

## Pre-Calculus Scope and Sequence

### Prerequisites

Topic	Standards	Skills
Real Numbers	CC.2.1.HS.F.1, CC.2.1.6.E.3	Interval notation, basic properties of algebra, properties of exponents, scientific notation
Cartesian Coordinate System	CC.2.1.6.E.3	Plotting points, absolute value, distance and midpoint formulas, equations of circles
Linear Equations and Inequalities	CC.2.2.HS.D.8	Solving equations and inequalities in one variable
Lines in the Plane	CC.2.2.HS.D.7	Slope, point-slope form, slope-intercept form, graphing lines, parallel and perpendicular lines
Solving Equations	CC.2.2.HS.D.8, CC.2.2.HS.D.10	Solving equations graphically, solving quadratics with square roots, completing the square, quadratic formula; finding intersections on the calculator
Solving Inequalities	CC.2.2.HS.D.10	Solving absolute value and quadratic inequalities graphically and algebraically
Factoring	CC.2.2.HS.C.2, CC.2.2.HS.D.2	Factor quadratic expressions
Function Review	Evaluate functions and simplify answers, CC.2.2.8.C.1	Evaluate and simplify functions

### Functions

Topic	Standards	Skills
Modeling and Equation Solving	CC.2.2.HS.D.10	Numeric, Algebraic, and Graphical Models, Solving Equations
Functions and Their Properties	Identify characteristics of functions, find domain and range, CC.2.2.HS.C.1, CC.2.2.HS.C.2	Function definition and notation, domain and range, continuity, increasing/decreasing, asymptotes, symmetry, extrema, end behavior
Twelve Basic Functions	Graph and Transform Parent Graphs, evaluate and graph piecewise functions CC.2.2.HS.C.2	Graphs of basic functions, analyze functions graphically, evaluate and graph piecewise functions
Combining Functions	CC.2.2.HS.D.3	Operations on functions, composite functions
Inverse Functions	CC.2.2.HS.C.4	Find inverse functions
Transformations	CC.2.2.HS.C.4	Transform graphs of functions
Modeling with Functions	CC.2.2.HS.C.5	Write functions from formulas, graphs, data, verbal descriptions

## Polynomial, Power, and Rational Functions

Topic	Standards	Skills
Linear and Quadratic Functions	LO.2.1A (EK.2.1A1), CC.2.2.HS.C.5	Average rate of change, find the vertex of a parabola
Polynomial Functions of Higher Degree	CC.2.2.HS.D.4, LO.1.2B (EK.1.2B1)	End behavior, Zeros, Intermediate Value Theorem
Real Zeros of Polynomials	CC.2.2.HS.D.4	Polynomial Division, Rational Zeros Theorem
Rational Functions	Simplify Rational Expressions, CC.2.2.HS.D.7	Domain and Range, Transformations
Solving Equations	Solve equations graphically and algebraically, CC.2.2.HS.D.10	Solve equations graphically on the calculator

## Logarithmic and Exponential Functions

Topic	Standards	Skills
Exponential Functions	Understand and use (natural logs) and $e$ , transform parent graphs, graph exponential equations	Evaluate Exponential Functions, Graph and transform exponential functions, define $e$
Exponential Growth and Decay	LO3.5B (EK3.5B1)	Solve exponential growth and decay problems
Logarithmic Functions	Convert between log and exponential forms, graph logarithmic functions, understand and use natural logs	Define logs, convert between logs and exponentials, graph and transform logs, use natural logs
Properties of Logarithms	Use log laws to expand or simplify expressions	Expand and simplify expressions using log laws
Solve log and exponential equations	Solve log/exponential equations	Solve log and exponential equations

## Trigonometric Functions

Topic	Standards	Skills
Angle Measures	Convert between Radians and Degrees, CC.2.2.HS.C.7	Define Radians, convert between radians and degrees
Right Triangle Trigonometry	Use right triangles to define all 6 trig functions and use to solve problems, CC.2.2.HS.A.7	Define 6 trig functions as they relate to right triangles
Unit Circle	Use the unit circle and corresponding angles and points to solve problems, CC.2.2.HS.C.7	Find coterminal angles, positive and negative angle measures, unit circle angles and points
Graphs of Sine and Cosine	Graph all 6 trig functions	Graph and transform sin and cos
Graphs of tan, cot, sec, csc	Graph all 6 trig functions	Graph and transform the other trig functions
Inverse Trig Functions	Use inverse trig functions to solve problems	Define, use, and graph inverse sin, cos, and tan

Solve problems with trig	Use right triangles to solve problems, use inverse trig functions to solve problems	Solve word problems using right triangles, trig, and inverse trig
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### Analytic Trig

Topic	Standards	Skills
Trig Identities	Verify trigonometric identities	Simplify trig identities, solve equations using trig identities
Proving Trig identities	Verify trigonometric identities	Multiple strategies for proving trig identities
Sum and Difference Identities	Verify Trigonometric Identities, Use trig to solve problems	Recognize and use sum and difference formulas
Multiple-Angle Identities	Verify Trigonometric Identities, use trig to solve problems	Use double-angle and half-angle identities
Law of Sines	Use the Law of Sines to solve triangles	Solve triangles using the Law of Sines
Law of Cosines/Area of a triangle	Use the Law of Cosines and Heron's Formula to solve triangles and find area	Solve triangles using the Law of Cosines, Use new area formula and Heron's Formula to find area

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