

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



Integrated Math 3

Board Approval Date: March 18, 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 2 or completion of Integrated Math 3 Foundations	Corequisite(s):
CTE Sector/Pathway: N/A	
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:

Integrated Math 3 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.

As stated in the Mathematics Framework (2013), the focus of Integrated Math 3 is for students to expand their repertoire of functions to include polynomial, rational, and radical functions. They expand their study of right triangle trigonometry to include general triangles. Finally, students bring together all of their experience with functions and geometry to create models and solve contextual problems. Mathematical modeling is a major theme of this course as it involves the process of choosing and using mathematics and statistics to analyze empirical situations, to understand them better, and to make decisions. The courses in the Integrated Pathway follow the structure begun in the K-8 standards of presenting mathematics as a coherent subject, mixing standards from various conceptual categories.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Geometric Modeling	<p>How can you use the population and area of a region to describe how densely the region is populated?</p> <p>How can you use the mass and volume of an object to describe the density of an object?</p> <p>How can you use a piece of food to create a real-life cross section?</p> <p>How can you create a solid of revolution?</p>	<p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include using area formulas and surface area are formulas to solve problems</p> <p>*Using volume formulas to find densities and masses</p> <p>*Describing and drawing cross sections</p> <p>*Sketching, describing, and finding surface areas and volumes of solids of revolution; and forming solids of revolution in the coordinate plane</p>
2. Linear and Quadratic Functions	<p>What are the characteristics of some of the basic parent functions?</p> <p>How do the graphs of $y=f(x) + k$, $y = f(x-h)$, and $y = -f(x)$ compare to the graph of the parent function f ?</p> <p>How can you use a linear function to model and analyze a real-life situation?</p> <p>How can you determine the number of solutions of a</p>	<p>*Learning Goals Inventory</p> <p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from Chapter 1 and a focus on identifying families of functions, and describing combinations of transformations of parent functions</p> <p>*Writing functions representing combinations of transformations</p> <p>*Finding lines of fit and</p>

	<p>linear system?</p> <p>How do the constants a, h, and k affect the graph of the quadratic function $g(x) = a(x-h)^2 + k$?</p> <p>What type of symmetry does the graph of $f(x) = a(x-h)^2 + k$ have and how can you describe this symmetry?</p> <p>How can you use a quadratic function to model a real-life situation?</p>		<p>lines of best fit for data sets</p> <p>*Solving systems of linear equations in three variables algebraically</p> <p>*Describing and writing transformations of quadratic functions; writing equations of quadratic functions using characteristics of their graphs; and writing quadratic equations to model data sets</p>
<p>3. Polynomial Functions</p>	<p>What are some common characteristics of the graphs of cubic and quartic polynomial functions?</p> <p>How can you cube a binomial?</p> <p>How can you use the factors of a cubic polynomial to solve a division problem involving the polynomial?</p> <p>How can you factor a polynomial?</p> <p>How can you determine whether a polynomial equation has a repeated solution?</p> <p>How can you determine whether a polynomial equation has imaginary solutions?</p> <p>How can you transform the graph of a polynomial function?</p> <p>How many turning points can the graph of a polynomial function have?</p> <p>How can you find a polynomial model for real-life data?</p>	<p>*Learning Goals Inventory</p> <p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on adding, subtracting, multiplying, dividing, and factoring polynomials</p> <p>*Finding solutions of polynomial equations and zeros of polynomial functions</p> <p>*Using the Fundamental Theorem of Algebra; graphing polynomial functions and analyzing graphs of polynomial functions, including transformations; and writing polynomial functions to model data.</p>

<p>4. Rational Exponents and Radical Functions</p>	<p>How can you use a rational exponent to represent a power involving a radical? How can you use properties of exponents to simplify products and quotients of radicals? How can you identify the domain and range of a radical function? How can you solve a radical equation? How can you use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions? How can you sketch the graph of the inverse of a function?</p>	<p>*Fact-First Questioning *Learning Goals Inventory *Exit Ticket *Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on simplifying and evaluating expressions using properties of rational exponents and properties of radicals *Graphing radical functions and writing transformations of radical functions *Solving equations containing radicals and rational exponents; solving radical inequalities; adding, subtracting, multiplying, and dividing functions; and finding and verifying inverses of nonlinear functions.</p>
<p>5. Exponential and Logarithmic Functions</p>	<p>What is the natural base e? What are some of the characteristics of the graph of a logarithmic function? How can you transform the graphs of exponential and logarithmic functions? How can you use properties of exponents to derive properties of logarithms? How can you solve exponential and logarithmic equations? How can you recognize polynomial, exponential, and logarithmic models?</p>	<p>*Response (Thinking) Logs *Fact-First Questioning *Learning Goals Inventory *Exit Ticket *Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on defining and using the natural base e *Graphing natural base functions *Defining and evaluating logarithmic functions and using properties of logarithmic and exponential functions *Writing and graphing logarithmic functions and transformations of exponential and logarithmic functions *Using properties and formulas to evaluate, expand, or condense logarithmic expressions; solving exponential and</p>

			logarithmic equations and inequalities; and writing exponential and logarithmic models for data sets
6. Rational Functions	<p>How can you recognize when two quantities vary directly or inversely?</p> <p>What are some of the characteristics of the graph of a rational function?</p> <p>How can you determine the excluded values in a product or quotient of two rational expressions?</p> <p>How can you determine the domain of the sum or difference of two rational expressions?</p> <p>How can you solve a rational equation?</p>	<p>*Give Me Five</p> <p>*Response (Thinking) Logs</p> <p>*Fact-First Questioning</p> <p>*Learning Goals Inventory</p> <p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on classifying direct and inverse variation and writing inverse variation equations</p> <p>*Graphing rational functions of the forms $f(x) = ax$, $f(x) = ax - h + k$, and $f(x) = ax + bcx + d$; adding, subtracting, multiplying, dividing, and simplifying rational expressions</p> <p>*Simplifying complex fractions involving rational expressions; and solving rational equations and finding inverses of rational functions</p>
7. Sequences and Series	<p>How can you write a rule for the nth term of a sequence?</p> <p>How can you recognize an arithmetic sequence from its graph?</p> <p>How can you recognize a geometric sequence from its graph?</p> <p>How can you find the sum of an infinite geometric series?</p> <p>How can you find the sum of an infinite geometric series?</p> <p>How can you define a sequence recursively?</p>	<p>*Give Me Five</p> <p>*Response (Thinking) Logs</p> <p>*Fact-First Questioning</p> <p>*Learning Goals Inventory</p> <p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on using sequence notation to write terms of sequences</p> <p>*Writing a rule for the nth term of a sequence; using summation notation; finding sums of finite arithmetic sequences, sums of finite and infinite geometric sequences, and partial sums of infinite geometric sequences</p> <p>*Evaluating recursive rules for sequences; and</p>

			translating between recursive rules and explicit rules for arithmetic and geometric sequences
8. Trigonometric Ratios and Functions	<p>How can you find a trigonometric function of an acute angle ?</p> <p>How can you find the measure of an angle in radians?</p> <p>How can you use the unit circle to define the trigonometric functions of any angle?</p> <p>What are the characteristics of the graphs of the sine and cosine functions?</p> <p>What are the characteristics of the graph of the tangent function?</p> <p>What are the characteristics of the real-life problems that can be modeled by trigonometric functions?</p>	<p>*Paired Verbal Fluency</p> <p>*Give Me Five</p> <p>*Response (Thinking) Logs</p> <p>*Fact-First Questioning</p> <p>*Learning Goals Inventory</p> <p>*Exit Ticket</p> <p>*Closure Statements: I feel confident about... or I am still confused about...</p>	<p>*Free Response problems that include Priority Standards from previous chapters and a focus on finding unknown side lengths and angle measures of right triangles using trigonometric ratios</p> <p>*Drawing angles in standard position in the coordinate plane; finding coterminal angles of a given angle</p> <p>*Converting between degree measure and radian measure and using radian measure to find arc lengths and areas of sectors</p> <p>*Evaluating trigonometric functions of any angle, and using the unit circle to find trigonometric functions of quadrantal angles; exploring the characteristics of trigonometric functions; graphing trigonometric functions and transformations of trigonometric functions</p> <p>*Interpreting and using frequency in real-life problems; writing sine and cosine functions; and using technology to find trigonometric models for data sets</p>

<p>9. Trigonometric Identities and Formulas</p>	<p>How can you verify a trigonometric identity? How can you evaluate trigonometric functions of the sum or difference of two angles? What is the Law of Sines? What is the Law of Cosines?</p>	<ul style="list-style-type: none"> *Paired Verbal Fluency *Give Me Five *Response (Thinking) Logs *Fact-First Questioning *Learning Goals Inventory *Exit Ticket *Closure Statements: I feel confident about... or I am still confused about... 	<ul style="list-style-type: none"> *Free Response problems that include Priority Standards from previous chapters and a focus on verifying and using trigonometric identities *Using sum and difference formulas to evaluate and simplify trigonometric expressions and to solve trigonometric equations *Using the Law of Sines and the Law of Cosines to solve triangles; and finding areas of triangles using the sine function or when all three side lengths are known
<p>10. Data Analysis and Statistics</p>	<p>In a normal distribution, about what percent of the data lies within one, two, and three standard deviations of the mean? How can you test theoretical probability using sample data? What are some considerations when undertaking a statistical study? How can you use an experiment to test a conjecture? How can you use a sample survey to infer a conclusion about a population? How can you test a hypothesis about an experiment?</p>	<ul style="list-style-type: none"> *Paired Verbal Fluency *Give Me Five *Response (Thinking) Logs *Fact-First Questioning *Learning Goals Inventory *Exit Ticket *Closure Statements: I feel confident about... or I am still confused about... 	<ul style="list-style-type: none"> *Free Response problems that include Priority Standards from previous chapters and a focus on calculating probabilities using normal distributions *Using z-scores and the standard normal table to find probabilities; distinguishing between populations and samples, and analyzing hypotheses *Analyzing methods of collecting data and recognizing bias in sampling and survey questions *Recognizing how randomization applies to experiments and observational studies, and analyzing experimental designs; and resampling data using a simulation to analyze a hypothesis

ESSENTIAL STANDARDS:

ALGEBRA

Arithmetic with Polynomials and Rational Expressions

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-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.

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.

FUNCTIONS

Interpreting Functions

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).

Building Functions

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 $f(x)$ 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 $x \neq 1$

Linear, Quadratic, and Exponential Models

F-LE-4 For exponential models, express as a logarithm the solution to $ab^{ct}=d$, 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)

Model periodic phenomena with trigonometric functions.

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

GEOMETRY

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.

STATISTICS AND PROBABILITY

Interpreting Categorical and Quantitative Data

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

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
<i>Yes</i>		<i>Big Ideas Math Integrated Math III</i>	Ron Larson and Laurie Boswell	Cengage/National Geographic/Big Ideas Learning		<i>1/1/2016</i>

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.):