ENVISION21
DEEP LEARNING • CFSD

Mathematics Standard
Catalina Foothills School District
High School: Applications of Mathematics

The Applications of Mathematics course will further develop students' understanding of mathematical concepts and extend problem-solving strategies and skills to apply mathematics in routine and non-routine contexts. Students will refine algebraic and trigonometric concepts studied in Algebra 2 and will be introduced to essential applications of mathematics used to make financial decisions. Units include extended applications of linear and nonlinear systems of equations, exponential growth and decay functions, trigonometric relationships, and business and finance applications. Technology, including graphing calculators (TI-84+) and spreadsheet applications, will be used to support coursework. Applications of Mathematics is designed to prepare students for the study of entry-level college mathematics and to support students' abilities to make mathematically informed decisions relating to business and finance.

Standards for Applications of Mathematics

Number and Quantity: Quantities (N-Q)	
A2-N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
A2.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities utilizing real-world context.
Functions: Building Functions (F-BF)	
P.F-BF.A.1	Write a function that describes a relationship between two quantities. c. 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).
P.F-BF.B.4	Find inverse functions. b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse.
P.F-BF.B.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Functions: Interpreting Functions (F-IF)	
A1.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of *f* is the graph of the equation $y = f(x)$.
A1.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
A1.F-IF.C.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).
A2.F-IF.B.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; even and odd functions; and periodicity.

A2.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions.
P.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Functions: Linear, Quadratic, and Exponential Models (F-LE)	
A1.F-LE.B.5	Interpret the parameters in a linear or exponential function with integer exponents utilizing real world context.
Functions: Trigonometric Functions (F-TF)	
A2.F-TF.B.5	Create and interpret sine, cosine and tangent functions that model periodic phenomena with specified amplitude, frequency, and midline.
P.F-TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.
P.F-TF.B.7	Use inverse functions to solve trigonometric equations utilizing real world context; evaluate the solution and interpret them in terms of context.
Algebra: Creating Equations (A-CED)	
A1.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on linear, quadratic, exponential and piecewise-defined functions (limited to absolute value and step).
A1.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
A1.A-REI.C.6	Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables. Include problem solving opportunities utilizing real-world context.
A1.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A2.A-REI.C.7	Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
A2.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ 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 problems in real-world context. Extend from linear, quadratic, and exponential functions to cases where $f(x)$ and/or $g(x)$ are polynomial, rational, exponential, and logarithmic functions.
Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT)	
G.G-SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.G-SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.G-SRT.C.8	Use trigonometric ratios (including inverse trigonometric ratios) and the Pythagorean Theorem to find unknown measurements in right triangles utilizing real-world context.
P.G-SRT.D.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).
Statistics & Probability: Interpreting Categorical & Quantitative Data (S-ID)	
A1.S-ID.C.7	Interpret the slope as a rate of change and the constant term of a linear model in the context of the data.
STANDARDS FOR MATHEMATICAL PRACTICE	
HS.MP.1	Make sense of problems and persevere in solving them.
HS.MP.2	Reason abstractly and quantitatively.
HS.MP.3	Construct viable arguments and critique the reasoning of others.

HS.MP.4	Model with mathematics.
HS.MP.5	Use appropriate tools strategically.
HS.MP.6	Attend to precision.
HS.MP.7	Look for and make use of structure.
HS.MP.8	Look for an express regularity in repeated reasoning.