



**HARFORD COUNTY PUBLIC SCHOOLS
HIGH SCHOOL INTRO ALGEBRA/ALGEBRA I (HS DAILY) CURRICULUM**

[CLICK HERE](#) for the Maryland College and Career Ready Standards for Algebra 1.

Topic 1: Solving Equations and Inequalities

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- The set of real numbers is infinite, and each real number can be associated with a unique point on the number line.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Question

- What general strategies can you use to solve simple equations?

Lesson Title	Lesson Overview	Standards * Modeling standard
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MATHia	<p>During Topic 1, students should complete the following units in MATHia:</p> <p><u>Topic 0: Pre-Launch Protocol</u> (Optional) 1 unit; 1 workspace</p> <ul style="list-style-type: none"> ○ Getting Started <p><u>Topic 1: Solving Equations and Inequalities</u> 7 units; 23 workspaces</p> <ul style="list-style-type: none"> ○ Rational Number Systems ○ Readiness for Using Inverse Operations to Solve Equations ○ Using Inverse Operations to Solve Equations ○ Solving Multi-Step Equations ○ Solving Linear equations with Variables on Both Sides ○ Interpreting the Number of Solutions to Equations ○ Modeling Linear Inequalities 	
Operations on Real Numbers	<p>Students will</p> <ul style="list-style-type: none"> • Find the sum or product of two rational numbers and explain why the sum or product is rational. • Find the sum or product of rational and irrational numbers and explain when the sum or product is irrational. 	<p>N.RN.B.3 N.Q.A.3*</p>
Solving Linear Equations	<p>Students will</p> <ul style="list-style-type: none"> • Explain that each step in solving a linear equation follows from the equality in the previous step. • Create and solve linear equations with one variable using the properties of equality. 	<p>A.CED.A.1* A.REI.A.1* A.REI.B.3 N.Q.A.1* A.CED.A.3*</p>
Solving Equations with a Variable on Both Sides	<p>Students will</p> <ul style="list-style-type: none"> • Use the properties of equality to solve linear equations with a variable on both sides. • Identify whether linear equations have one solution, infinitely many solutions, or no solution. 	<p>A.CED.A.1* A.REI.A.1* A.REI.B.3 A.CED.A.2*</p>



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Literal Equations and Formulas	<p>Students will</p> <ul style="list-style-type: none"> Rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations. Use formulas and equations to solve problems. 	A.CED.A.4* N.Q.A.1* A.CED.A.1*
Solving Inequalities in One Variable	<p>Students will</p> <ul style="list-style-type: none"> Create and solve inequalities in one variable. Interpret solutions to inequalities within the context. Identify inequalities as true or false based on the number of solutions. 	A.CED.A.1* A.CED.A.3* A.REI.B.3
Mathematical Modeling in 3 Acts: Collecting Cans	<p>Students will</p> <ul style="list-style-type: none"> Use mathematical modeling to represent a problem situation and to propose a solution. Test and verify the appropriateness of their math models. Explain why the results from their mathematical models might not align exactly with the problem situation. 	A.CED.A.1* A.REI.B.3 A.REI.A.1*
Compound Inequalities	<p>Students will</p> <ul style="list-style-type: none"> Create and solve compound inequalities. Interpret the solution to a compound inequality within a modeling context 	A.CED.A.1* A.CED.A.3* A.REI.B.3
Absolute Value Equations and Inequalities	<p>Students will</p> <ul style="list-style-type: none"> Solve absolute value equations and inequalities. Use absolute value equations and inequalities to solve problems. 	A.CED.A.1*



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Topic 2: Linear Equations

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Essential Question

- Why is it useful to have different forms of linear equations?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	During Topic 2, students should complete the following unit in MATHia: <u>Topic 2: Linear Equations</u> 1 unit; 5 workspaces <ul style="list-style-type: none"> Graphing Linear Equations 	
Slope-Intercept	Students will <ul style="list-style-type: none"> Write linear equations in two variables using slope-intercept form to represent the relationship between two quantities. Interpret the slope and the intercept of a linear model. 	A.CED.A.2* A.SSE.A.1* S.ID.C.7
Point-Slope Form	Students will <ul style="list-style-type: none"> Write and graph linear equations in point-slope form. Analyze different forms of a line to interpret the slope and y -intercept of a linear model in the context of data. 	A.CED.A.2* S.ID.C.7



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Standard Form	Students will <ul style="list-style-type: none">• Write and graph linear equations in standard form.• Use linear equations in standard form to interpret the x - and y -intercepts in the context of given data.	A.CED.A.2* A.REI.D.10 A.CED.A.3* S.ID.C.7
Mathematical Modeling in 3 Acts: How Tall is Tall?	Students will <ul style="list-style-type: none">• Use mathematical modeling to represent a problem situation and to propose a solution.• Test and verify the appropriateness of their math models.• Explain why the results from their mathematical models might not align exactly with the problem situation.	A.CED.A.1* A.CED.A.3* A.CED.A.4*
Parallel and Perpendicular Lines	Students will <ul style="list-style-type: none">• Create equations to represent lines that are parallel or perpendicular to a given line.• Graph lines to show an understanding of the relationship between the slopes of parallel and perpendicular lines.• Solve real-world problems that involve parallel or perpendicular lines.	A.CED.A.2*



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Topic 3: Linear Functions

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Essential Question

- How can linear functions be used to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	<p>During Topic 3, students should complete the following units in MATHia:</p> <p><u>Topic 3: Linear Functions</u></p> <p>6 units; 11 workspaces</p> <ul style="list-style-type: none"> ○ Recognizing Functions and Function Families ○ Multiple Representations of Linear Functions ○ Comparing Linear Functions in Different Forms ○ Least Squares Regression ○ Correlation ○ Creating Residual Plots 	



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Domain and Range of Functions	<p>Students will</p> <ul style="list-style-type: none"> Understand that a relation is a function if each element of the domain is assigned to exactly one element in the range. Determine a reasonable domain and identify constraints on the domain based on the context of a real-world problem. 	<p>F.IF.A.1 A.CED.A.3*</p>
Linear Functions	<p>Students will</p> <ul style="list-style-type: none"> Write and evaluate linear functions using function notation. Graph a linear function and relate the domain of a function to its graph. Interpret functions represented by graphs, tables, verbal descriptions, and function notation in terms of a context. 	<p>F.IF.A.2 F.IF.B.5* F.IF.A.1 F.LE.A.2*</p>
Transforming Linear Functions	<p>Students will</p> <ul style="list-style-type: none"> Graph transformations of linear functions by multiplying or adding specific values of k to the input or output of a function. Interpret the key features of the graph of a linear function and use them to write the function that the graph represents. 	<p>F.BF.B.3* F.IF.C.7a F.IF.B.5* F.BF.A.1* N.Q.A.2*</p>
Mathematical Modeling in 3 Acts: The Express	<p>Students will</p> <ul style="list-style-type: none"> Use mathematical modeling to represent a problem situation and to propose a solution. Test and verify the appropriateness of their math models. Explain why the results from their mathematical models might not align exactly with the problem situation. 	<p>F.IF.A.2 F.LE.A.2* S.ID.C.7</p>
Arithmetic Sequences	<p>Students will</p> <ul style="list-style-type: none"> Write arithmetic and geometric sequences both recursively and with an explicit formula. Use explicit formulas and recursive formulas to model real-world situations. 	<p>F.IF.A.3* F.BF.A.1a* F.BF.A.2 F.LE.A.1b* F.LE.A.2* F.BF.A.1*</p>



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Scatter Plots and Lines of Fit	Students will <ul style="list-style-type: none">• Fit a function to linear data shown in a scatter plot and use fitted functions to solve problems in the context of the data.• Interpret the slope of a trend line within the context of data.	S.ID.B.6 S.ID.B.6a* S.ID.B.6c S.ID.C.7
Analyzing Lines of Fit	Students will <ul style="list-style-type: none">• Compute and interpret the correlation coefficient for linear data.• Plot and analyze residuals to assess the fit of a function.• Distinguish between correlation and causation.	S.ID.B.6 S.ID.B.6a* S.ID.B.6b S.ID.B.6c S.ID.C.8 S.ID.C.9



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Topic 4: Systems of Linear Equations and Inequalities

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Question

- How do you use systems of linear equations and inequalities to model situations and solve problems?

Lesson Title	Lesson Overview	Standards <small>* Modeling standard</small>
MATHia	<p>During Topic 4, students should complete the following units in MATHia:</p> <p><u>Topic 4: Systems of Linear Equations and Inequalities</u></p> <p>4 units; 9 workspaces</p> <ul style="list-style-type: none"> ○ Introduction to Systems of Linear Equations ○ Using Linear Combination to Solve a System of Linear Equations ○ Graphing Linear Inequalities in Two Variables ○ Graphing a System of Linear Inequalities 	
Solving Systems of Equations by Graphing	<p>Students will</p> <ul style="list-style-type: none"> • Graph systems of linear equations in two variables to find an approximate solution. • Write a system of linear equations in two variables to represent real-world problems. 	<p>A.REI.C.6 A.REI.D.11*</p>
Solving Systems of Equations by Substitution	<p>Students will</p> <ul style="list-style-type: none"> • Use the substitution method to solve systems of equations. • Represent situations as systems of equations and interpret solutions as viable/nonviable options for the situation. 	<p>A.REI.C.6 A.CED.A.3* A.SSE.A.1*</p>



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Solving Systems of Equations by Elimination	<p>Students will</p> <ul style="list-style-type: none"> Solve systems of linear equations by elimination and prove that the sum of one equation and a multiple of the other produces a system with the same solutions as the original system. Represent constraints with a system of equations in a modeling context. 	<p>A.REI.C.5 A.CED.A.3* A.REI.C.6</p>
Linear Inequalities in Two Variables	<p>Students will</p> <ul style="list-style-type: none"> Graph solutions to linear inequalities in two variables. Represent constraints with inequalities and interpret solutions as viable or nonviable options in a modeling context. 	<p>A.CED.A.3* A.REI.D.12</p>
Mathematical Modeling in 3 Acts: Get Up There!	<p>Students will</p> <ul style="list-style-type: none"> Use mathematical modeling to represent a problem situation and to propose a solution. Test and verify the appropriateness of their math models. Explain why the results from their mathematical models might not align exactly with the problem situation. 	<p>A.CED.A.2* A.CED.A.3*</p>
Systems of Linear Inequalities	<p>Students will</p> <ul style="list-style-type: none"> Graph the solution set of a system of linear inequalities in two variables. Interpret solutions of linear inequalities in a modeling context. 	<p>A.CED.A.3* A.REI.D.12</p>



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Topic *6: Exponents and Exponential Functions

To be completed by January 23, 2025

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Essential Question

- How do you use exponential functions to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	<p>During Topic 6, students should complete the following units in MATHia:</p> <p><u>Topic 6: Exponents and Exponential Functions</u> 4 units; 18 workspaces</p> <ul style="list-style-type: none"> ○ Properties of Powers with Integer Exponents ○ Exponential Functions ○ Compare Linear and Exponential Models ○ Linear and Exponential Transformations 	
Rational Exponents and Properties of Exponents	<p>Students will</p> <ul style="list-style-type: none"> • Extend the properties of integer exponents to rational exponents to rewrite radical expressions using rational exponents. • Solve equations with rational exponents using the properties of exponents. 	<p>N.RN.A.1 N.RN.A.2</p>



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Radical Expressions	<p>Students will</p> <ul style="list-style-type: none"> • Use properties of exponents to rewrite radical expressions. • Multiply radical expressions. • Write a radical expression to model or represent a real-world problem. 	<p>N.RN.A.2 N.Q.A.1*</p>
A Review of Properties of Exponents	<p>Students will simplify numerical and algebraic expressions using properties of exponents.</p>	<p>8.EE.A.1</p>
Exponential Functions	<p>Students will</p> <ul style="list-style-type: none"> • Sketch graphs showing key features of exponential functions. • Write exponential functions using tables and graphs. • Compare linear and exponential functions. 	<p>F.IF.B.4* F.IF.B.5* F.IF.C.7e F.BF.A.1* F.LE.A.1a* F.LE.A.1* F.LE.A.2* F.LE.A.3*</p>
Exponential Growth and Decay	<p>Students will</p> <ul style="list-style-type: none"> • Construct exponential growth and decay functions given a description of a relationship. • Recognize if a situation can be modeled with exponential growth or exponential decay, and interpret the parameters of the model in context. 	<p>A.SSE.A.1b* A.CED.A.2* F.LE.A.1c* F.LE.A.2* F.LE.B.5* A.SSE.B.3c* A.IF.B.6 F.IF.C.8b N.Q.A.3* A.SSE.A.1*</p>
Geometric Sequences	<p>Students will</p> <ul style="list-style-type: none"> • Find explicit and recursive formulas for geometric sequences. • Translate between recursive and explicit formulas for geometric sequences. • Construct exponential functions to represent geometric sequences. 	<p>F.IF.A.3* F.BF.A.2 F.LE.A.2*</p>



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Translations of Exponential Functions	<p>Students will</p> <ul style="list-style-type: none">• Translate the graph of an exponential function vertically and horizontally, identifying the effect different values of h and k have on the graph of the function.• Compare characteristics of two exponential functions represented in different ways, such as tables and graphs.	F.IF.C.7e F.IF.C.9* F.BF.B.3*
Mathematical Modeling in 3 Acts: Big Time Pay Back	<p>Students will</p> <ul style="list-style-type: none">• Use mathematical modeling to represent a problem situation and to propose a solution.• Test and verify the appropriateness of their math models.• Explain why the results from their mathematical models might not align exactly with the problem situation.	F.BF.A.1* F.LE.A.1* F.LE.A.2*



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Topic 7: Polynomials and Factoring

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways.

Essential Question

- How do you work with polynomials to rewrite expressions and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	<p>During Topic 7, students should complete the following units in MATHia:</p> <p><u>Topic 7: Polynomials and Factoring</u></p> <p>2 units; 10 workspaces</p> <ul style="list-style-type: none"> Polynomial Operations Quadratic Expression Factoring 	
Adding and Subtracting Polynomials	<p>Students will</p> <ul style="list-style-type: none"> Identify the parts of a polynomial, such as coefficients, variables, and constants. Classify polynomials by number of terms and by degree. Write a polynomial in standard form. Add or subtract two polynomials and recognize that polynomials are closed under addition and subtraction, just as the integers are. 	A.APR.A.1



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Multiplying Polynomials	<p>Students will</p> <ul style="list-style-type: none"> • Use the Distributive Property with polynomials, recognizing that polynomials are closed under multiplication. • Multiply polynomials using a table and an area model. 	A.APR.A.1
Multiplying Special Cases	<p>Students will</p> <ul style="list-style-type: none"> • Determine the square of a binomial. • Find the product of a sum and difference of two squares. • Solve real-world problems involving the square of a binomial. 	A.APR.A.1
Factoring Polynomials	<p>Students will</p> <ul style="list-style-type: none"> • Find the greatest common factor of the terms of a polynomial. • Use the structure of a polynomial, and the understanding that polynomials form a system similar to integers, to rewrite it in factored form. • Factor polynomials that represent real-world problems. 	A.APR.A.1 A.SSE.A.2*
Factoring $x^2 + bx + c$	<p>Students will</p> <ul style="list-style-type: none"> • Factor a trinomial in the form $x^2 + bx + c$ by finding two binomial factors whose product is equal to the trinomial. • Identify patterns in the signs of the coefficients of the terms of a trinomial expression and use those patterns to determine the signs of the second terms in the binomial factors. 	A.SSE.A.1* A.SSE.A.1a* A.SSE.A.1b* A.SSE.A.2*
Mathematical Modeling in 3 Acts: Who's Right?	<p>Students will</p> <ul style="list-style-type: none"> • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of their mathematical models. • Explain why the results from their mathematical models might not align exactly with the problem situation. 	A.APR.A.1



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Factoring $ax^2 + bx + c$	Students will <ul style="list-style-type: none">• Identify the common factor of the coefficients in the terms of a trinomial expression when $a \neq 1$.• Write a quadratic trinomial as a product of two binomial factors.	A.SSE.A.1* A.SSE.A.1a* A.SSE.A.1b* A.SSE.A.2*
Factoring Special Cases	Students will <ul style="list-style-type: none">• Identify and factor a trinomial that is a perfect square or a binomial that is a difference of two squares.• Factor special cases of polynomials within the context of real-world problems.	A.SSE.A.1* A.SSE.A.1b* A.SSE.A.2*



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Topic 8: Quadratic Functions

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Essential Question

- How can you use sketches and equations of quadratic functions to model situations and make predictions?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	During Topic 8, students should complete the following units in MATHia: <u>Topic 8: Quadratic Functions</u> 3 units; 7 workspaces <ul style="list-style-type: none"> Key Characteristics of Quadratic Functions Quadratic Models in General Form Sketching and Comparing Quadratic Functions 	
Key Features of a Quadratic Function	Students will <ul style="list-style-type: none"> Identify key features of the graph of a quadratic function using graphs, tables, and equations. Explain the effect of the value of a on the quadratic parent function. 	A.CED.A.2* F.BF.B.3* A.SSE.A.1* F.IF.B.6*
Quadratic Functions in Vertex Form	Students will <ul style="list-style-type: none"> Identify key features of the graph of quadratic functions written in vertex form. Graph quadratic functions in vertex form. 	F.IF.C.7a F.BF.B.3* A.SSE.A.1*



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Quadratic Functions in Standard Form	<p>Students will</p> <ul style="list-style-type: none"> • Graph quadratic functions in standard form and show intercepts, maxima, and minima. • Determine how the values of a, b, and c affect the graph of $f(x) = ax^2 + bx + c$. • Identify key features of parabolas. • Compare properties of quadratic functions presented in different forms (algebraically, in a table, graphically). 	<p>F.IF.B.4* F.IF.C.7a F.IF.C.8 F.IF.C.9*</p>
Modeling With Quadratic Functions	<p>Students will</p> <ul style="list-style-type: none"> • Use quadratic functions fitted to data to model real-world situations. • Use the vertical motion model to write an equation. • Compare a model to a data set by analyzing and evaluating residuals. 	<p>F.BF.A.1* S.ID.B.6a* S.ID.B.6b A.SSE.A.1* F.IF.A.2</p>
Mathematical Modeling in 3 Acts: The Long Shot	<p>Students will</p> <ul style="list-style-type: none"> • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of their math models. • Explain why the results from their mathematical models might not align exactly with the problem situation. 	<p>F.IF.B.4* A.REI.D.10</p>
Linear, Exponential, and Quadratic Models	<p>Students will</p> <ul style="list-style-type: none"> • Determine which model—linear, exponential, or quadratic—best fits a set of data. • Use fitted functions to solve problems in the context of data. 	<p>F.LE.A.3* S.ID.B.6a*</p>



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Topic 9: Solving Quadratic Equations

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Question

- How do you use quadratic equations to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	During Topic 9, students should complete the following unit in MATHia: <u>Topic 9: Solving Quadratic Equations</u> 1 unit; 5 workspaces <ul style="list-style-type: none"> Quadratic Equation Solving 	
Solving Quadratic Equations Using Graphs and Tables	Students will <ul style="list-style-type: none"> Use a graph to identify the x-intercepts as solutions of a quadratic equation. Use a graphing calculator to make a table of values to approximate or solve a quadratic equation. 	A.REI.B.4b*
Solving Quadratic Equations by Factoring	Students will <ul style="list-style-type: none"> Use the Zero-Product Property and factoring to find the solutions of a quadratic equation. Apply factoring to solve real-world problems. Use the zeros of a quadratic equation to sketch a graph. Write a factored form of a quadratic function from a graph. 	A.SSE.B.3a* A.APR.B.3* A.REI.B.4b* F.IF.C.8a



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Solving Quadratic Equations Using Square Roots	Students will <ul style="list-style-type: none"> Solve quadratic equations by finding square roots. Determine reasonable solutions for real-world problems. 	A.CED.A.1* A.REI.B.4b*
Completing the Square	Students will <ul style="list-style-type: none"> Solve a quadratic trinomial by completing the square to transform a quadratic equation into a perfect square trinomial. Use completing the square to write a quadratic equation in vertex form. 	A.SSE.B.3b* A.REI.B.4a F.IF.C.8a
Radical Expressions	Students will <ul style="list-style-type: none"> Use properties of exponents to rewrite radical expressions. Multiply radical expressions. Write a radical expression to model or represent a real-world problem. 	N.RN.A.2 N.Q.A.1*
The Quadratic Formula and the Discriminant	Students will <ul style="list-style-type: none"> Derive the quadratic formula by completing the square. Solve quadratic equations in one variable by using the quadratic formula. Use the discriminant to determine the number and type of solutions to a quadratic equation. 	N.Q.A.3* A.SSE.B.3* A.CED.A.1* A.REI.B.4a A.REI.B.4b*
Mathematical Modeling in 3 Acts: Unwrapping Change	Students will <ul style="list-style-type: none"> Use mathematical modeling to represent a problem situation. Test and verify the appropriateness of their math models. Explain why the results might not exactly match the problem situation. 	A.CED.A.1* A.CED.A.3* A.REI.B.4
Solving Systems of Linear and Quadratic Equations	Students will <ul style="list-style-type: none"> Describe a linear-quadratic system of equations. Solve a linear-quadratic system of equations by graphing, elimination, or substitution. 	A.REI.C.7 A.REI.D.11*



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Topic 10: Working With Functions

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.

Essential Question

- What are some operations on functions that you can use to create models and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	During Topic 10, students should complete the following unit in MATHia: <u>Topic 10: Working with Functions</u> 1 unit; 2 workspaces <ul style="list-style-type: none"> ○ Graphs of Functions 	
The Square Root Function	Students will <ul style="list-style-type: none"> • Graph translations of the square root function. • Calculate and interpret the average rate of change for a square root function over a specified interval. 	F.IF.B.4* F.IF.B.6* F.IF.C.7b F.IF.C.9*
The Cube Root Function	Students will <ul style="list-style-type: none"> • Identify key features of the graph of cube root functions and graph translations of them. • Model real-world situations using the cube root function. • Calculate and interpret the average rate of change of a cue root function over a specified interval. 	F.IF.B.4* F.IF.B.6* F.IF.C.7b F.IF.C.9*



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Analyzing Functions Graphically	<p>Students will</p> <ul style="list-style-type: none"> • Relate the domain and range of a function to its graph. • Analyze the key features of the graph of a function—including the domain, range, maximum and minimum values, axis of symmetry, and end behavior—to identify the type of function it represents. 	<p>F.IF.B.4* F.IF.B.5*</p>
Translations of Functions	<p>Students will</p> <ul style="list-style-type: none"> • Graph translations of absolute value, exponential, quadratic, and radical functions. • Determine how combining translations affects the key features of the graph of a function. 	<p>F.IF.C.7b F.IF.B.4* F.BF.B.3*</p>
Compressions and Stretches of Functions	<p>Students will</p> <ul style="list-style-type: none"> • Identify the effect on the graph of a function of multiplying the output by -1. • Identify the effect on the graph of a function of replacing $f(x)$ by $kf(x)$ or by $f(kx)$ for specific values of k. 	<p>F.BF.B.3*</p>
Mathematical Modeling in 3 Acts: Edgy Tiles	<p>Students will</p> <ul style="list-style-type: none"> • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of their math models. • Explain why the results from their mathematical models might not align exactly with the problem situation. 	<p>F.IF.B.4* F.IF.C.7b</p>
Operations With Functions	<p>Students will</p> <ul style="list-style-type: none"> • Combine functions using arithmetic operations, including addition, subtraction, and multiplication. • Combine functions to solve real-world problems. 	<p>F.BF.A.1b*</p>
Inverse Functions	<p>Students will</p> <ul style="list-style-type: none"> • Write an equation for the inverse of a linear function. • Write the inverse of a quadratic function after restricting the domain so the original function is one-to-one. 	<p>F.BF.B.4a F.BF.B.4</p>



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***Topic 5: Piecewise Functions**

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.

Essential Question

- How do you use piecewise-defined functions to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia	During Topic 5, students should complete the following units in MATHia: <u>Topic 5: Piecewise Functions</u> 3 units; 10 workspaces <ul style="list-style-type: none"> ○ Reasoning About Absolute Value Functions ○ Linear Piecewise Functions ○ Step Functions 	
The Absolute Value Function	Students will <ul style="list-style-type: none"> • Graph an absolute value function and identify the key features of the graph. • Calculate and interpret the rate of change of an absolute value function over a specified interval. 	F.IF.B.4* F.IF.C.7b F.IF.B.6*
Absolute Value Equations and Inequalities	Students will <ul style="list-style-type: none"> • Solve absolute value equations and inequalities. • Use absolute value equations and inequalities to solve problems. 	A.CED.A.1*



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Mathematical Modeling in 3 Acts: The Mad Runner	Students will <ul style="list-style-type: none">• Use mathematical modeling to represent a problem situation and to propose a solution.• Test and verify the appropriateness of their math models.• Explain why the results from their mathematical models might not align exactly with the problem situation.	F.IF.B.4*
Piecewise-Defined Functions	Students will <ul style="list-style-type: none">• Understand and graph piecewise-defined functions.• Analyze the key features of the graph of a piecewise-defined function.• Write and interpret a piecewise-defined function to solve application problems.	F.IF.A.2 F.IF.B.4* F.IF.C.7b
Step Functions	Students will <ul style="list-style-type: none">• Graph step functions including ceiling functions and floor functions.• Calculate and interpret the average rate of change of step functions.	F.IF.A.2 F.IF.C.7b F.IF.B.6*
Transformations of Piecewise-Defined Functions	Students will <ul style="list-style-type: none">• Graph transformations of piecewise-defined functions.• Identify the effect of changing constants and coefficients of absolute value functions on their graphs.	F.IF.C.7b F.BF.B.3*



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Topic 11: Statistics

Primary Resource: *enVisionmath Algebra 1*, Pearson Savvas, 2024.

Enduring Understandings

- Data can be represented visually using tables, charts, and graphs.
- There are special numerical measures that describe the center and spread of numerical data sets.

Essential Question

- How do you use statistics to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard
MATHia**	<p>**Note: Topic 11 contains content beyond the scope of MCCRS Algebra I. It may be completed if time permits.</p> <p>During Topic 11, students should complete the following units in MATHia:</p> <p><u>Topic 11: Statistics</u> 4 units; 14 workspaces</p> <ul style="list-style-type: none"> ○ Graphically Representing Data ○ Comparing Measures of Center and Spread ○ Comparing Data Sets ○ Two-variable Categorical Data 	
Analyzing Data Displays	<p>Students will</p> <ul style="list-style-type: none"> • Represent data using dot plots, box plots, and histograms. • Interpret the data displayed in dot plots, box plots, and histograms within the context it represents. 	<p>S.ID.A.1 S.ID.A.2</p>



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Comparing Data Sets	<p>Students will</p> <ul style="list-style-type: none"> • Use measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms. • Explain and account for the effect of outliers on measures of center and variability. • Use measures of variability, such as the MAD and IQR, to interpret and compare data sets. 	<p>S.ID.A.2 S.ID.A.1 S.ID.A.3</p>
Interpreting the Shapes of Data Displays	<p>Students will</p> <ul style="list-style-type: none"> • Interpret and compare differences in the shape, center, and spread of different data sets. • Determine the relationship between the mean and median of a data set when the shape of the data display is evenly spread, skewed right, or skewed left. 	<p>S.ID.A.3 S.ID.A.2</p>
Standard Deviation	<p>Students will</p> <ul style="list-style-type: none"> • Interpret differences in the variability or spread in the context of a data set. • Calculate the standard deviation of a data set and use it to compare and interpret data sets. 	<p>S.ID.A.1 S.ID.A.2 S.ID.A.3 N.Q.A.3*</p>
Two-Way Frequency Tables	<p>Students will</p> <ul style="list-style-type: none"> • Organize and summarize categorical data by creating two-way frequency tables. • Calculate and interpret joint and marginal frequencies, joint and marginal relative frequencies and conditional relative frequencies, and use them to make inferences about a population. 	<p>S.ID.B.5</p>
Mathematical Modeling in 3 Acts:** Edgy Tiles	<p>Students will</p> <ul style="list-style-type: none"> • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of the math model. • Explain why the results from their mathematical models might not align exactly with the problem situation. 	<p>S.ID.A.2 S.ID.A.3</p>