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

Applications of Mathematics 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.

Standard for Applications of Mathematics by Unit and Measurement Topic

UNIT 1: SOLVING SYSTEMS IN CONTEXT & USING TECHNOLOGY	
Functions: Building Functions (F-BF)	
HS.F-BF.1	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
Number and Quantity: Quantities (N-Q)	
HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Statistics & Probability: Interpreting Categorical & Quantitative Data (S-ID)	
HS.S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Functions: Interpreting Functions (F-IF)	
HS.F-IF.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).
HS.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; even and odd functions; and periodicity.
HS.F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
HS.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.
HS.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. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
HS.F-IF.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Functions: Linear, Quadratic, and Exponential Models (F-LE)	
HS.F-LE.5	Interpret the parameters in a linear or exponential function in terms of a context.

Algebra: Creating Equations (A-CED)	
HS.A-CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HS.A-CED.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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
HS.A-REI.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).
HS.A-REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
UNIT 2: EXPONENTIAL FUNCTIONS IN CONTEXT	
Number and Quantity: Quantities (N-Q)	
HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Functions: Interpreting Functions (F-IF)	
HS.F-IF.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).
HS.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; even and odd functions; and periodicity.
HS.F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
HS.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 exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
HS.F-IF.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Algebra: Creating Equations (A-CED)	
HS.A-CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HS.A-CED.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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.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)
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
UNIT 3: TRIGONOMETRIC RELATIONSHIPS	
Number and Quantity: Quantities (N-Q)	

HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Functions: Interpreting Functions (F-IF)	
HS.F-IF.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).
HS.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; even and odd functions; and periodicity.
HS.F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
HS.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. a. Graph trigonometric functions, showing period, midline, and amplitude.
HS.F-IF.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Geometry: Special Right Triangles (G-SRT)	
HS.G-SRT.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.
HS.G-SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.
HS.G-SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
HS.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).
Functions: Trigonometric Functions (F-TF)	
HS.F-TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
Algebra: Creating Equations (A-CED)	
HS.A-CED.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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.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).
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
UNIT 4: MANAGING INCOME	
Number and Quantity: Quantities (N-Q)	
HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Functions: Interpreting Functions (F-IF)	
HS.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.
HS.F-IF.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Functions: Linear, Quadratic, and Exponential Models (F-LE)	
HS.F-LE.5	Interpret the parameters in a linear or exponential function in terms of a context.
Algebra: Creating Equations (A-CED)	

HS.A-CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HS.A-CED.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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.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).
HS.A-REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Statistics: Interpreting Categorical & Quantitative Data (S-ID)	
HSS-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
UNIT 5: MANAGING DAY-TO-DAY EXPENSES	
Number and Quantity: Quantities (N-Q)	
HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Statistics & Probability: Interpreting Categorical & Quantitative Data (S-ID)	
HS.S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Algebra: Creating Equations (A-CED)	
HS.A-CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
HS.A-CED.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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.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).
HS.A-REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
UNIT 6: MAKING LIFELONG FINANCIAL DECISIONS	
Number and Quantity: Quantities (N-Q)	
HS.N-Q.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.
HS.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Functions: Interpreting Functions (F-IF)	
HS.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.
HS.F-IF.9	Compare properties of two functions each represented in a different way, algebraically, graphically, numerically, and in tables, or by verbal descriptions. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Algebra: Reasoning with Equations & Inequalities (A-REI)	
HS.A-REI.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).
HS.A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
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.