

**Mathematics Standard
Catalina Foothills School District
High School: Precalculus**

Precalculus will extend and refine algebraic and trigonometric concepts introduced and developed in Algebra 2. The course emphasizes critical and creative thinking in its design for students who wish to further their advanced algebra skills. Precalculus is taught at a level and pace to prepare students for AP Calculus AB or college coursework in Calculus.

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise. Mathematical modeling is integrated throughout the Precalculus course by utilizing real world context.

Standards for Precalculus

NUMBER AND QUANTITY: The Complex Number System (N-CN)	
P.N-CN.A.3	Find the conjugate of a complex number; use conjugates to find the moduli and quotients of complex numbers.
P.N-CN.C.8	Extend polynomial identities to the complex numbers.
P.N-CN.C.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
ALGEBRA: Arithmetic with Polynomials and Rational Expressions (A-APR)	
P.A-APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
FUNCTIONS: Interpreting Functions (F-BF)	
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. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
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. d. Produce an invertible function from a non-invertible function by restricting the domain.
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: Trigonometric Functions (F-TF)	
P.F-TF.A.3	Know and apply the Remainder and Factor Theorem: For a polynomial $p(x)$ and a number a , the 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.A.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
P.F-TF.B.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
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.
P.F-TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
GEOMETRY: Similarity, Right Triangles, and Trigonometry (G-SRT)	
P.G-SRT.D.9	Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
P.G-SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
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).
GEOMETRY: Circles (G-C)	
P.G-C.A.4	Construct a tangent line from a point outside a given circle to the circle.
GEOMETRY: Expressing Geometric Properties with Equations (G-GPE)	
G-GPE.A.2	Derive the equation of a parabola given a focus and directrix.
G-GPE.A.3	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
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.