FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Integrated Math 3

Board Approval Date: April 15, 2021	**Course Length: 2 Semesters**
Grading: A-F	**Credits: 5 Credits per Semester**
Proposed Grade Level(s): 9, 10, 11, 12	**Subject Area: Mathematics** **Elective Area (if applicable):**
Prerequisite(s): **"C" or better in Integrated Math II**	**Corequisite(s):** **N/A**
CTE Sector/Pathway:	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (c) Mathematics	
Graduation Requirement: No	
Course Intent: District Course **Program (if applicable):**	
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COURSE DESCRIPTION: (Online Course)

Mathematics III is designed to extend and apply the mathematics learned in previous math courses. The standards are based on the Common Core State Standards for Mathematics and include topics from the conceptual categories: Number and Quantity, Algebra, Functions, Geometry, and Statistics and Probability. Instructional time will focus on four critical areas: (1) apply methods from probability and statistics to draw inferences and conclusions from data; (2) expand understanding of functions to include polynomial, rational, and radical functions; (3) expand right triangle trigonometry to include general triangles; and (4) consolidate functions and geometry to create models and solve contextual problems.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Statistical Analysis	How can collecting and analyzing data help you make decisions or predictions? How can you make and interpret different representations of data?	*Journal: Cell Phone Battery Life	*Practice: Statistical Truth or Fiction? *Unit Test
2. Functions	What is a function? How are functions graphed? How do you solve linear and nonlinear equations and inequalities? How do you find the point of intersection? How are quadratic functions used to model, analyze and interpret mathematical relationships?	*Journal: The Summer Job	*Modeling: Pumpkin Launch *Unit Test
3. Transforming Functions	How does the equation of a function affect its graphical representation? How does changing the equation of a function in more than one way affect its graphical representation? How can you use the equation of a function to graph the function without using ordered pairs?	*Journal: Inverting Time and Temperature	*Practice: Transformations of Parent Functions *Performance Task: 3-D Printer Business *Unit Test
4. Polynomial Functions	What does the degree of a polynomial tell you about its related polynomial function? For a polynomial function, how are factors, zeros and x-intercepts related? For a polynomial function,	*Journal: Designing a Mountain Landscape	*Practice: Multiplying Polynomials *Unit Test

	how are factors and roots related? For a polynomial function, how are complex numbers and synthetic division used?		
5. Rational Expressions and Functions	Are two quantities inversely proportional if an increase in one corresponds to a decrease in the other? What kinds of asymptotes are possible for a rational function? Are a rational expression and its simplified form equivalent?	*Journal: Rural Wireless Internet	*Practice: Finding the Constant in Inverse Variation *Unit Test
6. Radical Expressions and Functions	To simplify the nth root of an expression, what must be true about the expression? When you square each side of an equation, is the resulting equation equivalent to the original? How are a function and its inverse function related?	*Journal: Rationalizing Denominators	*Practice: Pendulums and Bridges *Project: Solving the Skid Distance Problem *Unit Test
7. Exponential and Logarithmic Functions	How do you model a quantity that changes regularly over time by the same percentage? How are exponents and logarithms related? How are exponential functions and logarithmic functions related?	*Journal: Exponential vs. Quadratic	*Modeling: Viral Videos *Unit Test
8. Right Triangles and Trigonometry	How do I solve right triangles using the Pythagorean theorem? How do you find a side length or angle measure in a right triangle? How do trigonometric ratios relate to similar right triangles?	*Journal: Law of Sines and Proofs	*Modeling: Leaning Towers *Unit Test

	What do you know about the side lengths and the trigonometric ratios in special right triangles?		
9. Trigonometry	What is the definition of the six basic trig functions in terms of the sides of a right triangle? What is the fundamental difference between a degree and a radian? How are the six basic trig functions graphed? How does the unit circle and the concept of coterminal angles help us to generate graphs of trig functions where the y-axis represents the value of the function and the x-axis represents the angle?	*Journal: A Better Way?	*Modeling: Riding the Circular Wave *Unit Test
10. Three Dimensional Solids	How can you determine the surface area and volume of three dimensional figures? How can you find and compare the areas and volumes of similar solids?	*Journal: Volume	*Modeling Solids *Unit Test

APEX Units 6 & 12: Review and Exams

ESSENTIAL STANDARDS:

ALGEBRA
Major Clusters:
Arithmetic with Polynomials and Rational Expressions A-APR
A-APR-1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
A-APR-3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
A-APR-7 Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a non-zero rational expression; add, subtract, multiply, and divide rational expressions.

Creating Equations A-CED
A-CED-1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and

exponential functions. (CA)

A-CED-2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED-3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

A-CED-4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Reasoning with Equations and Inequalities A-REI

A-REI-2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A-REI-11 Explain why the x-coordinates of the points where the graphs of $y = f(x)$ and $y = g(x)$ the equations and intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Additional/Supporting Clusters:

Arithmetic with Polynomials and Rational Expressions A-APR

A-APR-2 Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by x-a is $p(a) = 0$, so if and only if (x-a) is a factor of $p(x)$.

A-APR-4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x2 + y2)2 = (x2 - y2)2 + (2xy)2$, can be used to generate Pythagorean triples.

A-APR-5 Know and apply the Binomial Theorem for the expansion of $(x + y)n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.3

A-APR-6 Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ n the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection long division, or, for the more complicated examples, a computer algebra system.

FUNCTIONS

Major Clusters

Interpreting function (F-IF):

F-IF -4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

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.

(b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. ★

(c)   Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. ★

(e) Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric.

F-IF-9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Additional/Supporting Clusters:

F-IF-5   Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

F-IF-6   Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Building Functions (F-BF)

Major Clusters

F-BF-1 Write a function that describes a relationship between two quantities.

b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

F-BF-3 Identify the effect on the graph of replacing by $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F-BF-4 Find inverse functions. Solve an equation of the form $f(x) = c$, for a simple function f that has an inverse and write an expression for the inverse. For example: $f(x) = (x+1)/(x- 1)$ for $x\neq1$

Linear, Quadratic, and Exponential Models (F-LE)

Major Clusters:

Construct and compare linear, quadratic, and exponential models and solve problems

F-LE-4 For exponential models, express as a logarithm the solution to $abct=d$, where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.[Logarithms as solutions for exponentials.]

Trigonometric functions (F-TF)

Major Clusters

Model periodic phenomena with trigonometric functions.

F-TF-5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Additional/Supporting Clusters:

Extend the domain of trigonometric functions using the unit circle.

F-TF-1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F-TF-2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric function to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

F-TF-2.1 Graph all 6 basic trigonometric functions. (CA)

GEOMETRY

Major Clusters:

Expressing Geometric Properties with Equations

G-GPE-3.1 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 under the normal curve.

Additional/Supporting Clusters:

G-SRT-9 Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

G-SRT-10 Prove the Laws of Sines and Cosines and use them to solve problems.

G-SRT-11 Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

G-GMD-4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

G-MG-1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

G-MG-2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

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).

STATISTICS AND PROBABILITY

Major Clusters:

Interpreting Categorical and Quantitative Data S-ID

S-ID-4: 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 under the normal curve.

Making Inferences and Justifying Conclusions S-IC

S-IC-1: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

Additional/Supporting Clusters:

Making Inferences and Justifying Conclusions S-IC

S-IC-2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

S-IC-3: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S-IC-4: Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

S-IC-5: Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S-IC-6: Evaluate reports based on data.

Using Probability and Make Decisions S-MD

S-MD-6: Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S-MD-7: Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.
https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf

Link to Framework (if applicable):
Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.
https://www.cde.ca.gov/ci/ma/cf/documents/mathfwmathematics3jl.pdf

Link to Subject Area Content Standards (if applicable):
Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

Link to Program Content Area Standards (if applicable):
Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
Yes		*APEX: Mathematics III*		APEX Online Courses		*2019*

Other Resource Materials

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):