

**Southington Public Schools
Curriculum Map**

Subject: Algebra II

Grade: 10 or 11

UNIT TITLE	Equations, Inequalities & the Number System	Linear & Absolute Value Functions	Quadratic Functions
CONTENT	<ul style="list-style-type: none"> • Simplify algebraic expressions using properties and order of operations • Solve linear equations and inequalities 	<ul style="list-style-type: none"> • Solve systems of equations and inequalities of two or more variables using a variety of techniques • Solve word problems involving systems 	<ul style="list-style-type: none"> • Understand, apply, and solve quadratic equations
STATE STANDARDS	<p>1.1.a(9-12E). Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions. <i>(2) Analyze essential relations in a problem to determine possible functions that could model the situation.</i></p> <p>1.2.a(9-12E). Relate the behavior of functions and relations to specific parameters and determine functions to model real world situations. <i>(1) Relate the graphical representation of a function to its function family and find equations, intercepts, maximum or minimum values, asymptotes and line of symmetry for that function.</i> <i>(2) Recognize the effect of changes in parameters on the graphs of functions or relations.</i></p> <p>1.3a(9-12E). Use and extend algebraic concepts to include real and complex numbers, vectors, and matrices <i>1) Determine equivalent representations of an algebraic equation or inequality to simplify and solve problems.</i></p>	<p>1.1 a(9-12e). Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions <i>(6) Understand and use optimization strategies including linear programming</i></p> <p>1.3 a (9-12c). Manipulate equations, inequalities, and functions to solve problems <i>(1) Model and solve problems with linear, quadratic, and absolute value equations; and linear inequalities.</i> <i>(2) Determine equivalent representations of an algebraic equation or inequality to simplify and solve problems.</i> <i>(3) Solve systems of two linear equations using algebraic or graphical methods</i></p>	<p>1.1.a.(9-12E) Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions. <i>1) Describe and compare properties and classes of functions including (exponential,) polynomial, (rational, logarithmic and trigonometric).</i> <i>(2) Analyze essential relations in a problem to determine possible functions that could model the situation.</i></p> <p>1.2.a.(9-12E) Relate the behavior of functions and relations to specific parameters and determine functions to model real world situations. <i>(1) Relate the graphical representation of a function to its function family and find equations, intercepts, maximum or minimum values, asymptotes and line of symmetry for that function.</i></p>

	<p>2.1a(9-12E). Extend the understanding of number to include the set of complex numbers.</p> <p><i>(1) Compare and contrast the properties of numbers and number systems including rational, real (and complex) numbers.</i></p> <p><i>(3) Justify mathematical procedures and determine how they apply to invented operations using field properties (closure, associative, commutative, distributive, identity, and inverse).</i></p> <p>4.2a(9-12E). Describe and analyze sets of data using statistical models</p> <p><i>(1) Determine statistical measures to describe univariate data.</i></p>		
ASSESSMENT	<p><u>PERFORMANCE TASK</u></p> <p>Give Me a Hand or Leaf Me Alone You are a biomedical scientist that must design a formula for measuring irregularly shaped objects. Your product should include the formula that you've developed, and any work that supports your conclusions.</p>	<p><u>PERFORMANCE TASK</u></p> <p>The Pike Bike Company, a small manufacturing company, makes two types of bikes – regular 10 speed and deluxe 18 speed. The company can sell no more than 30 regular bikes and no more than 15 deluxe bikes per day. Frames for the bikes are made by machine. Each regular bike requires 1 hour of machine time, while each deluxe bike requires 2 hours. The company has 5 machines, each of which can be operated for 8 hours a day. The profit on a regular 10 speed is \$60, while the profit on a deluxe 18 speed is \$80. The president of the Pike Bike Co. wants to know how many bikes of each type should be made each day in order to make the total profits as large as possible.</p>	<p><u>PERFORMANCE TASK</u></p> <p><u>Summary of project:</u> Students build a quadratic to model to related situations regarding the area of a garden to be constructed. One situation requires the student to use roots to solve, the other requires finding a maximum area. Students are to describe and discuss how they built the quadratic and what the solution means in terms of the original situation.</p> <p>Also, students are to write two equations, one of which will have two real roots and one that will have no real roots. Again, students describe how they built the equation. This requires that the student understand all of the components of the equation and how they relate to the physical characteristics of the parabola.</p>

	<p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Quiz on Formulas and Number System • Mean Salaries Performance Task from <u>A Collection of Performance Tasks and Rubrics: High School Mathematics</u> pp. 147-149 (see attached) • Quiz on Absolute Value Equations • Quiz on Inequalities • Quiz on slope/equation of line • Quiz on Measures of Central Tendency • Homework • Teacher Observation 	<p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Performance Task: graphing and linear programming • Quiz: Substitution and Elimination • Quiz: Matrix Operations/Inverse Matrix • Unit 3 Alternative Assessment and Math Journal (TM p. 150H) • Homework • Teacher observation/class participation 	<p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Performance Task • Quiz: Graphing functions and identifying roots, vertex, axis of symmetry • Quiz: Completing the square • Quiz: Using quadratic formula • Quiz: Transformations/fitting data points • Quiz: Word problems • Alternative Assessment and Math Journal Ch. 4
<p>SKILLS</p>	<ul style="list-style-type: none"> • Use order of operations to evaluate expressions • Determine the sets of numbers to which a given number belongs • Use properties of real numbers to simplify expressions • Find and use mean, median, mode and range to interpret data • Translate verbal expressions and sentences into algebraic expressions and equations • Solve equations using properties of equality and solve for a specific variable • Solve equations containing absolute value • Solve inequalities • Graph a relation, state its domain & range, and determine if it's a functions. • Identify and graph linear functions. • Identify intercepts and use to graph a function. • Determine when lines are parallel or perpendicular 	<ul style="list-style-type: none"> • Solve systems of equations in two variables by graphing, substitution, and elimination. • Solve systems of inequalities in two variables by graphing. • Solve systems of equations in three variables by elimination • Identify matrix size. • Create matrices to represent a system of equations. • Perform matrix operations – addition, subtraction, scalar multiplication, multiplication manually • Perform matrix operations – addition, subtraction, scalar multiplication, multiplication, solving systems, using TI-83. • Solve systems of equations in three variables by matrix operation. • Write a system of equations in two or three variables to represent a given problem or situation. • Write a system of inequalities to represent a given problem or situation. • Use linear programming to solve 	<ul style="list-style-type: none"> • Graph quadratic functions in standard form • Graph quadratic functions in vertex/intercept form • Solve and analyze quadratic equations by factoring, completing the square, using quadratic formula • Write an equation based on given data from a table and/or graph • Write an equation based on a situation that is best suited to a quadratic function.

	<ul style="list-style-type: none">• Given information about their slopes• Find and use prediction equations• Identify and graph absolute value functions• Solve problems by identifying and using a pattern(family of linear and absolute value graphs)• Draw graphs of inequalities in two variables.	problems given certain constraints.	
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Subject: Algebra II

Grade: 10 or 11

UNIT TITLE	Other Polynomial Functions	Rational Equations & Functions	Exponential Functions
CONTENT	<ul style="list-style-type: none"> • Understand, apply and solve higher order degree function using a variety of formats • Identify major parts of a polynomial function 	<ul style="list-style-type: none"> • Apply and solve rational equations and identify parts of its graph 	<ul style="list-style-type: none"> • Evaluate, solve and graph exponential and logarithmic expressions and equations
STATE STANDARDS	<p>1.1.a.(9-12E) Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions. <i>(1) Describe and compare properties and classes of functions including (exponential, polynomial, (rational, logarithmic and trigonometric).</i> <i>(2) Analyze essential relations in a problem to determine possible functions that could model the situation.</i></p> <p>1.2.a.(9-12E) Relate the behavior of functions and relations to specific parameters and determine functions to model real world situations. <i>1) Relate the graphical representation of a function to its function family and find equations, intercepts, maximum or minimum values, asymptotes and line of symmetry for that function.</i> <i>(2) Recognize the effect of changes in parameters on the graphs of functions or relations.</i></p> <p>1.3.a.(9-12E) Use and extend algebraic concepts to include real and complex numbers, vectors, and matrices.</p>	<p>1.1.a.(9-12E) Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions. <i>(1) Describe and compare properties and classes of functions including (exponential, polynomial,) rational, (logarithmic and trigonometric).</i> <i>(2) Analyze essential relations in a problem to determine possible functions that could model the situation.</i></p> <p>1.2.a.(9-12E) Relate the behavior of functions and relations to specific parameters and determine functions to model real world situations. <i>(1) Relate the graphical representation of a function to its function family and find equations, intercepts, maximum or minimum values, asymptotes and line of symmetry for that function.</i> <i>(2) Recognize the effect of changes in parameters on the graphs of functions or relations.</i></p>	<p>1.1.a.(9-12E) Model real world situations and make generalizations about mathematical relationships using a variety of patterns and functions. <i>(1) Describe and compare properties and classes of functions including exponential, polynomial, rational, logarithmic and trigonometric.</i> <i>(2) Analyze essential relations in a problem to determine possible functions that could model the situation.</i> <i>(4) Solve problems involving financial applications including compound interest, amortization of loans, and investments.</i></p> <p>1.2.a.(9-12E) Relate the behavior of functions and relations to specific parameters and determine functions to model real world situations. <i>(1) Relate the graphical representation of a function to its function family and find equations, intercepts, maximum or minimum values, asymptotes and line of symmetry for that function.</i> <i>(2) Recognize the effect of changes in parameters on the graphs of functions or relations.</i></p> <p>1.3a (9-12e) Use and extend algebraic</p>

	<p><i>(2) Combine, compose, and invert functions.</i></p>		<p>concepts to include real and complex numbers, vectors, and matrices <i>(2) Use logarithms, vectors and matrices to solve problems.</i></p> <p>2.2a (9-12e) Investigate mathematical properties and operations related to objects that are not numbers <i>(3) Perform operations with complex numbers, matrices, determinants, and logarithms</i></p> <p>4.1 a (9-12c) Create the appropriate visual or graphical representation of real data. <i>(1) Collect real data and create meaningful graphical representations of the data.</i> <i>(2) Develop, use, and explain applications and limitations of linear and non-linear models and regression in a variety of contexts</i></p>
<p>ASSESSMENT</p>	<p><u>PERFORMANCE TASK</u></p> <p>Grunion Tracking Activity You are a packaging engineer hired to design a rectangular prism which will hold a given volume. Your final product should include a 2-dimensional sketch of your package with dimensions included and work that supports your conclusions.</p> <p>You are a marine biologist charged with the task of analyzing the ocean tides so as to determine the appropriate time to rope of the beach to protect marine life. You must support your work with a graph of a polynomial function that models the ocean tides.</p> <p>As a teacher of an Algebra II Math class, you must create problems that will be assigned to your students. Your final</p>	<p><u>PERFORMANCE TASK</u></p> <p>You are part of the Institute of Oceanography in New York that has decided to do some research of the Kenosha shipwreck. Before you can begin your dive, you must first plan out the mission, and then present your findings to the divers. Your presentation should include the speed of decent/ascent, the time it takes to reach the ship, and the total distance traveled.</p>	<p><u>PERFORMANCE TASK</u></p> <p>Students, acting as restaurant managers, will find how long buffet items can sit out before cooling to an unacceptable temperature. Ice water will be used to speed the simulation of temperature drop. Using CBL with temperature probes, probe will be heated in a cup of hot water, then cooled in ice water. CBL will measure temperature at regular intervals and plot these points on the screen of TI-83. Students will sketch the experiment and sketch the graph. Students will describe what occurs in their own words. Students will make a table of values and make buffet management decisions based on data.</p> <p>Later in the unit, the students will take the data from this task and rewrite I as a log function (inverse) making time a function of temperature, for the purpose of finding out</p>

	<p>product will include problems that reflect the entire unit of study for your class, as well as worked out solutions to each problem.</p> <p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Performance Task • Quiz: properties of exponents, polynomial operations • Quiz: identify degree and number of turning points • Quiz: find roots by factoring, long division, graphing on TI-83 • Quiz: find roots using rational root theorem and synthetic division • Test: find roots, y-intercept, sketch graph, and use interval notation • Quiz: finding inverse of a function, composite functions • Daily class discussion and homework • Alternative Assessment and Math Journal, Ch. 5 & 6 	<p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Performance Task • Quiz topics: Recognize and Graph Inverse Variation Functions (Simple and General Rational Functions) • Multiply and Divide Rational Expressions • Add and Subtract Rational Expressions • Simplifying Complex Rational Expressions • Solve Rational Equations • Alternative Assessment and Math Journal, Chapter 8 	<p>how long to leave the buffet open with a target food temperature of 80 degrees.</p> <p><u>OTHER EVIDENCE</u></p> <ul style="list-style-type: none"> • Performance Task • Daily Homework and Class Participation • Quiz Topics: Quiz on Exponential Growth and Decay (including continuous, e) • Evaluation and Properties of Logarithms • Solving Exponential and Logarithmic Equations • Test: Writing and Applying Exponential and Logarithmic Functions • Alternative Assessment and Math Journal, Ch. 7
<p>SKILLS</p>	<ul style="list-style-type: none"> • Graph a polynomial function using technology • Determine the maximum number of zeros and turning points for a function • Determine the zeros of a function • Apply rational root theorem • Identify the y-intercept of a function • Identify the relative maxima and minima of a function using technology • Solve problems using features of graphs of functions • Find composition of functions • Find the inverse of a function graphically and algebraically • Determine if the inverse is also a function 	<ul style="list-style-type: none"> • Write a rational function that represents a given situation. • Identify intercepts and asymptotes of a given function • Draw asymptotes • Recognize vertical asymptotes on a calculator • Sketch a graph of a given rational function • Write and solve a rational equation, given a specific problem • Add, subtract, multiply, divide rational expressions • Simplify complex rational expressions 	<ul style="list-style-type: none"> • Evaluate exponential functions with base a. • Graph exponential functions. • Evaluate and graph exponential functions with base e. • Evaluate logarithmic functions with base a. • Graph logarithmic functions. • Evaluate and graph natural logarithmic functions. • Rewrite logarithmic functions with different bases. • Use properties of logarithms to evaluate logarithmic expressions. • Use properties of logarithms to expand or condense logarithmic expressions.

	<ul style="list-style-type: none">• Graph functions and their inverses• Explain the relationship between a function and its inverse		<ul style="list-style-type: none">• Use logarithmic expressions to solve real-life problems.• Solve simple exponential and logarithmic equations.• Use exponential and logarithmic equations to model and solve real-life problems.• Use exponential growth and decay functions to model and solve real-life problems.• Fit exponential and logarithmic models to sets of data.
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