



# GREAT NECK PUBLIC SCHOOLS

*"Where Discovery Leads to Greatness"*

*#DiscoverGreatness*

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## Curriculum Profile: Algebra 2.1

<u>Department</u>	Mathematics	
<u>Course Name</u>	Algebra 2.1	
<u>Course Length</u>	1 Year	
<u>High School Credits</u>	1	
<u>Description</u>	<p>Algebra 2 is designed for students who successfully completed Algebra 1 and Geometry. It is the third year in the NYS "Story of Functions" curriculum. The focus of this course is built on their work with linear, quadratic, and exponential functions in Algebra 1, and extend their repertoire of functions to include polynomial, rational, radical, and trigonometric functions. Students work closely with the expressions that define the functions and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers, and solving exponential equations using the properties of logarithms. Students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. They identify different ways of collecting data, including sample surveys, observational studies, and experiments. Using simulation, randomization, and careful design, students make inferences, justify conclusions, and critique statistical claims. Students create theoretical and experimental probability models following the modeling cycle. They compute and interpret probabilities from those models for compound events, attending to mutually exclusive events, independent events, and conditional probability. The content from the NYS Algebra 2 curriculum will be covered in depth and with enrichment. Regents exam required after the first semester of Algebra 2.2 in the following year.</p>	
<u>Target/eligible students</u>		
<u>State Learning Standards Link(s)</u>	<a href="#">New York State Next Generation Mathematics Learning Standards</a>	
<u>Primary texts and materials</u>	<a href="https://www.engageny.org">https://www.engageny.org</a>	
	<ul style="list-style-type: none"> <li>● Overview /Standards</li> </ul>	
<u>Unit 1: Basic Functions</u>	<ul style="list-style-type: none"> <li>● AII-A.CED.1</li> <li>● AII-F.IF.3</li> <li>● AII-F.IF.4b</li> <li>● AII-F.IF.6</li> <li>● AII-F.BF.1a</li> <li>● AII-F.BF.3b</li> </ul>	<p>Recognition and understanding of function notation and how it applies in contextual situations. Composition of functions will be explored. Transformations of functions: vertical scaling, horizontal scaling, vertical translations and horizontal translations. Identifying the domain and range of a function given its graph. Identifying the dependent and independent variables in a contextual situation. Understanding the concept of odd and even functions and being able to determine whether a function is odd, even or neither based on its function rule or its graph. Calculating an average rate of change between two variables, and understanding of what the average rate of change describes in a contextual situation.</p>
<u>Unit 2: Polynomial Functions</u>	<ul style="list-style-type: none"> <li>● AII-A.SSE.3a</li> <li>● AII-A.APR.2</li> <li>● AII-A.APR.3</li> <li>● AII-A.REI.4b</li> <li>● AII-A.REI.11</li> </ul>	<p>Identifying the degree of a function given its function rule. Understanding the differences in the general trends of polynomial functions of various degrees and using these trends to identify the end behaviors of the function.</p> <ul style="list-style-type: none"> <li>● Linear functions – writing a rule for a linear function given a point and slope or two points on the function.</li> </ul>

	<ul style="list-style-type: none"> <li>● AII.F.IF.7</li> </ul>	<ul style="list-style-type: none"> <li>● Quadratic functions – identifying the coordinates of the vertex, the equation of the axis of symmetry and the domain and range of quadratic functions. Calculating the zeros of a quadratic function when the function is represented in its various forms. Identifying when a quadratic function has positive/negative outputs. Factoring quadratic expressions. Solving quadratic equations/finding the zeros of quadratic functions by completing the square, factoring or using the quadratic formula.</li> <li>● Polynomial functions of higher degrees – Finding the zeros of polynomial functions expressed in factored form. Using division of polynomials to find zeros of polynomial functions of higher degrees given one or multiple zeros of the function. Identifying when polynomial functions of higher degrees have positive/negative outputs.</li> </ul>
<u>Unit 3: Complex Numbers</u>	<ul style="list-style-type: none"> <li>● AII-N.CN1</li> <li>● AII-N.CN2</li> </ul>	Introduction of the imaginary number $i$ . Understanding of the various powers of $i$ . Simplifying radicals with negative radicands. Representing complex numbers as vectors on a two-dimensional plane. Quantifying the magnitude/absolute value of a complex number. Addition, subtraction and multiplication of complex numbers and the effect these operations have on complex numbers. Finding zeros of polynomial functions with complex zeros and understanding the difference between zeros of a function and x-intercepts of a function. Understanding of the fundamental theorem of algebra.
<u>Unit 4: Rational Functions</u>	<ul style="list-style-type: none"> <li>● AII-A-APR.6</li> </ul>	Using division of polynomials to express a rational function as a polynomial function with a remainder. Recognition of the remainder theorem and how it applies to the given function at a specific input. Being able to state the domain of rational functions. Simplifying rational expressions using factoring. Adding, subtracting, multiplying and dividing rational expressions. Solving rational equations. Identifying extraneous solutions that occur with some rational equations.
<u>Unit 5: Root Functions</u>	<ul style="list-style-type: none"> <li>● AII-A.REI.1b</li> <li>● AII.F.BF.4b</li> </ul>	Recognition of functions with various roots (square root, cube root, 4 <sup>th</sup> root, etc.) as the inverse of power functions. Concept of a composition of inverse functions to attain the identity function and using this concept to solve equations. Being able to write the rule for an inverse function of a given function and representing this function using $f^{-1}$ notation. Stating the domain and range of root functions. Solving square root equations and identifying extraneous solutions when they occur. Solving cube root equations and root equations of other degrees.
<u>Unit 6: System of Equations</u>	<ul style="list-style-type: none"> <li>● AII-A.REI.7b</li> </ul>	Understanding of what solutions to system of equations represent. Finding solutions to systems of equations with two variables involving linear function, quadratic functions, circles, or polynomial functions of higher degrees. Finding the solutions to systems of equations of three variables.
<u>Unit 7: Exponential Functions and Logarithmic Functions</u>	<ul style="list-style-type: none"> <li>● AII-N.RN</li> <li>● AII-A-SSE.2</li> <li>● AII-A-SSE.3c</li> <li>● AII.F.BF.5b</li> </ul>	Understanding of the properties of exponents and using these laws to represent operations with these laws in an equivalent manner. Convert between radical expressions with rational exponents using the properties of exponents. Understanding inverse relationships between exponents and logarithms algebraically and graphically. Writing a rule for an exponential function given two points on the exponential function. Writing rules of exponential functions in contextual situations. Writing a rule for exponential functions that compound within each cycle. Writing rules for exponential functions that compound continuously within each cycle. Understanding of logarithmic functions as the inverse of exponential functions. Solving exponential equations algebraically by expressing the equation in its equivalent logarithmic form. Solving basic logarithmic equations by expressing the equation in its equivalent exponential form. Using the three properties of logarithms to express logarithmic expressions in an equivalent form. Using the properties of logarithms to express a logarithmic equation into its basic form in order to solve a logarithmic equation. Solving logarithmic equations with logarithms on both sides of the equation. Using the change of base formula to express a logarithm in an equivalent manner. Understanding of the graphs of exponential and logarithmic functions, the domain and range of these functions, and the equations of the asymptotes of these functions.
<u>Unit 8: Trigonometric Functions*</u>	<ul style="list-style-type: none"> <li>● AII-F.TF.2</li> <li>● AII-F.TF.4</li> <li>● AII-F.TF.8</li> </ul>	Understanding of the six trigonometric ratios. Representing an angle drawn in standard position and approximating the six trigonometric values of an angle based on where the angle terminates. Understanding of reference angles and how two angles with the same reference angle compare to one another. Using the ratios in the 30-60-90 right triangle and the 45-45-90 to find the exact values of the six trigonometric functions whose reference angles are 30, 45 or 60 degrees. Finding

		the six trigonometric values of quadrantal angles. Understanding of radians as a real number representation of an angle measurement. Being able to convert between degrees and radians. Finding the exact values of the six trigonometric functions at angles expressed as radian measurements. Understanding of the unit circle and how it can be used to better understand basic trigonometry. Graphing sinusoidal functions after performing transformations on parent sine and cosine functions. Being able to write an equation of a sinusoidal function based on the graph of the function or given specific information about the function. Basic understanding of the graphs of the tangent, cosecant, secant and cotangent functions. Understanding of basic trigonometric identities and Pythagorean identities. Being able to use Pythagorean identities to find trigonometric values based on a given other trigonometric value. Verifying basic trigonometric identities and simplifying basic trigonometric expressions.
<u>Additional Notes</u>	Sequencing of topics may vary. * denotes that this unit may not be completed in its entirety and will be finished in the next course.	