

Note to ES and EE:
Students must use one of the approved textbooks listed below to meet the requirements of this course. Other textbooks can be used to supplement the course. Contact the Math Department Chair for assistance with using supplemental material.

Pre-requisite(s): Pre-Algebra or Math 8
Length of course: Full year (2 semesters)
Grade Level: 9

Course Description:

This course is designed to foster enthusiasm for mathematics, develop an appreciation for the importance of mathematics in the real world, and prepare students for success in future mathematics courses. Students are given opportunities to gain a solid foundation in algebra skills while understanding the "why" (conceptual understanding) behind the math and not just the "how" (procedural understanding). This emphasis allows students to extend their skills beyond basic practice to understanding and solving real world problems. Students develop interpretive and analytical skills through constructed response problems, extended response problems, and performance tasks. In addition to deepening and extending student understanding of linear and exponential relationships, emphases are placed on understanding laws of exponents and extending student understanding to square and cube roots, and applying linear and quadratic models to real life data.

Course Content:

Unit 1: Numbers, Expressions, Equations and Functions

This unit introduces students to algebraic expressions, equations, inequalities and linear functions. Students gain a solid foundation of real numbers with an emphasis on exponents. This knowledge is then extended and reinforced by evaluating, simplifying and writing algebraic expressions. Progression of content continues to solving equations in one and two variables. Finally, students' understanding is extended with an introduction to functions.

Sample Assignment:
Students produce a presentation involving the creation of equations showing the distance a student travels by bicycle from home to a bicycle repair shop. The student then returns home via a different route by car. The presentation includes:

- A map, drawn to scale, that includes the student's home, bicycle shop and

both routes.
    - An equation for the distance of each route and an equation for the total distance traveled.
    - The solution of the equations shown in a clear step-by-step manner.

Students learn the power of equations to represent real life situations.

Unit 2: Linear Functions, Systems of Linear Equations and Inequalities, and Exponential Functions and Equations

This unit introduces students to linear and exponential functions. Emphases include understanding intercepts, slope, and the slope-intercept form for linear equations. This knowledge is then extended and reinforced with problems involving building and modeling with linear functions. Progression of content continues by including the study of systems of equations and inequalities. Learning to model with exponential functions, including exponential growth and decay, further expands students' understanding of graphical representations of data.

Sample Assignment:
Students choose a flight of stairs at home or some other location and measure the rise and run of one step. They then write and graph an equation for the line that goes from the bottom of the stairs to the top, labeling each axis appropriately.

Students learn the power of linear equations and their graphs to represent real life situations.

Unit 3: Polynomial Expressions and Equations

This unit introduces students to polynomials and operations with polynomials. This knowledge is then extended by factoring polynomials in the form of $x^2 + bx + c$, then $ax^2 + bx + c$, then factoring special products. Progression of content continues by including the study of different ways to solve quadratic equations; including using square roots, factoring, and completing the square. This unit concludes with deriving the quadratic formula and using the quadratic formula to solve real world problems using and solving quadratic equations.

Sample Assignment:
Students derive the quadratic formula in front of the entire class. The teacher and classmates are encouraged to ask probing questions to check for the presenting student's understanding.
Students learn the necessity of building upon previously learned skills to derive

important formulae. This assignment incorporates several of the Common Core Mathematical Practices, including "construct viable arguments and critique the reasoning of others" and "attend to precision.

Unit 4: Functions and Modeling

This unit introduces students to quadratic, absolute value, square root, and cube root functions. After learning to stretch, compress and reflect quadratic functions, students' knowledge is extended to combine these transformations of quadratic functions. Further extending this knowledge, students then apply this learning to transforming absolute value, square root, and cube root functions. Emphases include solving systems of linear and quadratic equations and comparing linear, quadratic and exponential models.

Sample Assignment:
Students solve a system of linear and quadratic equations to determine when a bolt (the height, in feet, of which after t seconds, is given by the equation $h = -16t^2 + 200$) will hit an elevator (the height, in feet, of which after t seconds is given by the equation $h=20t$). Students determine the time it takes for the bolt to hit the elevator, the height at which it does so, and students explain why it makes sense for this problem to be modeled with a downward opening parabola.

Students learn the power of systems of equations to model and solve real life situations.

Course Materials

Textbooks - the following textbooks are approved to use with this course:

Title	Author	Publisher	Edition
CA Standards-based textbook (this course is aligned to the 2015 **Algebra 1: Analyze, Connect, Explore** Houghton Mifflin Harcourt textbook, but it is designed to work	Burger, Dixon, Kanold, Larson, Leinwand, Sandoval-Martinez	Houghton Mifflin Harcourt	2015

with any of the below CA standards aligned textbook.)			
HMH Algebra 1: Student Edition 2015	Kanold, Burger, Dixon, Larson, Leinwand	Houghton Mifflin Harcourt	2015
Eureka Math: Algebra 1	Alkire, Allwood, et.al	Great Minds	2019
Pearson: Algebra 1, Common Core Edition ©2015	Charles, Kennedy, Hall	Pearson Education, Inc. / Prentice Hall	2015
Glencoe Algebra 1 © 2018	Carter; Cuevas; Day; Malloy	McGraw Hill / Glencoe Publishing	2018