

HIGH SCHOOL

MATH

SCOPE AND SEQUENCE

ALGEBRA I

MATH MODELS

ALGEBRA II

PRE-AP ALGEBRA II

GEOMETRY

PRE CALCULUS

Mathematical Models with Applications

First Six Weeks :: The student is expected to...

- compare and analyze various methods for solving a real-life problem;[1.A]
- use multiple approaches (algebraic, graphical, and geometric methods) to solve problems from a variety of disciplines[1.B]
- interpret information from various graphs, including line graphs, bar graphs, circle graphs, histograms, scatterplots, line plots, stem and leaf plots, and box and whisker plots to draw conclusions from the data;[2.A]
- analyze graphs from journals, newspapers, and other sources to determine the validity of stated arguments[2.C]
- use rates, linear functions, and direct variation to solve problems involving personal finance and budgeting, including compensations and deductions;[5.A]

Second Six Weeks :: The student is expected to...

- select a method to solve a problem, defend the method, and justify the reasonableness of the results.[1.C]
- analyze numerical data using measures of central tendency, variability, and correlation in order to make inferences;[2.B]
- formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions;[3.A]
- communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project by written report, visual display, oral report, or multi-media presentation[3.B]
- analyze methods of payment available in retail purchasing and compare relative advantages and disadvantages of each option;[6.A]

Third Six Weeks :: The student is expected to...

- use regression methods available through technology to describe various models for data such as linear, quadratic, exponential, etc., select the most appropriate model, and use the model to interpret information.[2.D]
- determine the appropriateness of a model for making predictions from a given set of data.[3.C]
- compare theoretical and empirical probability[4.A]

Fourth Six Weeks :: The student is expected to...

- solve problems involving personal taxes[5.B]
- analyze data to make decisions about banking.[5.C]
- use amortization models to investigate home financing and compare buying and renting a home[6.B]
- use amortization models to investigate automobile financing and compare buying and leasing a vehicle.[6.C]

Fifth Six Weeks :: The student is expected to...

- analyze types of savings options involving simple and compound interest and compare relative advantages of these options;[7.A]
- analyze and compare coverage options and rates in insurance[7.B]
- investigate and compare investment options including stocks, bonds, annuities, and retirement plans.[7.C]
- use geometric models available through technology to model growth and decay in areas such as population, biology, and ecology;[8.A]

Sixth Six Weeks :: The student is expected to...

- use trigonometric ratios and functions available through technology to calculate distances and model periodic motion[8.B]
- use direct and inverse variation to describe physical laws such as Hook's, Newton's, and Boyle's laws.[8.C]
- use geometric transformations, symmetry, and perspective drawings to describe mathematical patterns and structure in art and architecture[9.A]
- use geometric transformations, proportions, and periodic motion to describe mathematical patterns and structure in music.[9.B]

Algebra I

First Six Weeks :: The student is expected to...

Second Six Weeks :: The student is expected to...

- describe independent and dependent quantities in functional relationships;[1.A]
- gather and record data and use data sets to determine functional relationships between quantities;[1.B]
- interpret situations in terms of given graphs or creates situations that fit given graphs[2.C]
- connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$. [4.C]
- develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;[6.A]
- interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;[6.B]
- use symbols to represent unknowns and variables[3.A]
- investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$;[6.C]
- determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;[6.E]

Third Six Weeks :: The student is expected to...

- describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;[1.C]
- represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities[1.D]
- collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.[2.D]
- look for patterns and represent generalizations algebraically.[3.B]
- use the commutative, associative, and distributive properties to simplify algebraic expressions[4.B]
- determine whether or not given situations can be represented by linear functions;[5.A]
- determine the domain and range for linear functions in given situations[5.B]
- use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.[5.C]
- graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y intercept;[6.D]
- interpret and predict the effects of changing slope and y -intercept in applied situations[6.F]
- investigate, describe, and predict the effects of changes in a on the graph of $y = ax^2 + c$;[9.B]
- investigate, describe, and predict the effects of changes in c on the graph of $y = ax^2 + c$ [9.C]

Fourth Six Weeks :: The student is expected to...

- identify and sketch the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions;[2.A]
- identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;[2.B]
- relate direct variation to linear functions and solve problems involving proportional change.[6.G]
- analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;[7.A]
- investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities[7.B]
- interpret and determine the reasonableness of solutions to linear equations and inequalities.[7.C]
- analyze situations and formulate systems of linear equations in two unknowns to solve problems;[8.A]
- solve systems of linear equations using concrete models, graphs, tables, and algebraic methods[8.B]
- interpret and determine the reasonableness of solutions to systems of linear equations.[8.C]
- use patterns to generate the laws of exponents and apply them in problem-solving situations;[11.A]

Algebra I

Fifth Six Weeks :: The student is expected to...

- interpret and make decisions, predictions, and critical judgments from functional relationships.[1.E]
- find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations.[4.A]
- determine the domain and range for quadratic functions in given situations.[9.A]
- analyze graphs of quadratic functions and draw conclusions.[9.D]
- solve quadratic equations using concrete models, tables, graphs, and algebraic methods[10.A]
- make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x-intercepts) of the graph of the function.[10.B]
- analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods[11.B]

Sixth Six Weeks :: The student is expected to...

- analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.[11.C]

Algebra II

First Six Weeks :: The student is expected to...

- identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations[1.A]
- collect and organize data, make and interpret scatterplots, fit the graph of a function to the data, interpret the results, and proceed to model, predict, and make decisions and critical judgments.[1.B]
- use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations[2.A]

Second Six Weeks :: The student is expected to...

- analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems.[3.A]
- use algebraic methods, graphs, tables, or matrices, to solve systems of equations or inequalities[3.B]
- interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.[3.C]
- identify and sketch graphs of parent functions, including linear ($f(x) = x$), quadratic ($f(x) = x^2$), exponential ($f(x) = ax$), and logarithmic ($f(x) = \log ax$) functions, absolute value of x ($f(x) = |x|$), square root of x ($f(x) = \sqrt{x}$), and reciprocal of x ($f(x) = 1/x$);[4.A]
- extend parent functions with parameters such as a in $f(x) = a/x$ and describe the effects of the parameter changes on the graph of parent functions[4.B]
- use functions to model and make predictions in problem situations involving direct and inverse variation.[10.G]

Third Six Weeks :: The student is expected to...

- relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions[6.B]
- determine a quadratic function from its roots or a graph.[6.C]

Fourth Six Weeks :: The student is expected to...

- use complex numbers to describe the solutions of quadratic equations.[2.B]
- describe and analyze the relationship between a function and its inverse.[4.C]
- use the method of completing the square.[5.E]
- determine the reasonable domain and range values of quadratic functions, as well as interpret and determine the reasonableness of solutions to quadratic equations and inequalities;[6.A]
- use characteristics of the quadratic parent function to sketch the related graphs and connect between the $y = ax^2 + bx + c$ and the $y = a(x - h)^2 + k$ symbolic representations of quadratic functions[7.A]
- use the parent function to investigate, describe, and predict the effects of changes in a , h , and k on the graphs of $y = a(x - h)^2 + k$ form of a function in applied and purely mathematical situations.[7.B]
- analyze and interpret the solutions of quadratic equations using discriminants and solve quadratic equations using the quadratic formula;[8.B]
- use the parent function to investigate, describe, and predict the effects of parameter changes on the graphs of square root functions and describe limitations on the domains and ranges;[9.A]
- determine solutions of square root equations using graphs, tables, and algebraic methods;[9.D]

Fifth Six Weeks :: The student is expected to...

- analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems;[8.A]
- compare and translate between algebraic and graphical solutions of quadratic equations[8.C]
- solve quadratic equations and inequalities using graphs, tables, and algebraic methods.[8.D]
- relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions;[9.B]
- determine the reasonable domain and range values of square root functions, as well as interpret and determine the reasonableness of solutions to square root equations and inequalities;[9.C]
- determine solutions of square root inequalities using graphs and tables;[9.E]
- analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems[9.F]
- connect inverses of square root functions with quadratic functions.[9.G]

Algebra II

- use quotients of polynomials to describe the graphs of rational functions, predict the effects of parameter changes, describe limitations on the domains and ranges, and examine asymptotic behavior;[10.A]
- determine the solutions of rational equations using graphs, tables, and algebraic methods;[10.D]
- determine solutions of rational inequalities using graphs and tables;[10.E]
- determine solutions of exponential and logarithmic inequalities using graphs and tables[11.E]

Sixth Six Weeks :: The student is expected to...

- describe a conic section as the intersection of a plane and a cone;[5.A]
- sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;[5.B]
- identify symmetries from graphs of conic sections;[5.C]
- identify the conic section from a given equation[5.D]
- analyze various representations of rational functions with respect to problem situations;[10.B]
- determine the reasonable domain and range values of rational functions, as well as interpret and determine the reasonableness of solutions to rational equations and inequalities;[10.C]
- analyze a situation modeled by a rational function, formulate an equation or inequality composed of a linear or quadratic function, and solve the problem[10.F]
- develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;[11.A]
- use the parent functions to investigate, describe, and predict the effects of parameter changes on the graphs of exponential and logarithmic functions, describe limitations on the domains and ranges, and examine asymptotic behavior;[11.B]
- determine the reasonable domain and range values of exponential and logarithmic functions, as well as interpret and determine the reasonableness of solutions to exponential and logarithmic equations and inequalities;[11.C]
- determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods; [11.D]
- analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.[11.F]

Pre AP Algebra II

First Six Weeks :: The student is expected to...

Second Six Weeks :: The student is expected to...

- identify the mathematical domains and ranges of functions and determine reasonable domain and range values for continuous and discrete situations[1.A]
- collect and organize data, make and interpret scatterplots, fit the graph of a function to the data, interpret the results, and proceed to model, predict, and make decisions and critical judgments.[1.B]
- analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems:[3.A]
- use algebraic methods, graphs, tables, or matrices, to solve systems of equations or inequalities[3.B]
- interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.[3.C]

Third Six Weeks :: The student is expected to...

- use the method of completing the square.[5.E]
- determine the reasonable domain and range values of quadratic functions, as well as interpret and determine the reasonableness of solutions to quadratic equations and inequalities:[6.A]
- relate representations of quadratic functions, such as algebraic, tabular, graphical, and verbal descriptions[6.B]
- determine a quadratic function from its roots or a graph.[6.C]
- use characteristics of the quadratic parent function to sketch the related graphs and connect between the $y = ax^2 + bx + c$ and the $y = a(x - h)^2 + k$ symbolic representations of quadratic functions[7.A]
- use the parent function to investigate, describe, and predict the effects of changes in a , h , and k on the graphs of $y = a(x - h)^2 + k$ form of a function in applied and purely mathematical situations.[7.B]
- analyze situations involving quadratic functions and formulate quadratic equations or inequalities to solve problems:[8.A]
- analyze and interpret the solutions of quadratic equations using discriminants and solve quadratic equations using the quadratic formula:[8.B]
- compare and translate between algebraic and graphical solutions of quadratic equations[8.C]
- solve quadratic equations and inequalities using graphs, tables, and algebraic methods.[8.D]
- use tools including factoring and properties of exponents to simplify expressions and to transform and solve equations[2.A]
- use complex numbers to describe the solutions of quadratic equations.[2.B]

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Fourth Six Weeks :: The student is expected to...

- identify and sketch graphs of parent functions, including linear ($f(x) = x$), quadratic ($f(x) = x^2$), exponential ($f(x) = ax$), and logarithmic ($f(x) = \log ax$) functions, absolute value of x ($f(x) = |x|$), square root of x ($f(x) = \sqrt{x}$), and reciprocal of x ($f(x) = 1/x$);[4.A]
- extend parent functions with parameters such as a in $f(x) = a/x$ and describe the effects of the parameter changes on the graph of parent functions[4.B]
- describe and analyze the relationship between a function and its inverse.[4.C]

Fifth Six Weeks :: The student is expected to...

- use the parent function to investigate, describe, and predict the effects of parameter changes on the graphs of square root functions and describe limitations on the domains and ranges:[9.A]
- relate representations of square root functions, such as algebraic, tabular, graphical, and verbal descriptions; [9.B]
- determine the reasonable domain and range values of square root functions, as well as interpret and determine the reasonableness of solutions to square root equations and inequalities:[9.C]
- determine solutions of square root equations using graphs, tables, and algebraic methods:[9.D]
- determine solutions of square root inequalities using graphs and tables:[9.E]
- analyze situations modeled by square root functions, formulate equations or inequalities, select a method, and solve problems[9.F]
- connect inverses of square root functions with quadratic functions.[9.G]

Pre AP Algebra II

- develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses;[11.A]
- use the parent functions to investigate, describe, and predict the effects of parameter changes on the graphs of exponential and logarithmic functions, describe limitations on the domains and ranges, and examine asymptotic behavior;[11.B]
- determine the reasonable domain and range values of exponential and logarithmic functions, as well as interpret and determine the reasonableness of solutions to exponential and logarithmic equations and inequalities;[11.C]
- determine solutions of exponential and logarithmic equations using graphs, tables, and algebraic methods; [11.D]
- determine solutions of exponential and logarithmic inequalities using graphs and tables[11.E]
- analyze a situation modeled by an exponential function, formulate an equation or inequality, and solve the problem.[11.F]

Sixth Six Weeks :: The student is expected to...

- use quotients of polynomials to describe the graphs of rational functions, predict the effects of parameter changes, describe limitations on the domains and ranges, and examine asymptotic behavior;[10.A]
- analyze various representations of rational functions with respect to problem situations;[10.B]
- determine the reasonable domain and range values of rational functions, as well as interpret and determine the reasonableness of solutions to rational equations and inequalities;[10.C]
- determine the solutions of rational equations using graphs, tables, and algebraic methods;[10.D]
- determine solutions of rational inequalities using graphs and tables;[10.E]
- analyze a situation modeled by a rational function, formulate an equation or inequality composed of a linear or quadratic function, and solve the problem[10.F]
- use functions to model and make predictions in problem situations involving direct and inverse variation.[10.G]
- describe a conic section as the intersection of a plane and a cone;[5.A]
- sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;[5.B]
- identify symmetries from graphs of conic sections;[5.C]
- identify the conic section from a given equation[5.D]

Geometry

First Six Weeks :: The student is expected to...

Second Six Weeks :: The student is expected to...

- make conjectures about angles, lines, polygons, circles, and three-dimensional figures and determine the validity of the conjectures, choosing from a variety of approaches such as coordinate, transformational, or axiomatic.[2.B]
- use logical reasoning to prove statements are true and find counter examples to disprove statements that are false:[3.C]
- use inductive reasoning to formulate a conjecture[3.D]

Third Six Weeks :: The student is expected to...

- develop an awareness of the structure of a mathematical system, connecting definitions, postulates, logical reasoning, and theorems:[1.A]
- use constructions to explore attributes of geometric figures and to make conjectures about geometric relationships[2.A]
- determine the validity of a conditional statement, its converse, inverse, and contrapositive:[3.A]
- construct and justify statements about geometric figures and their properties:[3.B]
- use deductive reasoning to prove a statement.[3.E]
- The student is expected to select an appropriate representation (concrete, pictorial, graphical, verbal, or symbolic) in order to solve problems.[4.A]
- identify and apply patterns from right triangles to solve meaningful problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.[5.D]
- use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons[7.B]
- derive and use formulas involving length, slope, and midpoint.[7.C]
- formulate and test conjectures about the properties of parallel and perpendicular lines based on explorations and concrete models:[9.A]
- formulate and test conjectures about the properties and attributes of polygons and their component parts based on explorations and concrete models:[9.B]
- use ratios to solve problems involving similar figures:[11.B]
- develop, apply, and justify triangle similarity relationships, such as right triangle ratios, trigonometric ratios, and Pythagorean triples using a variety of methods[11.C]

Fourth Six Weeks :: The student is expected to...

- compare and contrast the structures and implications of Euclidean and non-Euclidean geometries.[1.C]
- use numeric and geometric patterns to develop algebraic expressions representing geometric properties:[5.A]
- use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles:[5.B]
- use properties of transformations and their compositions to make connections between mathematics and the real world, such as tessellations[5.C]
- use orthographic and isometric views of three-dimensional geometric figures to represent and construct three-dimensional geometric figures and solve problems.[6.C]
- use one- and two-dimensional coordinate systems to represent points, lines, rays, line segments, and figures; [7.A]
- derive, extend, and use the Pythagorean Theorem[8.C]
- formulate and test conjectures about the properties and attributes of circles and the lines that intersect them based on explorations and concrete models[9.C]
- use congruence transformations to make conjectures and justify properties of geometric figures including figures represented on a coordinate plane[10.A]
- use and extend similarity properties and transformations to explore and justify conjectures about geometric figures:[11.A]

Geometry

Fifth Six Weeks :: The student is expected to...

- recognize the historical development of geometric systems and know mathematics is developed for a variety of purposes.[1.B]
- describe and draw the intersection of a given plane with various three-dimensional geometric figures;[6.A]
- use nets to represent and construct three-dimensional geometric figures[6.B]
- find areas of regular polygons, circles, and composite figures;[8.A]
- find areas of sectors and arc lengths of circles using proportional reasoning;[8.B]
- find surface areas and volumes of prisms, pyramids, spheres, cones, cylinders, and composites of these figures in problem situations.[8.D]
- analyze the characteristics of polyhedra and other three-dimensional figures and their component parts based on explorations and concrete models.[9.D]
- justify and apply triangle congruence relationships.[10.B]
- describe the effect on perimeter, area, and volume when one or more dimensions of a figure are changed and apply this idea in solving problems.[11.D]

Sixth Six Weeks :: The student is expected to...

Precalculus

First Six Weeks :: The student is expected to...

Second Six Weeks :: The student is expected to...

- describe parent functions symbolically and graphically, including $f(x) = x^n$, $f(x) = 1/n x$, $f(x) = \log_a x$, $f(x) = 1/x$, $f(x) = e^x$, $f(x) = |x|$, $f(x) = ax$, $f(x) = \sin x$, $f(x) = \arcsin x$, etc.;[1.A]
- determine the domain and range of functions using graphs, tables, and symbols;[1.B]
- describe symmetry of graphs of even and odd functions;[1.C]
- recognize and use connections among significant values of a function (zeros, maximum values, minimum values, etc.), points on the graph of a function, and the symbolic representation of a function[1.D]
- investigate the concepts of continuity, end behavior, asymptotes, and limits and connect these characteristics to functions represented graphically and numerically.[1.E]
- apply basic transformations, including a $f(x)$, $f(x) + d$, $f(x - c)$, $f(b x)$, and compositions with absolute value functions, including $|f(x)|$, and $f(|x|)$, to the parent functions;[2.A]
- perform operations including composition on functions, find inverses, and describe these procedures and results verbally, numerically, symbolically, and graphically[2.B]
- investigate properties of trigonometric and polynomial functions;[3.A]
- use functions such as logarithmic, exponential, trigonometric, polynomial, etc. to model real-life data;[3.B]
- use regression to determine the appropriateness of a linear function to model real-life data (including using technology to determine the correlation coefficient);[3.C]
- use properties of functions to analyze and solve problems and make predictions[3.D]

Third Six Weeks :: The student is expected to...

- investigate identities graphically and verify them symbolically, including logarithmic properties, trigonometric identities, and exponential properties.[2.C]
- solve problems from physical situations using trigonometry, including the use of Law of Sines, Law of Cosines, and area formulas and incorporate radian measure where needed.[3.E]

Fourth Six Weeks :: The student is expected to...

- use the concept of vectors to model situations defined by magnitude and direction[6.A]
- analyze and solve vector problems generated by real-life situations.[6.B]

Fifth Six Weeks :: The student is expected to...

- use conic sections to model motion, such as the graph of velocity vs. position of a pendulum and motions of planets;[5.A]
- use properties of conic sections to describe physical phenomena such as the reflective properties of light and sound;[5.B]
- convert between parametric and rectangular forms of functions and equations to graph them[5.C]
- use parametric functions to simulate problems involving motion.[5.D]

Sixth Six Weeks :: The student is expected to...

- represent patterns using arithmetic and geometric sequences and series;[4.A]
- use arithmetic, geometric, and other sequences and series to solve real-life problems;[4.B]
- describe limits of sequences and apply their properties to investigate convergent and divergent series[4.C]
- apply sequences and series to solve problems including sums and binomial expansion.[4.D]