NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Number and Quantity **The Real Number System (N-RN)**				
		Standard Code	**Standard**	**Additional Clarifications/Examples**
Cluster	A. Extend the properties of exponents to rational exponents.	**N-RN.A.1**	Explore how the meaning of rational exponents follows from extending the properties of integer exponents.	e.g., we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $5^{(1/3)3}$ must equal 5.
		N-RN.A.2	Convert between radical expressions and expressions with rational exponents using the properties of exponents.	Note: All radical expressions involving variables assume the variables are representing positive numbers. Includes expressions with variable factors, such as $\sqrt[3]{27x^5y^3}$, being equivalent to $(27x^5y^3)^{1/3}$ which equals $3x^{5/3}y$.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Number and Quantity **The Complex Number System (N-CN)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Perform arithmetic operations with complex numbers.	**N-CN.A.1**	1. Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form a + b*i* with a and b real.	
		N-CN.A.2	2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	Note: Tasks include simplifying powers of *i*.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra **Seeing Structure in Expressions (A-SSE)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Interpret the structure of expressions.	**A-SSE.A.2**	2. Recognize and use the structure of an expression to identify ways to rewrite it. (Shared standard with Algebra I)	Notes: Includes factoring by grouping and factoring the sum and difference of cubes. Tasks are limited to polynomial, rational or exponential expressions. Quadratic expressions include leading coefficients other than 1. e.g., a) $81x^4 - 16y^4$ is equivalent to $(9x^2)^2 - (4y^2)^2$ or $(9x^2 - 4y^2)(9x^2 + 4y^2)$ or $(3x + 2y)(3x - 2y)(9x^2 + 4y^2)$ b) $\frac{x^2+4}{x^2+3}$ is equivalent to $\frac{(x^2+3)+1}{x^2+3} = \frac{x^2+3}{x^2+3} + \left(\frac{1}{x^2+3}\right) = 1 + \frac{1}{x^2+3}$ c) $x^4+6x^2-7=(x^2-1)(x^2+7)=(x+1)(x-1)(x^2+7)$ This standard is a fluency expectation for Algebra II. The ability to see structure in expressions and to use this structure to rewrite expressions is a key skill in everything from advanced factoring (e.g., grouping) to summing series, to rewriting of rational expressions, to examining the end behavior of the corresponding rational function. For more guidance, see Fluency in the Glossary of Verbs Associated with the New York State Math Standards.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra Seeing Structure in Expressions (A-SSE)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
	B. Write expressions in equivalent forms to reveal their characteristics. ★	**A-SSE.B.3**	3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (Shared standard with Algebra I)	
		A-SSE.B.3a	3a. Factor quadratic expressions including leading coefficients other than 1 to reveal the zeros of the function it defines.	Note: This standard extends work done in Algebra I (A-SSE.A.2 and F-IF.C.8a).
		A-SSE.B.3c	c. Use the properties of exponents to rewrite exponential expressions. (Shared standard with Algebra I)	Note: Tasks involve rewriting exponential expressions whose coefficients in the exponent will be rational.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra Arithmetic with Polynomials and Rational Expressions (A-APR)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Understand the relationship between zeros and factors of polynomials.	**A-APR.B.2**	2. ~~A~~pply 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).	
		A-APR.B.3	3. Identify zeros of polynomials when suitable factorizations are available. (Shared standard with Algebra I)	This standard connects with work in standards A-REI.B.4b, F.IF.B.4, F.IF.C.7c and F.IF.C.8a.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra Arithmetic with Polynomials and Rational Expressions (A-APR)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	C. Rewrite rational expressions.	**A-APR.D.6**	6. Rewrite 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).	Note: This standard is a fluency expectation for Algebra II. This standard sets an expectation that students will divide polynomials with remainders by inspection in simple cases. For example, one can view the rational expression $\frac{x+4}{x+3}$ as $\frac{(x+3)+1}{(x+3)}$ which is $1+\frac{1}{x+3}$. For more guidance, see Fluency in the Glossary of Verbs Associated with the New York State Math Standards.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra Creating Equations (A-CED) ★				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Create equations that describe numbers or relationships. ★	**A-CED.A.1**	1. Create equations and inequalities in one variable to represent a real-world context. (Shared standard with Algebra I)	Note: This standard is about creating an equation/inequality and developing the model. Tasks include linear, quadratic, rational, and exponential functions.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra Reasoning with Equations and Inequalities (A-REI)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Understand solving equations as a process of reasoning and explain the reasoning.	**A-REI.A.1b**	1b. Explain each step when solving rational or radical equations 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. (Shared standard with Algebra I)	
		A-REI.A.2	2. Solve rational and radical equations in one variable, identify extraneous solutions, and explain how they arise.	Note: Radical equations may include but are not limited to those of the form $x^{\frac{3}{5}}= 8$ and $3x^{\frac{3}{4}} + 5=86$.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra **Reasoning with Equations and Inequalities (A-REI)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Solve equations and inequalities in one variable.	**A-REI.B.4**	4. Solve quadratic equations in one variable. (Shared standard with Algebra I)	Note: Solutions may include simplifying radicals.
		A-REI.B.4b	4b. Solve quadratic equations by: i) inspection; ii) taking square roots; iii) factoring; iv) completing the square; v) the quadratic formula and vi) graphing Write complex solutions in a+bi form. (Shared standard with Algebra I)	Note: i) An example for inspection: $x^2 = -81$, where a student should know that the solutions would include $\pm$ 9i. iv) An example where students need to factor out a leading coefficient while completing the square, such as $4x^2+8x-9=0$ vi) The method of solving graphically shows the relationship between the zeros of a quadratic function and its graph; see standards A-APR.B.3, F-IF.B.4, F-IF.C.7c and F-IF.C.8. Students should use technology where appropriate.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra **Reasoning with Equations and Inequalities (A-REI)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	C. Solve systems of equations.	**A-REI.C.7b**	7b. Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. (Shared standard with Algebra I)	Note: Conics are limited to parabolas and circles. e.g., find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Algebra **Reasoning with Equations and Inequalities (A-REI)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	D. Represent and solve equations and inequalities graphically.	**A-REI.D.11**	11. Given the equations y=f(x) and y=g(x): i) recognize that each x-coordinate of the intersection(s) is the solution to the equation f(x)=g(x); and ii) find the solutions approximately using technology to graph the functions or make tables of values; and iii) interpret the solution in context. ★ iv.) find the solution of f(x)<g(x) or f(x)≤g(x) graphically (Shared standard with Algebra I)	Note: Tasks include cases where f(x) and/or g(x) are linear, polynomial, absolute value, square root, cube root, trigonometric, exponential, and logarithmic functions.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions **Interpreting Functions (F-IF)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Understand the concept of a function and use function notation.	**F-IF.A.3**	3. Recognize that a sequence is a function whose domain is a subset of the integers. (Shared standard with Algebra I)	Notes: In Algebra II, sequences will be defined/written recursively and explicitly in subscript notation. This standard is a fluency expectation for Algebra II. Fluency in translating between recursive definitions and closed forms is helpful when dealing with many problems involving sequences and series, with applications ranging from fitting functions to tables to problems in finance. For more guidance, see Fluency in the Glossary of Verbs Associated with the New York State Math Standards.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions **Interpreting Functions (F-IF)**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Interpret functions that arise in applications in terms of the context. ★	**F-IF.B.4**	4b. For a function that models a relationship between two quantities: i) interpret key features of graphs and tables in terms of the quantities; and ii) sketch graphs showing key features given a verbal description of the relationship. (Shared standard with Algebra I)	Note: Algebra II key features include: intercepts, zeros; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior; and periodicity. Tasks may involve real-world context and may include polynomial, square root, cube root, exponential, logarithmic, and trigonometric functions.
		F-IF.B.6	6b. Calculate and interpret the average rate of change of a function over a specified interval. (Shared standard with Algebra I)	Note: Algebra II tasks have a real-world context and may involve polynomial, square root, cube root, exponential, logarithmic, and trigonometric functions.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Interpreting Functions (F-IF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	C. Analyze functions using different representations.	**F-IF.C.7**	7. Graph functions and show key features of the graph by hand and using technology when appropriate. ★	
		F-IF.C.7c	7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
		F-IF.C.7e	7e. Graph cube root, exponential and logarithmic functions, showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Interpreting Functions (F-IF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	C. Analyze functions using different representations.	**F-IF.C.8**	8. Write a function in different but equivalent forms to reveal and explain different properties of the function. (Shared standard with Algebra I)	
		F-IF.C.8b	8b. Use the properties of exponents to interpret exponential functions, and classify them as representing exponential growth or decay.	Note: Tasks also include real world problems involving compound ($A=P(1+(r/n))^{nt}$) and continuous compounding ($A=Pe^{rt}$) .
		F-IF.C.9	9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (Shared standard with Algebra I)	Note: Tasks may involve polynomial, square root, cube root, exponential, logarithmic and trigonometric functions.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Building Functions (F-BF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Build a function that models a relationship between two quantities. ★	**F-BF.A.1**	1. Write a function that describes a relationship between two quantities. (Shared standard with Algebra I)	
		F-BF.A.1a	1a. Determine a function from context. Determine an explicit expression, a recursive process, or steps for calculation from a context. (Shared standard with Algebra I)	Note: Tasks may involve linear functions, quadratic functions, and exponential functions.
		F-BF.A.1b	1b. Combine standard function types using arithmetic operations.	e.g., 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.
		F-BF.A.2	2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	Note: In Algebra II, sequences will be defined/written recursively and explicitly in subscript notation.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Building Functions (F-BF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Build new functions from existing functions.	**F-BF.B.3b**	3b. Using f(x) + k, k f(x), f(kx) and f(x + k): i) Identify the effect on the graph when 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); ii) Find the value of k given the graphs; iii) Write a new function using the value of k; and iv) Use technology to experiment with cases and explore the effects on the graph. Include recognizing even and odd functions from their graphs. (Shared standard with Algebra I)	Note: Algebra II tasks may involve polynomial, square root, cube root, exponential, logarithmic, and trigonometric functions.
		F-BF.B.4	4. Find inverse functions.	
		F-BF.B.4a	4a. Find the inverse of a one-to-one function both algebraically and graphically.	
		F.BF.B.5a	5a. Understand inverse relationships between exponents and logarithms algebraically and graphically.	Note: This additional standard connects to solving exponential equations using logs in F-LE.A.4.

		F-BF.B.6	6. Represent and evaluate the sum of a finite arithmetic or finite geometric series, using summation (sigma) notation.	
		F-BF.B.7	7. Explore the derivation of the formulas for finite arithmetic and finite geometric series. Use the formulas to solve problems. ★	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions **Linear, Quadratic and Exponential Models (F-LE) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Construct and compare linear, quadratic, and exponential models and solve problems.	**F-LE.A.2**	2. Construct a linear or exponential function symbolically given: i) a graph; ii) a description of the relationship; iii) two input-output pairs (include reading these from a table). (Shared standard with Algebra I)	
		F-LE.A.4	4. Use logarithms to solve exponential equations, such as $ab^{ct} = d$ (where a, b, c, and d are real numbers and $b > 0$) and evaluate the logarithm using technology.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions **Linear, Quadratic and Exponential Models (F-LE) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Interpret expressions for functions in terms of the situation they model.	**F-LE.B.5**	5. Interpret the parameters in a linear or exponential function in terms of a context. (Shared standard with Algebra I)	Note: Algebra II tasks have a real-world context and exponential functions are not limited to integer domains.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Trigonometric Functions (F-TF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Extend the domain of trigonometric functions using the unit circle.	**F-TF.A.1**	1a. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 1b. Using proportionality, find one of the following given two others; the central angle, arc length, radius or area of sector.	Note: Radian measure is no longer an expectation of Geometry.
		F-TF.A.2	2. Apply concepts of the unit circle in the coordinate plane to calculate the values of the six trigonometric functions given angles in radian measure.	
		F-TF.A.4	4. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	Note: Focus of this standard is on cos (x), sin (x) and tan (x).

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Trigonometric Functions (F-TF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Model periodic phenomena with trigonometric functions. ★	**F-TF.B.5**	5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, phase shift, and midline.	Note: Standard is connected to work done with F-BF.B.3b, y=A sin(ω(x-h))+k, with the focus being on sin(x) and cos(x).

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Functions Trigonometric Functions (F-TF)				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	C. Prove and apply trigonometric identities.	**F-TF.C.8**	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$. Find the value of any of the six trigonometric functions given any other trigonometric function value and when necessary find the quadrant of the angle.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ **Interpreting categorical and quantitative data (S-ID) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Summarize, represent, and interpret data on a single count or measurement variable.	**S-ID.A.4**	4a. Recognize whether or not a normal curve is appropriate for a given data set. 4b. If appropriate, determine population percentages using a graphing calculator for an appropriate normal curve.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ **Interpreting categorical and quantitative data (S-ID) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Summarize, represent, and interpret data on two categorical and quantitative variables.	**S-ID.B.6**	6. Represent bivariate data on a scatter plot, and describe how the variables' values are related.	Note: It's important to keep in mind that the data must be linked to the same "subjects", not just two unrelated quantitative variables; being careful not to assume a relationship between the actual variables (correlation/causation issue).
		S-ID.B.6a	6a. Fit a function to real-world data; use functions fitted to data to solve problems in the context of the data. (Shared standard with Algebra I)	Note: Algebra II emphasis is on quadratic, exponential and power models and includes the regression capabilities of the calculator.

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ **Making Inferences and Justifying Conclusions (S-IC) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Understand and evaluate random processes underlying statistical experiments.	**S-IC.A.2**	2. Determine if a value for a sample proportion or sample mean is likely to occur based on a given simulation.	Note: For the purposes of this course, if the statistic falls within two standard deviations of the mean (95% interval centered on the population parameter), then the statistic is considered likely (plausible, usual).

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ **Making Inferences and Justifying Conclusions (S-IC) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Make inferences and justify conclusions from sample surveys, experiments, and observational studies.	**S-IC.B.3**	3. Recognize the purposes of and differences among surveys, experiments, and observational studies. Explain how randomization relates to each.	
		S-IC.B.4	4. Given a simulation model based on a sample proportion or mean, construct the 95% interval centered on the statistic (+/- two standard deviations) and determine if a suggested parameter is plausible.	
		S-IC.B.6	6a. Use the tools of statistics to draw conclusions from numerical summaries. 6b. Use the language of statistics to critique claims from informational texts. For example, causation vs correlation, bias, measures of center and spread.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ **Conditional Probability and the Rules of Probability (S-CP) ★**				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	A. Understand independence and conditional probability and use them to interpret data.	**S-CP.A.1**	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").	
		S-CP.A.4	4. 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 calculate conditional probabilities.	

NYS Algebra II Mathematics Learning Standards (Revised 2017)				
Statistics and Probability ★ Conditional Probability and the Rules of Probability (S-CP) ★				
		Standard Code	**Standard**	**Additional Clarification/Examples**
Cluster	B. Use the rules of probability to compute probabilities of compound events in a uniform probability model.	**S-CP.B.7**	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.	