a-g Algebra 2 (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.

Course Description
Overview:

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 2 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. Student develop interpretive and analytical skills through constructed response problems, extended response problems, and performance tasks. In addition to lessons on probability, statistics, sequences and series, throughout the course there is an emphasis on understanding functions- linear and nonlinear, including quadratic, exponential, logarithmic, radical, and trigonometric.

Prerequisites:
Algebra 1 or Integrated Math 1- Required
Geometry- Recommended

Co-requisites:
None

Unit 1: Linear functions and systems
This unit begins with a review of number properties and operations- topics from algebra 1. Students' understanding is extended with in depth explorations of the Pythagorean Theorem and negative exponents. Progression of content continues with the study of linear equations and functions, including linear inequalities in two variables and transforming linear functions. Student understanding of linear equations and functions is extended with the study of absolute-value equations, inequalities, functions, and linear systems, including linear systems in three dimensions. Finally, matrices are introduced and explored; students learn to use matrices to solve systems of equations.

Sample Assignment:

Given the horizontal speed and vertical speed of a helicopter at takeoff, students write equations for and draw a graph of the motion of the helicopter. Students then describe the location of the helicopter when given a certain time after takeoff.

Students learn to graph parametric equations and use them to model real world applications. Students also learn to write the function represented by a pair of parametric equations.

Unit 2: Nonlinear Functions

This unit extends student understanding of functions to include quadratic, polynomial, exponential, logarithmic, rational, and radical functions. The study of quadratic functions includes solving quadratic inequalities and operations with complex numbers. The study of polynomial functions includes using the fundamental theorem of algebra to write polynomial functions in factored form, investigating graphs of polynomial functions, and transforming polynomial functions. The study of exponential and logarithmic functions includes inverses of relations and functions, properties of logarithms, the natural base *e*, and transformations of exponential and logarithmic functions. The study of rational and radical functions includes the study of operations on rational expressions, solving rational equations and inequalities, radical expressions and rational exponents, and solving radical equations and inequalities.

Sample Assignment:

Given the first five rows of Pascal's Triangle, students use the patterns they see to:

- Find rows 6-10
- Make a conjecture: what is the relationship between the row number and the number of terms in a row?
- Make a conjecture: what is the relationship between the row number and the second term in each row?
- Make a conjecture: expand (x+1)(x+1) and (x+1)(x+1)(x+1) and use the answers to make a conjecture about the relationship between Pascal's triangle and the multiplication of binomials.
- Students text their conjecture by expanding (x+1)(x+1)(x+1)(x+1) with multiplication and by using Pascal's triangle.

Students learn the power of Pascal's Triangle. They understand the connection between algebra and number theory.

Unit 3: Conic Sections, Probability and Statistics, and Sequences and Series

This unit begins with the study of circles, ellipses, hyperbolas and parabolas. Student

understanding is extended to identifying conic sections and solving nonlinear systems. Next, permutations and combinations are examined with the study of theoretical and experimental probability, independent and dependent events, and compound events. Students' understanding of statistics is extended through the study of measures of central tendency and variation, with an examination of binomial and normal distributions. This unit concludes with the study of sequences and series, in which students learn series and summation notation, arithmetic sequences and series and geometric sequences and series.

Unit Assignment(s):

Sample Assignment:

Given that the SAT is designed so that scores are normally distributed with a mean of 500 and a standard deviation of 100, students are asked to determine:

- The percent of SAT scores between 400 and 600.
- The probability that an SAT score is above 600.
- The probability that an SAT score is above 300.
- The probability that an SAT score is less than 300 or greater than 700.

Students learn the value and use of normal distributions in certain situations. They learn to understand and interpret the information given in a normal distribution.

Unit 4: Trigonometric Functions, Graphs and Identities

This unit introduces students to trigonometric functions. Students learn about right triangle trigonometry, angles of rotation, the unit circle, and inverses of trigonometric functions. Further extending this knowledge, students then learn the laws of sines and cosines. Progression of content continues to trigonometric graphs and identities. This study includes the graphs of the sine, cosine, and other trigonometric functions. Student learning is then extended to include fundamental trigonometric identities, sum and difference identities, double-angle and half-angle identities. The unit concludes with an in depth study of solving trigonometric equations.

Sample Assignment:

Given a blueprint of a triangular reception area of a building, students use Heron's

formula to find the area of the reception area. Students then check their answer by using the law of cosines and their knowledge of sines and cosines.

Students learn the power of trigonometric functions to model and solve real life situations.

Course Materials

Textbook

Title	Author	Publisher	Edition	Primary
Holt McDougal Algebra 2, Common Core Edition©2012	Edward B. Burger, David C. Chard, Paul A. Kennedy, Steven J. Lenwald, Freddie L. Renfro, Tom W. Roby, Bert K. Waits	Houghton Mifflin Harcourt	2012	Yes
HMH Algebra 2: Student Edition 2015	Kanold, Burger, Dixon, Larson, Leinwand	Houghton Mifflin Harcourt	2015	Yes
Eureka Math: Algebra 2	Alkire, Allwood, et.al	Great Minds	2019	Yes
Pearson: Algebra 2, Common Core Edition ©2015	Charles, Kennedy, Hall	Pearson Education, Inc. / Prentice Hall	2015	Yes
Glencoe Algebra 2 © 2018	Carter; Cuevas; Day; Malloy	McGraw Hill / Glencoe Publishing	2018	Yes

Websites

Title	Affiliated Institution	URL
Holt McDougal Online	Houghton Mifflin Harcourt	my.hrw.com