High School Math Solution Integrated Math II **MATHia**® Table of Contents
2019-2020 School Year

CARNEGIE LEARNING

1 Reasoning with Shapes

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Topic 1 Composing and Decomposing Shapes															
Lines, Rays, Segments, and Angles	Naming Lines, Rays, Segments, and Angles	Students practice identifying geometric entities from their names, writing names for various geometric entities, and identifying when an entity has multiple possible names.	G.CO.1		✓								•		
	Working with Measures of Segments and Angles	Students practice writing measure statements for segments and angles using appropriate notation.	G.CO.1		✓								•		
Properties of Circles	Introduction to Circles	Students watch an animation defining some of the terminology of circle parts. They then identify chords, tangents, points of tangency, and secants of circles. Next, students sort inscribed and central angles. Finally, they classify minor and major arcs as well as semicircles.	G.C.1 G.C.2	✓		•				•					
	Determining Central and Inscribed Angles in Circles	Students calculate the measure of an arc or an angle using the definition of a central angle, the Arc Addition Postulate, or the Inscribed Angle Theorem.	G.C.2		✓								•		
	Angles of an Inscribed Quadrilateral	Students are shown an inscribed quadrilateral and prove the Inscribed Quadrilateral-Opposite Angles Conjecture. They then use the theorem to determine the measure of an angle in an inscribed quadrilateral given the measure of the opposite angle.	G.C.3	✓										•	•
Topic 2 Justifying Line and Angle Relationships															
Angle Properties	Calculating and Justifying Angle Measures	Students calculate the measure of the sought angle by following a prescribed path of angle measures.	G.CO.9		✓								•		
	Calculating Angle Measures	Students calculate the measure of the sought angle by following an open solution path.	G.CO.9		✓								•		

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Introduction to Proofs with Segments and Angles	Introduction to Proofs	Students are introduced to proof by answering questions related to two animations demonstrating the Triangle Sum Theorem and the Vertical Angle Theorem.	G.CO.1	✓		•				•					•
	Completing Measure Proofs	Students complete the steps in a scaffolded proof, supplying appropriate statements and reasons to prove a variety of fundamental angle and segment theorems.	G.CO.1		✓										•
	Connecting Steps in Angle Proofs	Students arrange the steps of more complex proofs into logical order.	G.CO.9		✓										•
	Using Angle Theorems	Students use a wide variety of postulates, properties, and theorems to solve mathematical problems related to angles in geometrical figures and diagrams. The Congruent Complements Theorem, Congruent Supplements Theorem, Angle Addition Postulate, angle bisection, Vertical Angle Theorem, and the Transitive Property are all discussed.	G.CO.9	✓											
Lines Cut by a Transversal	Classifying Angles Formed by Transversals	Students follow worked examples and complete sorting activities as they learn to identify angles and angle pairs formed by lines cut by a transversal.	G.CO.9	✓						•					
	Calculating Angles Formed by Transversals	Calculate the measure of the sought angle by using angle relationships formed by two lines cut by a single transversal.	G.CO.9		✓								•		
	Calculating Angles Formed by Multiple Transversals	Calculate the measure of the sought angle by using angle relationships formed by three parallel lines cut by a single transversal or two parallel lines cut by two transversals.	G.CO.9		✓								•		
Parallel Lines Theorems	Proving Parallel Lines Theorems	Students apply basic angle theorems to prove the alternate interior, alternate exterior, same side interior, and side side exterior parallel line theorems.	G.CO.9		✓										•

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Parallel Lines Theorems (continued)	Proving the Converses of Parallel Lines Theorems	Students apply basic angle theorems to prove the alternate interior converse, alternate exterior converse, same side interior converse, and side side exterior converse parallel line theorems.	G.CO.9		✓										•
Proving Triangles Congruent	Proving Triangles Congruent using SAS and SSS	Students prove triangles congruent using the side-angle-side and side-side-side congruence theorems in a variety of diagrams.	G.CO.10		✓										•
	Proving Triangles Congruent using AAS and ASA	Students prove triangles congruent using the angle-angle-side and angle-side-angle congruence theorems in a variety of diagrams.	G.CO.10		✓										•
Using Triangle Congruence	Proving Theorems using Congruent Triangles	Students use congruent triangle theorems to prove the perpendicular bisector theorem, isosceles triangle base angle theorem and its converse, and the angle bisector theorem.	G.CO.10		✓										•
	Proving Triangle Theorems	Students apply previously proved theorems to prove the triangle sum and exterior angle theorems.	G.CO.10		✓										•
	Using Triangle Theorems	Students apply angle, parallel line, and triangle theorems to prove relationships between elements in more complex diagrams.	G.CO.10		✓										•
Special Right Triangles	Introduction to Special Right Triangles	Students use what they know about the Pythagorean Theorem to identify patterns in 45-45-90 and 30-60-90 triangles. They use the relationships between the side lengths of the special right triangles to solve for unknown side lengths. Students sort triangles according to whether they are a 45-45-90 triangle, a 30-60-90 triangle, or neither.	G.SRT.4	✓						•					
	Calculating the Lengths of Sides of Special Right Triangles		G.SRT.4 G.SRT.5		✓								•		
	Determining Interior and Exterior Angles in Circles	Students calculate the measure of an arc or an angle using Interior Angles of a Circle Theorem and Exterior Angles of a Circle Theorem.	G.C.2		✓								•		

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Topic 3 Using Congruence Theorems

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Angle Properties	Proving Triangles Congruent using HL and HA	Students prove triangles congruent using the hypotenuse-leg and hypotenuse-angle congruence theorems in a variety of diagrams.	G.CO.10		✓										•
Properties of Parallelograms	Understanding Parallelograms	Students are given the properties of parallelograms and use the information to determine the side parallel to a given side of a parallelogram as well as the sides or angles that are congruent to a given side or angle of a parallelogram. They then determine a missing statement to prove a quadrilateral is a parallelogram using the Parallelogram/Congruent-Parallel Side Theorem. Finally, students identify quadrilaterals by properties of their sides, angles, and diagonals.	G.CO.11	✓									•		
	Determining Parts of Quadrilaterals and Parallelograms	Students are given a parallelogram and asked to calculate the length of the bisected diagonals, the measure of the angles, and the length of the opposite side and base.	G.CO.11		✓								•		
Parallelogram Proofs	Proofs about Parallelograms	Students apply their knowledge of congruent triangles and parallel lines in order to prove several theorems about parallelograms.	G.CO.11		✓										•

CARNEGIE LEARNING

2 Investigating Proportionality

Topic 1 Similarity

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Similar Triangles	Understanding Similarity	Students watch an animation which demonstrates that when figures are similar, a series of rigid motions and dilations can transform one figure on top of the other to match exactly. Students recall that similar figures have corresponding side lengths that are proportional and congruent corresponding angles. Students identify similar figures and determine corresponding side lengths and corresponding angle measures, given similar figures.	G.SRT.2	✓		•									
	Calculating Corresponding Parts of Similar Triangles	Students calculate corresponding parts of similar triangles, both in context and out of context.	G.SRT.5		✓								•		
	Proofs Using Similar Triangles	Students use the AA Similarity Postulate, SSS Similarity Theorem, and SAS Similarity Theorem to prove the parallel segment proportionality theorem and triangle midsegment theorem.	G.SRT.5		✓										•
	Partitioning Segments in Given Ratios	Students watch an animation describing the usefulness of directed line segments and how to interpret fractions of directed segments. Students observe directed line segments divided into two lengths by a point and determine the ratio of those lengths, starting with horizontal and vertical line segments and then moving to non-vertical and non-horizontal segments.	G.GPE.6	✓		•						•			
	Partitioning Segments Proportionately		G.GPE.6		✓								•		

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2 Investigating Proportionality

Topic 2 Trigonometry

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Strategies: Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Trigonometric Ratios	Introduction to Trigonometric Ratios	Students use similar triangles to define and understand the trigonometric ratios sine, cosine, and tangent. Students then explore the sine, cosine, and tangent and estimating these ratios using an interactive Explore Tool with a unit circle, including describing the ratios as percents of different lengths. Students solve problems in various contexts using the trigonometric ratios and the Explore Tool.	G.SRT.6	✓							•		•	•	
	Using One Trigonometric Ratio to Solve Problems	Students calculate the measures of sides and angles of a right triangle using trigonometric ratios, the Pythagorean Theorem, and/or the Triangle Sum Theorem in both contextual and abstract problems.	G.SRT.8		✓								•		
	Using Multiple Trigonometric Ratios to Solve Problems	Students calculate the measures of sides and angles of two right triangles that share a side using trigonometric ratios, the Pythagorean Theorem, and/or the Triangle Sum Theorem in both contextual and abstract problems.	G.SRT.8		✓								•		
	Relating Sines and Cosines of Complementary Angles	Students use the interactive unit circle trig ratio Explore Tool to explore complementary angles and to see that the sine of an angle is equal to the cosine of its complement, and vice versa.	G.SRT.7	✓							•				

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2 Investigating Proportionality

Topic 3 Circles and Volume

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Strategies: Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Arc Length	Relating Arc Length and Radius	Students explore the difference between the degree measure of an arc and the length of an arc. They then practice calculating the fraction of a circle's circumference that an arc occupies and writing an expression that can be used to calculate an arc's length. Students then calculate the arc length given the radius or diameter of the circle. Next, they relate the arc length to the circle's radius and are introduced to the units radians and the theta symbol. Finally, students practice determining different measurements of a circle using the formula theta = s/r.	G.C.5	✓											
	Determining Chords in Circles	Students calculate the length of an arc using the radius or diameter, the circumference, and the arc-to-circle ratio.	G.C.2		✓								•		
	Calculating the Area of a Sector	Students are given the definition of a sector of a circle and practice identifying sectors. They then work through an example that develops the formula for determining the area of a sector of a circle before using the formula to find areas of different sectors of circles.	G.C.5	✓						•					
Volume	Creating Three-Dimensional Shapes from Two-Dimensional Figures	Students rotate two-dimensional figures about an axis to create three-dimensional shapes and relate the dimensions of the plane figure to the solid. They then identify vocabulary highlighting the difference between right and oblique solids. Finally students create solids by stacking congruent or similar shapes.	G.GMD.4	✓									•		
	Calculating Volume of Cylinders	Students use mathematical and real-world objects to determine the volume of cylinders.	G.GMD.3		✓									•	
	Calculating Volume of Pyramids	Students calculate the volume of pyramids in mathematical and real-world contexts using given measurements.	G.GMD.3		✓									•	

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2 Investigating Proportionality

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Volume (continued)	Calculating Volume of Cones	Students use mathematical and real-world objects to determine the volume of cones.	G.GMD.3		✓									•	
	Calculating Volume of Spheres	Students use mathematical and real-world objects to determine the volume of spheres.	G.GMD.3		✓									•	

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3 Exploring Functions

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Topic 1 Functions Derived from Linear Relationships															
Absolute Value Equations	NEW WORKSPACE Building Absolute Value Functions	Students watch an animation showing how taking the absolute value of a number reflects that number across 0, or across the x-axis. Students use reflections to create the basic absolute value function from the functions f(x) = x and f(x) = -x. They show that the two functions f(x) = |x| and f(x) = |-x| are equivalent.	F.IF.7b	✔						•				•	
	Graphing Simple Absolute Value Equations Using Number Lines	Students write a simple absolute value equation from a verbal statement, determine the number of solutions, and then represent the solution on a number line.	A.CED.3		✔							•			
	Solving Absolute Value Equations	Students solve multi-step absolute value equations, determine the number of solutions, and then represent the solution on a number line	A.CED.3		✔							•			
	Reasoning About Absolute Value Inequalities	Students use graphical representations to solve absolute value inequalities. They learn to write equivalent compound inequalities for absolute value inequalities.	A.CED.3	✔							•				
Graphs of Piecewise Functions	Introduction to Piecewise Functions	Students are introduced to a linear piecewise function through a real-world scenario and giving the definition of a piecewise function. They then sort sketches of graphs of linear piecewise functions to given scenarios. Finally, students identify the graph of a linear piecewise function after being given the function's equation.	F.IF.C.7b	✔							•				
	Graphing Linear Piecewise Functions	Given a linear piecewise function definition, students represent its piece domain boundaries on a number line and then graph the function.	F.IF.C.7b		✔							•			

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3 Exploring Functions

						Strategies									
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Graphs of Piecewise Functions (continued)	Interpreting Piecewise Functions	Students identify the domain in both non-continuous and continuous piecewise functions given an equation and the graph of the function. They are then given a domain and a graph of a piecewise function and are asked to determine the equation the graph with that domain represents.	F.IF.C.7b	✔								•			
	Using Linear Piecewise Functions	Students use graphs of linear piecewise functions to answer questions about scenarios in context.	F.IF.C.7b		✔							•			
	Analyzing Step Functions	Students are introduced to step functions in the first problem. They then identify the domain of a given equation of a step function using a problem situation and graph. Next students are asked to identfiy the step function that represents a given problem situation and graph.	F.IF.C.7b	✔											

Topic 2 Exponentials

Compare Linear and Exponential Models	Recognizing Linear and Exponential Models	Students compare linear and exponential functions and their graphs in the context of simple interest (linear) and compound interest (exponential). Students solve problems related to the independent and dependent variables of both linear and exponential functions using the graphs and equations.	F.LE.1b F.LE.1c	✔								•			
	Recognizing Growth and Decay	Students watch two different animations: one shows a model of exponential growth and one shows a model of exponential decay. They analyze how to recognize the difference between the two exponential models before interpreting exponential functions using scenarios of population increase and decrease.	F.LE.1c	✔						•					

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Compare Linear and Exponential Models (continued)	Calculating and Interpreting Average Rate of Change	A formula is provided to calculate the average rate of change for a specified interval of an exponential function, and the reason it is considered an average is explained. Students are provided contexts along with either a graph or table. They must calculate the average rate of change for specified intervals of the function, and make an estimation for another interval based upon their results.	F.IF.6	✔										•	
	Modeling Equations with a Starting Point of 1.	Students use exponential equations with a y-intercept of 1 to model scenarios. They answer questions by completing a table of values and graphing corresponding points of the exponential function.	A.CED.2 A.REI.10		✔							•		•	
	Modeling Equations with a Starting Point Other Than 1		A.CED.2 A.REI.10		✔							•		•	
	Comparing Exponential Functions in Different Forms	Given two exponential functions in different representations -- equation, graph, table, or description -- with a contextual or noncontextual scenario, students compare the functions' y-intercepts, x-intercepts, or average rates of change over a specific interval.	F.IF.C.9		✔										
Rational Exponents	Using the Properties of Exponents	Students review the properties of powers and identify simplified versions of expressions with numeric powers. They deal with more complex exponential expressions with variables, sorting them into groups that are equivalent expressions.	F.IF.C.8b	✔							•				

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Rational Exponents (continued)	Properties of Rational Exponents	Students learn the names of the components of radical notation (radical, radicand, index and nth root). They use the properties of powers to make sense of the fact that x to the one-half power and the square root of x are equivalent. Students practice rewrite expressions with radical notation using rational exponents, and then reverse the process and rewrite expressions with rational exponents using radical notation. In these problems, all rational exponents are positive fractions with one as a numerator.	N.RN.1	✔											
	Rewriting Expressions with Radical and Rational Exponents	Students expand their understanding of rational exponents to include making sense of fractional exponents with a numerator other than one and negative exponents. Given various expressions with exponents with fractions, exponents with negative values and powers raised to a power, they select a equivalent radical expressions. The process is then reversed, and students convert radical expressions to expressions with positive or negative fractional exponents.	N.RN.2	✔							•				
	Solving Contextual Exponential Equations Using Common Bases	Students model contextual scenarios by creating equations or inequalities involving an exponential expression with a single variable and a constant expression. Student solve for the variable by rewriting the expressions as exponential expressions with a common base, rewriting the equation or inequality with just the exponents, and then simplifying if necessary to isolate the variable. Finally, students interpret their symbolic solution in terms of the contexts.	A.CED.1		✔										

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Linear and Exponential Transformations	Introduction to Transforming Exponential Functions	Students use four animations, demonstrating the different ways of transforming an exponential function, to investigate how changing the equation for an exponential function changes the graph of the function. Students answer questions related to horizontal and vertical translations and dilations of exponential functions.	F.BF.3	✓						•					
	Shifting Vertically	Students vertically shift graphs of linear and exponential functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Shifting Horizontally	Students horizontally shift graphs of linear and exponential functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Reflecting and Dilating using Graphs	Students reflect and dilate graphs of linear and exponential functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Transforming using Tables of Values	Given a table of values and a table of transformed values, students determine how the basic linear and exponential functions were transformed to create the new functions.	F.BF.3		✓							•			
	Using Multiple Transformations	Given a representation of a transformed function, students determine how the basic linear and exponential functions were transformed to create the new functions.	F.BF.3		✓							•			

Topic 3 Introduction to Quadratic Functions

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Modeling Quadratic Functions	Modeling Area as Product of Monomial and Binomial	Students complete a table of values and graph from a scenario represented by a quadratic model. Students construct the quadratic function for the scenario as a product of a monomial and a binomial.	A.CED.1		✓							•		•	

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3 Exploring Functions

						Strategies									
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Modeling Quadratic Functions (continued)	Modeling Area as Product of Two Binomials	Students complete a table of values and graph from a scenario represented by a quadratic model. Students construct the quadratic function for the scenario as the product of two binomials.	A.CED.1		✓							•		•	
	Interpreting Maximums of Quadratic Models	Students analyze the graphs of functions modeling scenarios of area and vertical motion to identify the maximum and interpret what it means in terms of the problem.	A.CED.1	✓											
	Modeling Projectile Motion	Students use quadratic functions to model projectile motion, and use the solver and the graphs to answer questions.	F.IF.4		✓							•		•	
	Recognizing Key Features of Vertical Motion Graphs	Students use an interactive Explore Tool to investigate how a vertical motion graph changes when the different values in the vertex, factored, and general form of the quadratic function change. They then use vertical motion graphs to identify the maximum, x-intercepts, y-intercept, domain, and range of a quadratic function. Finally, students use a vertical motion graph to determine the axis of symmetry and vertex of a quadratic function.	F.IF.4	✓		•									
Linear and Quadratic Transformations	Shifting Vertically	Students vertically shift graphs of linear and quadratic functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Shifting Horizontally	Students horizontally shift graphs of linear and quadratic functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Reflecting and Dilating using Graphs	Students reflect and dilate graphs of linear and quadratic functions. Students use verbal descriptions, graphs, and algebraic representations.	F.BF.3		✓							•			
	Transforming Using Tables of Values	Given a table of values and a table of transformed values, students determine how the basic linear and quadratic functions were transformed to create the new functions.	F.BF.3		✓							•			

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Linear and Quadratic Transformations (continued)	Using Multiple Transformations	Given a representation of a transformed function, students determine how the basic linear and quadratic functions were transformed to create the new functions.	F.BF.3		✔							•			
NEW UNIT Properties of Quadratic Functions	Identifying Properties of Quadratic Functions	Students differentiate among general form, factored form, and vertex form of a quadratic function. They learn the characteristics of the graph that are visible from each form: y-intercept from general form, x-intercepts from factored form, and vertex from vertex form, and practice identifying these characteristics from the algebraic representations. The axis of symmetry is introduced as an aid in graphing, and students determine the vertex and axis of symmetry from the vertex form and factored form of a quadratic function. They use the concept of symmetry to determine an additional point that lies on a parabola. Lastly, students identify whether a parabola is concave up or down based upon the sign of the x-squared term when the function is written in any form.	F.IF.C.8a	✔							•			•	
	Sketching Quadratic Functions	Sketch a quadratic function given factored, standard or vertex form	F.IF.C.7.a		✔							•			
	Comparing Quadratic Functions in Different Forms	Given two quadratic functions in different representations -- equation, graph, table, or description -- with a contextual or noncontextual scenario, students compare the functions' y-intercepts, zeros, absolute maximums/minimums, or rates of change over a specific interval.	F.IF.C.9		✔										

CARNEGIE LEARNING

4 Seeing Structure

Topic 1 Solving Quadratic Equations

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Polynomial Operations	Introduction to Polynomial Arithmetic	Students are introduced to polynomials and identify the difference between different types of polynomials as well as non-polynomials. They then use an Explore Tool to investigate combining like terms when adding polynomial expressions. Finally, students examine the steps to simplifying polynomial expressions that are either added or subtracted before simplifying on their own.	A.APR.1	✓		•					•			•	
	Operating with Functions on the Coordinate Plane	Students watch an animation about operating with functions on the coordinate plane before examining adding and subtracting constant functions, linear functions, and a linear and a quadratic function.	F.BF.3	✓						•				•	
	Adding Polynomials	Students add quadratic expressions.	A.APR.1		✓										
	Subtracting Polynomials	Students subtract polynomials.	A.APR.1		✓										
	Using a Factor Table to Multiply Binomials	Students use factor tables to multiply linear expressions. Students combine like terms.	A.APR.1		✓									•	
	Multiplying Binomials	Students determine which factor table is appropriate for a given problem, set up the table, and then use the table to multiply linear expressions.	A.APR.1		✓									•	
Quadratic Equation Solving	Making Sense of Roots and Zeros	Students experiment with patterns relating two lines and the parabola that is generated by the product of their two linear functions. The first pattern solidifies the fact that the two expressions are factors of the quadratic function. The second pattern guides students to the Zero Product Property, an underpinning for determining the zeros of a quadratic function written in factored form.	A.REI.11	✓											
	Factoring Trinomials with Coefficients of One	Students factor quadratic trinomials with a coefficient of one.	A.SSE.3a		✓										

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4 Seeing Structure

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Quadratic Equation Solving (continued)	Factoring Trinomials with Coefficients Other than One	Students factor quadratic trinomials with a coefficient other than one.	A.SSE.3a		✓										
	Factoring using Difference of Squares	Students factor quadratic expressions using difference to two squares.	A.SSE.2		✓										
	Factoring Quadratic Expressions	Students factor quadratic expressions using all known factoring methods.	A.SSE.3a		✓										
	Solving Quadratic Equations by Factoring	Students solve quadratic equations by factoring and applying the zero-product property.	A.REI.4b		✓										
	Problem Solving Using Factoring		A.SSE.3a	✓											
	Completing the Square	Students analyze a worked example of a quadratic function in general form being written in vertex form through the process of completing the square. They then practice completing the square using polynomials and area models before filling in unknown values in trinomials that create perfect square trinomials. Finally, students are shown the algebraic method of changing a quadratic function in general form to vertex form by completing the square. They use the algebra shown to determine the axis of symmetry and vertex of quadratic functions in general form.	A.REI.4a F.IF.C.8a	✓											
	Problem Solving Using Completing the Square		A.SSE.3b	✓											
	Deriving the Quadratic Formula	Students use the completing the square method to determine the roots of a given quadratic equation. They then analyze the method of completing the square for any quadratic equation in general form from which the Quadratic Formula is derived. They practice using the Quadratic Formula to calculate the roots of quadratic equations in general form.	A.REI.4a A.REI.4b	✓											
	Solving Quadratic Equations	Students solve quadratic equations by using factoring or the quadratic formula.	A.REI.4b		✓										

4 Seeing Structure

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Forms of Quadratics	Converting Quadratics to General Form	Students convert quadratic equations to general form from either factored form or vertex form.	A.SSE.3a A.SSE.3b F.IF.C.8a		✔										
	Converting Quadratics to Factored Form	Students convert quadratic equations to factored form from either general form or vertex form.	A.SSE.3a A.SSE.3b F.IF.C.8a		✔										
	Converting Quadratics to Vertex Form	Students convert quadratic equations to vertex form from either factored form or general form.	A.SSE.3a A.SSE.3b F.IF.C.8a		✔										

Topic 2 Applications of Quadratics

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Operations with Complex Numbers	Introduction to Complex Numbers	Students watch a video introducing them to the imaginary number line and its relation to the real number line. They then practice identifying real and imaginary numbers through the sorting tool. Finally, students are introduced to complex numbers and practice identifying them on the complex plane to help them understand that all numbers are complex, but some are real and some are purely imaginary.	N.CN.1	✔		•				•			•		
	Simplifying Radicals with Negative Radicands	Students simplify radical expressions that result in complex numbers.	N.CN.1		✔										
	Simplifying Powers of i	Students identify expressions that are equivalent to i, -1, -i, and 1. They use the definition of i to rewrite higher powers of i.	N.CN.1	✔						•				•	
	Adding and Subtracting Complex Numbers	Students add and subtract complex numbers.	N.CN.2		✔										
	Multiplying Complex Numbers	Students multiply complex numbers, including both problems where the two complex numbers are complex conjugates, and problems where they are not.	N.CN.2		✔										
	Solving Quadratic Equations with Complex Roots	Students solve quadratic equations, some of which have real solutions and some of which have complex solutions.	N.CN.C.7		✔										

CARNEGIE LEARNING

4 Seeing Structure

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Strategies: Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Applications of Quadratics	Using Regression Models	Students use equations of quadratic regression models, the solver, and graphs to answer questions.	S.ID.6a		✔							•		•	
Function Operations	Adding and Subtracting Linear Functions	Given two functions in function notation, students determine the sum or difference of the functions and verify the sum or difference by evaluating the new function at a given value.	F.BF.1b		✔										
Inverses of Functions	Recognizing Graphs of Inverses	Given the graphs of two relations, students decide if the relations are inverses.	F.BF.4		✔										

Topic 3 Circles on a Coordinate Plane

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Equation of a Circle (M4T3)	Deriving the Equation of a Circle	Students are given a circle on the coordinate plane with a defined center. They use the Pythagorean Theorem to derive the standard form for the equation of a circle.	G.GPE.1	✔											
	Determining the Radius and Center of a Circle	Students are given an equation for a circle. They then rewrite the equation if necessary in standard form to identify the radius and center of the circle.	G.GPE.1	✔						•					

CARNEGIE LEARNING

5 Making Informed Decisions

Topic 1 Independence and Conditional Probability

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Independence and Conditional Probablility	Independent Events	Students define “independent events.” They investigate different scenarios to determine whether the events given are independent or not independent. Students then investigate compound probability with “and” and use the equation P(A and B) = P(A) x P(B) to verify whether two events are independent or not.	S.CP.2	✔											
	Conditional Probability	Students use an interactive Explore Tool to explore probability using area and random points. Students then explore the idea of conditional probability, using the interactive tool to visualize the conditional probability formula P(A | B) = P(A and B) / P(B). Students apply what they know about conditional probability to make predictions and check for independence of events using the Explore Tool.	S.CP.3 S.CP.6	✔							•				

Topic 2 Computing Probabilities

MATHia Unit	MATHia Workspace	Overview	CCSS	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example
Computing Probabilities	Understanding Frequency Tables	Students review how to read a two-way frequency table and construct a relative frequency table. Students then use two-way frequency tables to determine probabilities, including conditional and other compound probabilities, and they use information from frequency tables to check for the independence of events.	S.CP.4	✔										•	
	Recognizing Concepts of Conditional Probability	Students investigate conditional probabilities using two-way frequency tables. They apply the concept of conditional probability in a variety of different situations involving a change in the sample space as a result of an event occurring.	S.CP.5	✔											