Algebra II					
	UNIT	**1**	**2**	**3**	**4**
N.RN.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 5 to be the cube root of 5 because we want 5 = 5 to hold, so 5 must equal 5.			X	
N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.			X	
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling. ALC for N.Q.2: This standard will be assessed in Algebra II by ensuring that some modeling tasks (involving Algebra II content or securely held content from previous grades and courses) require the student to create a quantity of interest in the situation being described (i.e., this is not provided in the task). For example, in a situation involving periodic phenomena, the student might autonomously decide that amplitude is a key variable in a situation, and then choose to work with peak amplitude.	X		X	X
N.CN.1	Know there is a complex number i such that $i = -1$, and every complex number has the form $a + bi$ with a and b real.	X			
N.CN.2	Use the relation $i = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	X			
N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.	X			
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x - y$ as $(x) - (y)$, thus recognizing it as a difference of squares that can be factored as $(x - y)(x + y)$. ALC for A.SSE.2: i) Tasks are limited to polynomial, rational, or exponential expressions. ii) Examples: see $x - y$ as $(x) - (y)$, thus recognizing it as a difference of squares that can be factored as $(x - y)(x + y)$. In the equation $x + 2x + 1 + y = 9$, see an opportunity to rewrite the first three terms as $(x + 1)$, thus recognizing the equation of a circle with radius 3 and center (□1, 0). See $(x + 4)/(x + 3)$ as $((x + 3) + 1)/(x + 3)$, thus recognizing an opportunity to write it as $1 + 1/(x + 3)$.	X			
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15 can be rewritten as (1.15/")" ≈ 1.012" to reveal the approximate equivalent monthly interest rate if the annual rate is 15% ALC for A.SSE.3c: i) Tasks have a real-world context. As described in the standard, there is an interplay between the mathematical structure of the expression and the structure of the situation such that choosing and producing an equivalent form of the expression reveals something about the situation. ii) Tasks are limited to exponential expressions with rational or real exponents.			X	
A.SSE.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.*			X	
A.APR.2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	X			
A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. ALC for A.APR.3: i) Tasks include quadratic, cubic, and quartic polynomials and polynomials for which factors are not provided. For example, find the zeros of $(x - 1)(x + 1)$	X			
A.APR.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x + y) = (x - y) + (2xy)$ can be used to generate Pythagorean triples.	X			
A.APR.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	X			
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. ALC for A.CED.1: i) Tasks are limited to exponential equations with rational or real exponents and rational functions. ii) Tasks have a real-world context.			X	
A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. ALC for A.REI.1: i) Tasks are limited to simple rational or radical equations.	X			
A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	X			
A.REI.4	Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x = 49$), 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. ALC for A.REI.4b: i) In the case of equations that have roots with nonzero imaginary parts, students write the solutions as $a \pm bi$ for real numbers a and b.	X			
A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. ALC for A.REI.6: i) Tasks are limited to 3x3 systems.	X			
A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x + y = 3$.	X			
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.* ALC for A.REI.11 i) Tasks may involve any of the function types mentioned in the standard.			X	
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n + 1) = f(n) + f(n - 1)$ for $n \geq 1$. ALC for F.IF.3: i) This standard is Supporting work in Algebra II. This standard should support the Major work in F-BF.2 for coherence.			X	
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; and periodicity.* ALC for F.IF.4: i) Tasks have a real-world context ii) Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions. Compare note (ii) with standard F-IF.7. The function types listed here are the same as those listed in the Algebra II column for standards F-IF.6 and F-IF.9.			X	
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.* ALC for F.IF.6: i) Tasks have a real-world context. ii) Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions. The function types listed here are the same as those listed in the Algebra II column for standards F-IF.4 and F-IF.9.			X	
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.* c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	X		X	
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions.			X	
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically 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. ALC for F.IF.9: i) Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions. The function types listed here are the same as those listed in the Algebra II column for standards F-IF.4 and F-IF.6.			X	
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. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. ALC for F.BF.1a: i) Tasks have a real-world context ii) Tasks may involve linear functions, quadratic functions, and exponential functions.			X	

F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*			X	
F.BF.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\ f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. ALC for F.BF.3: i) Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions ii) Tasks may involve recognizing even and odd functions. The function types listed in note (i) are the same as those listed in the Algebra II column for standards F-IF.4, F-IF.6, and FIF.9.			X	
F.BF.4a	Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2\ x$ or $f(x) = (x + 1)/(x - 1)$ for $x \neq 1$.			X	
F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ALC for F.LE.2: i) Tasks will include solving multi-step problems by constructing linear and exponential functions.			X	
F.LE.4	For exponential models, express as a logarithm the solution to $ab'' = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.			X	
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context. ALC for F.LE.5: i) Tasks have a real-world context. ii) Tasks are limited to exponential functions with domains not in the integers.			X	
F.TF.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.		X		
F.TF.2	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.		X		
F.TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*		X		
F.TF.8	Prove the Pythagorean identity $sin(\theta) + cos(\theta) = 1$ and use it to find $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ given $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ and the quadrant of the angle.		X		
G.GPE.2	Derive the equation of a parabola given a focus and directrix.	X			
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, and tables to estimate areas under the normal curve.				X
S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. ALC for S.ID.6a: i) Tasks have a real-world context. ii) Tasks are limited to exponential functions with domains not in the integers and trigonometric functions.				X
S.IC.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.				X
S.IC.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?				X
S.IC.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.				X
S.IC.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.				X
S.IC.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.				X
S.IC.6	Evaluate reports based on data.				X
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).				X
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.				X
S.CP.3	Understand the conditional probability of A given B as $P(A\ and\ B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.				X
S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.				X
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.				X
S.CP.6	Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.				X
S.CP.7	Apply the Addition Rule, $P(A\ or\ B) = P(A) + P(B) - P(A\ and\ B)$, and interpret the answer in terms of the model.				X