

## ALGEBRA II

Domain	Code	Standard Description	Essential Vocabulary
Arithmetic with Polynomials and Rational Expressions	HS-A.APR.3	Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.	
	HS-A.APR.7	Add, subtract, multiply, and divide rational expressions. Understand that rational expressions form a system comparable to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression.	closure
Creating Equations and Inequalities	HS-A.CED.2	Create equations in two or more variables to represent relationships between quantities. Graph equations on coordinate axes with appropriate labels and scales.	coordinate plane, scale
Reasoning with Equations and Inequalities	HS-A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	extraneous solutions
	HS-A.REI.4	Solve quadratic equations in one variable. a) Use the method of completing the square to transform any quadratic equation in $x$ into an equation of the form $(x - p)^2 = q$ that has the same solutions. (+) Derive the quadratic formula from this form. b) Solve quadratic equations by inspection (e.g., for $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers $a$ and $b$ .	completing the square, quadratic formula
Seeing Structure in Expressions	HS-A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Factor a quadratic expression to reveal the zeros of the function it defines. b) Complete the square in a quadratic expression to produce an equivalent expression. c) Use the properties of exponents to transform exponential expressions.	equivalent form, quadratic function, zero of a function, complete the square, maximum, minimum, vertex, exponent, exponential, rate of growth or decay

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MATHEMATICS  
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<b>Building Functions</b>	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. b) Combine standard function types using arithmetic operations. c) Compose functions.	composition of functions
	HS-F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula and convert between the two forms. Use sequences to model situations.	Sequence, recursive, explicit, arithmetic sequences, geometric sequences
	HS-F.BF.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ , $f(x + k)$ , $k f(x)$ , and $f(kx)$ , for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Recognize even and odd functions from their graphs.	transformation, even functions, odd functions
	HS-F.BF.4	Find inverse functions. a) Write an equation for the inverse given a function has an inverse. 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.	inverse function, independent variable, dependent variable, one-to-one function, invertible function
	HS-F.BF.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	logarithm



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Seeing Structure in Expressions	HS-F.IF.4	Use tables, graphs, verbal descriptions, and equations to interpret and sketch the key features of a function modeling the relationship between two quantities	Intercepts, relative maximum, relative minimum, end behavior, periodicity, symmetry
	HS-F.IF.7 b, c, e, f	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. <ul style="list-style-type: none"> <li>a) Graph linear and quadratic functions and show intercepts, maxima, and minima where appropriate.</li> <li><b>b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.</b></li> <li><b>c) Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.</b></li> <li>d) (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.</li> <li><b>e) Graph exponential and logarithmic functions, showing intercepts and end behavior.</b></li> <li><b>f) Graph <math>f(x) = \sin x</math> and <math>f(x) = \cos x</math> as representations of periodic phenomena.</b></li> <li>g) (+) Graph trigonometric functions, showing period, midline, phase shift and amplitude.</li> </ul>	square root function, cube root function, piecewise-defined function, step function, absolute value function, polynomial function, exponential function, logarithmic function, asymptote, period, midline, amplitude
	HS-F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. <ul style="list-style-type: none"> <li>a) Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.</li> <li>b) Use the properties of exponents to interpret expressions for exponential functions.</li> </ul>	exponential growth, exponential decay, extreme values
	HS-F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)	



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Trigonometric Functions	HS-F.TF.2	Extend right triangle trigonometry to the four quadrants. (+) Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle	reference triangle, radian
	HS-F.TF.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$ , $\pi/4$ and $\pi/6$ . (+) 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.	special triangles, reference triangle
Expressing Geometric Properties with Equations	HS-G.GPE.3	Identify key features of conic sections given their equations. Apply properties of conic sections in real world situations. *	center, radius, vertex, focus, directrix, major axis, minor axis, asymptotes
The Real Number System	HS-N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents	root index, radicand, radical
The Complex Number System	HS-N.CN.3	Use conjugates to find quotients of complex numbers.	conjugate
	HS-N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.	quadratic equation, complex solution



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Interpreting Categorical and Quantitative Data	HS-S.ID.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, or tables to estimate areas under the normal curve.	normal distribution
	HS-S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. <ul style="list-style-type: none"> <li>a) Fit a function to the data (with or without technology). Use functions fitted to data to solve problems in the context of the data.</li> <li>b) (+) Informally assess the fit of a function by plotting and analyzing residuals.</li> </ul>	scatter plot, residual: the observed value minus the predicted value. It is the difference of the results obtained by observation, and by computation from a formula, residual plot

