Kenilworth Public Schools

Curriculum Guide

Content Area: Algebra Honors
Grade: 9
BOE Approved: N/A

Revision Date: N/A
Submitted by: Michelle Ryan & Anthon Rosetti
BOE Revision Approved: 8/14/23

Algebra I Honors

Grade Level: 9

August 2023

Unit 1- Expressions, Equations, Functions	Unit 2- Solving Linear and Non Linear Equations and Inequalities	Unit 3 Relations and Functions	Unit 4 – Graphing and Writing Linear and Non-Linear Equations and Inequalities	Unit 5- Linear Systems	Unit 6- Exponents and Radical Expressions	Unit 7- Polynomials, Rational Expressions, Factorings	Unit 8- Quadratic Functions	Unit 9 Data Analysis
Weeks 1-4	Weeks 5-10	Weeks 11-12	Weeks 13-18	Weeks 19	Weeks 20-21	Weeks 22-26	Weeks 27-32	Weeks 33-38
***Unit Description*:** Bridge and transition Pre-Algebra skills to the Algebra 1 content.	***Unit Description:*** Solve Linear and Non-Linear Equations and Inequalities Algebraically. Use formulas	***Unit Description:*** Represent relations and functions and interpreting graphs of relations and functions	***Unit Description:*** Graph and Write Linear Equations and Inequalities	***Unit Description:*** Solve Systems of Linear Equations by graphing, substitution, and elimination. Solve Systems of Inequalities by graphing.	***Unit Description:*** Apply all properties of all real number exponents, and evaluate expressions involving exponents	***Unit Description:*** Simplify Polynomial Expressions and factor polynomials	***Unit Description:*** Graph and Solve Quadratic Functions	***Unit Description:*** Find Measures of Central Tendency and Variation, represent data using various methods.

Unit Targets: • Recognize and use vocabulary terms. • Evaluate, write, simplify and evaluate expressions both numeric and algebraic • Translate verbal expressions into algebraic expressions, equations, and inequalities. • Solve equations and inequalities in one variable. • Use distributive property. • Expressions involving absolute value	*Unit Targets:* • Recognize and use vocabulary terms. • Solve one-step, two-step, multi-step equations, and equations with variables on one or both sides. • Solve one-step, two-step, multi-step inequalities, inequalities with variables on one or both sides, and compound inequalities. • Solve Absolute Value Equations • Solve Proportions • Use Formulas	*Unit Targets:* • Identify relations that are functions • Use vertical line test • Identify domain and range • Use function notation	*Unit Targets:* • Graph Linear Equations and Linear Inequalities using a table of values, the slope-intercept form, and the x- and y-intercepts • Write linear equations in slope-intercept form, standard form, and point-slope form. • Write equations given a point and the slope, given two points, and given a point and another line	*Unit Targets:* • Recognize and use vocabulary terms. • Solve Systems of Linear Equations by Graphing Solve Systems of Linear Equations using Substitution • Solve Linear Equations using Elimination	*Unit Targets:* • Recognize and use vocabulary terms. • Apply Properties of Exponents • Rewrite Expressions with Rational Exponents as Radicals** • Operations on Radical Expressions** • Evaluate expressions with exponents** **Supplement with other resources – not found in text	*Unit Targets:* • Recognize and use vocabulary terms. • Add, Subtract, Multiply Polynomials • Recognize Special Polynomials • Factor using Special Techniques (GCF, Grouping, Difference of two squares, AC Method)	*Unit Targets:* • Recognize and use vocabulary terms. • Graph Quadratic Functions • Solve by graphing and factoring • Solve by using the Quadratic Formula • Solve using Square roots • Identify vertex, Maximum or Minimum	*Unit Targets:* • Recognize and use vocabulary terms. • Represent data using dot plots, histograms, and box-and-whisker plots, stem-and-leaf plots • Use measures of Central Tendency and Standard Deviation to Compare Sets of Data

			(parallel/ perpendicular) ● Graph scatter plots ● Determine line of best fit ● Graph absolute functions ● Graph exponential functions					

Algebra I Honors

Grade Level 9th

August 2023

Unit 1: Expression, Equations and Functions

Pacing/Days: Weeks 1-4

Unit Summary: Bridge and transition Pre-Algebra skills to the Algebra 1 content.

Learning Targets

Unit Big Ideas: Understanding how to work with algebraic and numerical expressions, equations and functions forms the foundation of algebra and higher level mathematics courses.

Unit Essential Questions:

- How can mathematical expressions be represented and evaluated?
- Why is it important to use a variable in a real-world situation?
- Why may we need to evaluate algebraic expressions?
- According to the order of operations, what should be simplified first?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • You can represent mathematical expressions verbally, numerically, and algebraically. they can be evaluated by applying properties and rules. For example, you can translate a sentence to a numerical or algebraic expression and use	Students will be able to… • A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. • A.SSE.2 Use the structure of an expression to identify ways to rewrite it.

the order of operations to simplify or evaluate the expression. • It is important to use a variable because many times we do not know a quantity in a real-world situation, so we can use a variable to represent this unknown quantity. Then we can still talk about the situation even with the missing piece. • In the real-world, algebraic expressions represent unknown values, which we may need to determine. We will need to substitute the known values into an expression and evaluate to determine the value. • Everything inside the parentheses.	• A.SSE.1a Identify parts of an expression, such as terms, factors, and coefficients

Evidence of Learning :

Formative: Warm-ups, Exit Tickets, Interactive classwork

Summative: Quizzes and Unit Test

New Jersey State Learning Standards

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

NJSLS Standards:

- A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity.
- A.SSE.2 Use the structure of an expression to identify ways to rewrite it.
- A.SSE.1a Identify parts of an expression, such as terms, factors, and coefficients

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Primary Interdisciplinary Connections:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

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8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Computer Science and Design Thinking Standards:

8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).

Climate Change Standards: NA

ELA Companion Standards:

NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

NJSLSA.SL4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

SL.9-10.4. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe and resources***
A.SSE.1b A.SSE.2	• 1.1 Numerical Expressions: When evaluating an expression, students should recall the set of rules that specifies which operation to do first, the order of operations. First, perform operations inside grouping symbols. Grouping symbols include parenthesis, brackets, braces, and fraction bars. Perform operations inside the innermost grouping symbol first. Then evaluate all the powers. Next, perform all multiplications and/or divisions from left to right. Finally, perform all additions and/or subtractions from left to right.	Reveal Algebra 1- McGraw Hill Weeks 1-4
A.SSE.1 A.SSE.2	• 1.2 Algebraic Expressions: Mathematical expressions that contain at least one variable are called algebraic expressions. They can be written as mathematical expressions or verbal expressions, but do not contain an equal sign. A variable is a symbol used to represent an unspecified number or value. Algebraic expressions may contain powers. When evaluating a power, the exponent tells how many ties the base is used as a factor.	
A.SSE.2	• 1.3 Properties of Real Numbers: properties of equality, addition, and multiplication can be used to justify steps when evaluating expressions and solving equations. Using these properties can often help make mental calculations easier.	
A.SSE.1a A.SSE.2	• 1.4 Distributive Property: The Distributive Property can be used to evaluate and simplify expressions. The property permits a factor outside the parentheses to	

A.SSE.2	be distributed to each term inside the parentheses. When the Distributive Property is applied to algebraic expressions, the coefficients of lie terms can be combined and the expressions can be simplified. • 1.5 Expressions Involving Absolute Value: The absolute value of a number is the distance the number is from zero on a number line. Absolute value is always greater than or equal to zero.	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content, student products, and assessment tools (rubrics for example)
• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

Examples of Strategies and Practices that Support Gifted & Talented Students:
• Adjusting the pace and content of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
• Student-driven instruction
• Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Unit 2: Solving Linear Equations and Inequalities

Pacing/Days: Weeks 5-10

Unit Summary: Solve Linear and Nonlinear Equations and Inequalities Algebraically

Learning Targets

Unit Big Ideas: Solving linear equations and inequalities uses previous knowledge of how to work with algebraic expressions to help students to find solutions to problems modeled using algebra.

Unit Essential Questions:

- How can writing and solving equations help you solve problems in the real world?
- How does using zero pairs help you solve the equation?
- Why is it important to create equivalent equations when solving an equation?
- How is solving a multi-step equation similar to solving a one-step equation?
- How can you solve an equation with the variable on each side?
- How is graphing the solution to an inequality different than the solution to an equation?
- How can you tell if a value will satisfy a compound inequality that includes the word *and*?
- How is margin of error related to absolute value?
- How can you solve for an unknown value if two quantities have a proportional relationship?
- What might you want to solve a formula for a specified variable?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… ● Equations can be written to describe the relationship between quantities in the real world. Solving these equations provides information about unknown quantities.	Students will be able to… ● A.CED.1 Create equations and inequalities in one variable and use them to solve problems.

● Zero pairs allow you to cancel values when you have the same number of positives and negatives. ● It is important to create equivalent equations because if you start with a true equation, then any equivalent equation will also be true. Therefore, the solution will be correct. ● You still need to perform the opposite operation in order to isolate x. ● Isolate the variable on one side. Then solve the equation like a one-step or multi-step equation. ● An equation has only one answer, so it is just a point on the number line. Because an inequality has an infinite number of solutions, a portion of the number line needs to be shaded as a solution set. ● If a value falls between the lowest and greatest values of a compound inequality that uses the word *and*, then it satisfies the inequality. ● Both represent distances, where from a given value and absolute value is the distance from zero. ● Write a ratio relating the two quantities using a variable for the unknown value. then set the ratio equal to the original ratio and solve.	● A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities,and interpret solutions as viable or nonviable options in modeling context. ● A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers assured at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. ● A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by numbers. ● A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

● I might solve a formula for a specific variable to make it easier to use the formula to find a specific value.	

Evidence of Learning :

Formative: Warm-ups, Exit Tickets, Interactive classwork

Summative: Quizzes and Unit Test

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Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
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NJSLS Standards:

- A.CED.1- Create equations and inequalities in one variable and use them to solve problems.
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- A.REI.3- Solve linear equations and inequalities in one variable, including equations with coefficients represented by numbers.
- A.CED.4- Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

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Primary Interdisciplinary Connections: (Use Font: Times, Size:12, Not Bold) (List content areas and standards)

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Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
A.CED.1 A.CED.3	• 2.1 Writing and Interpreting Equations: Variables are used to represent an unknown amount when writing equations from a verbal sentence. The ability to	Weeks 5-10

	write an equation from a verbal sentence is needed when solving problems. When a verbal sentence can be translated into an equation that states a rule for the relationship between certain quantities, the equation is then called a formula, and can be used to solve problems involving those quantities.	
A.CED.1 A.REI.1	• 2.2 Solving One-Step Equations: Solving an equation means finding the value of the variable in the equation that makes the equation true. To solve a one-step equation, isolate the variable with a coefficient of one by applying the correct property of equality to maintain equivalent expressions in each step of the process.	
A.CED.1 A.REI.1 A.REI.3	• 2.3 Solving Multi-step Equations: Multi-step equations involve more than one operation. THese equations can be solved using the properties of equality and the strategy of undoing each operation by working backward.	
A.CED.1 A.REI.1 A.REI.3	• 2.4 Solving Equations with Variables on Both Sides: When the variable is on each side of the equation, first use the Distributive Property when appropriate to simplify before using the properties of equality to solve. If all of the variables are eliminated during the solving process, and both sides of the equation are different, then the equation is not true; there is no solution. If both sides of the equation aer the same, then the equation is an identity; all the values are solutions.	
A.CED.1 A.REI.3	• 6.1 Solving One-step Inequalities: A linear inequality is an open sentence that contains greater than, less than, greater than or equal to, less than or equal to. Inequalities can be solved by using algebraic methods similar to solving equations. When solved in this way, inequalities that contain a negative coefficient for the variable require special attention when calculating the direction of the inequality in the final solution.	

A.CED.1 A.REI.3	• 6.2 Solving Multi-Step Inequalities: A linear inequality is an open sentence that contains greater than, less than, greater than or equal to, less than or equal to, which can be solved by using algebraic methods similar to solving equations. Inequalities containing more elaborate expressions require additional steps of computations to isolate the variables in a solution inequality.	
A.CED.1 A.CED.3	• 6.3 Solving Compound Inequalities: A compound inequality is an open sentence with an algebraic expression is constrained by two different inequality relationships. Compound inequalities can be solved by using algebraic methods similar to solving equations and standard inequalities.	
A.CED.1 A.REI.3	• 2.5 Solving Equations Involving Absolute Value: The absolute value of a number is the distance the number is from zero on the number line. To solve an equation involving absolute value, first isolate the absolute value on one side of the equation and rewrite the equation as a compound sentence using the word or. The solution set of an absolute value equation can be graphed on a number line or written inset notation.	
A.CED.1 A.REI.3	• 2.6 Solving Proportions: A ratio is a comparison of two numbers by division. A ratio is called a rate if the two numbers of a ratio represent measurements with different units, such as miles and hours. A proportion is an equation stating that two ratios are equal. Proportions are useful in finding missing values in a ratio relationship.	
A.CED.4 A.REI.3	• 2.7 Using Formulas: Equations or formulas containing more than one variable are called literal equations. These equations can be solved for a specific variable in terms of the other variable(s). Many formulas require using dimensional analysis, which is converting units or rates.	

Differentiating Instruction:
Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content, student products, and assessment tools (rubrics for example)
• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

Examples of Strategies and Practices that Support Gifted & Talented Students:
• Adjusting the pace and content of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
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Examples of Strategies and Practices that Support English Language Learners:
• Pre-teaching of vocabulary and concepts
• Visual learning, including graphic organizers
• Use of cognates to increase comprehension
• Teacher modeling
• Pairing students with beginning English language skills with students who have more advanced English language skills
• Scaffolding

•Word walls •Sentence frames •Think-pair-share •Cooperative learning groups

Unit 3: Relations and Functions

Pacing/Days: Weeks 11-12

Unit Summary: Represent relations and functions and interpreting graphs of relations and functions

Learning Targets

Unit Big Ideas: Students need to understand and analyze how quantities are related to each other and how they can be represented mathematically. Relations and functions provide a way to describe and model real-world situations using mathematical expressions and equations.

Unit Essential Questions:

- Why are representations of relations and functions useful?
- What makes a relation a function?
- How can you tell if an appropriate scale is being used to represent a relationship?
- Why is it helpful to have several different representations of the same relation?
- How can you tell whether a relation is a function?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • Relations and functions can help you visualize relationships between quantities. They can also be used to display data, identify trends, and make predictions. • If it has exactly one output for each input.	Students will be able to… • N.Q.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. • F.IF.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and x is an element of its domain, then

• The scape is appropriate if it allows you to view all of the data in a reasonably-sized graph, and allows you to read or estimate data values. • Different representations of the same relation can show different aspects of the relationship. For example, a mapping is helpful because it allows you to quickly visualize how many times an element in the domain is paired with an element in the range, or vice versa. • You can look at its graph and use the vertical line test. If a vertical line intersects the graph in more than one point, the relation is not a function.	*f(x)* denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation y=*f(x)*. • F.IF.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Evidence of Learning :

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6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

NJSLS Standards:

- N.Q.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- F.IF.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and x is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation y=*f(x)*.
- F.IF.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Career Readiness, Life Literacies, and Key Skills (CLKS):

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9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

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Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
N.Q.1 F.IF.1 F.IF.1 F.IF.2	• 3.1 Representing Relations: A relation can be represented as a set of ordered pairs, as an equation, a table, a mapping, or a graph. A mapping lists the x-values in the domain (independent variable) and the y-values in the range (dependent variable) with arrows drawn from the x-values to the corresponding y-values. A table lists the set of x-coordinates in the first column and their corresponding y-coordinates in the second column. A graph consists of a horizontal axis (x-axis) and a vertical axis (y-axis), and the intersection of the axes (origin). The scale of the graph is the distance between tick marks on the x and y axes. Using a scale other than 1 can male graphing a relation easier. • 3.2 Functions: A function is a relationship between input and output in which each input value has exactly one output. The set of input values is the domain of the function, and the set of output values is the range. The vertical line test can be used toe determine whether a graph represents a function. If the graph does not intersect any drawn vertical line more than once, it is a function. Functions can be written using function notation. In a function, if x represents the independent quantity (elements in the domain), f(x) represents the dependent quantity (elements in that range).	Week 11-12
Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students		

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content, student products, and assessment tools (rubrics for example)
• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

Examples of Strategies and Practices that Support Gifted & Talented Students:
• Adjusting the pace and content of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
• Student-driven instruction
• Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:
• Pre-teaching of vocabulary and concepts
• Visual learning, including graphic organizers
• Use of cognates to increase comprehension
• Teacher modeling
• Pairing students with beginning English language skills with students who have more advanced English language skills
• Scaffolding
•Word walls
•Sentence frames
•Think-pair-share
•Cooperative learning groups

Unit 4: Graphing and Writing Linear and Non-Linear Equations and Inequalities

Pacing/Days: Weeks 13-18

Unit Summary: Graph and Write Linear Equations and Inequalities

Learning Targets

Unit Big Ideas: Graphing and writing linear and non-linear equations and inequalities in Algebra 1 helps students to understand and analyze mathematical relationships, represent them graphically, and use them to solve problems. These concepts provide tools for visualizing and modeling various real-world situations.

Unit Essential Questions:

- What can a function tell you about the relationship that it represents?
- Why is it important to know if coordinates make an equation true?
- How is the graph of a linear equation related to its solutions?
- How does slope help to describe a line?
- How do the quantities m and b affect the graph of a linear function in slope-intercept form?
- How does performing an operation on an absolute value function change its graph?
- What can a function tell you about the relationship that it represents?
- How are the point-slope and slope-intercept forms of a linear equation related?
- How can you use a scatter plot to estimate unknown data?
- How is graphing a linear inequality on the coordinate plane similar to and different from graphing on the number line?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :)**
Students will understand that…	Students will be able to…

• It can tell you about the rate of change, whether the relationship is positive or negative, the locations of the x and y intercepts, and what points fall on the graph. • It is important to know when the substituted values make both sides of the equation equal. The coordinates that make the equation true are solutions of the equation. • The graph of a line is all of the solutions of its equation plotted on a coordinate plane. • The slope of a line can tell you whether the graph of the line will slope up or down from the left to right or if it will be a horizontal or vertical line. • Changing the slope affects the steepness of the graph. Changing the y-intercept determines the distance and direction that the graph is shifted from the origin. • Adding a value to the function moves the graph up or down. Subtracting a value from x moves the graph left to right. Multiplying the function by a value makes the graph wider or narrower or flips it over the x-axis. • Functions can tell you whether the value of the dependent variable	• A. REI.10 Understand that the graph of an equation in two variable is the set of all its solutions plotted in a coordinate plane, often forming a curve (which could be a line) • F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima • F.LE.5 Interpret the parameters in a linear or exponential function in terms of contect • F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. • A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. • F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x)+k$, $k\,f(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects of the graph using technology. • S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. • A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. • S.ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of data • S.ID.6c Fit a linear function for a scatter plot that suggests a linear association • A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

increases or decreases as the independent variable changes. They describe trends in data and can be used to make predictions. • They both contain x,y, and the slope, but the point-slope form contains the coordinates of a pint on the line, while the slope-intercept form contains the y-intercept. • If the data have a linear relationship, you can find a line to describe the data. Then, use the line to estimate unknown data. • When graphing on a coordinate plane and a number line, you graph x=a and the points to the left or right represent the solution. However, when you graph on the coordinate plane, you graph a line and when you graph on a number line, you plot a point.	
Evidence of Learning : **Formative:** Warm-ups, Exit Tickets, Interactive classwork **Summative:** Quizzes and Unit Test	

New Jersey State Learning Standards

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

NJSLS Standards:

- A. REI.10 Understand that the graph of an equation in two variable is the set of all its solutions plotted in a coordinate plane, often forming a curve (which could be a line)
- F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima
- F.LE.5 Interpret the parameters in a linear or exponential function in terms of contect
- F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x)+k$, $k\,f(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects of the graph using technology.
- S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

- S.ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of data
- S.ID.6c Fit a linear function for a scatter plot that suggests a linear association
- A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Primary Interdisciplinary Connections: (Use Font: Times, Size:12, Not Bold) (List content areas and standards)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

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8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Computer Science and Design Thinking Standards:

8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
Climate Change Standards: NA
ELA Companion Standards: NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. NJSLSA.SL4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. SL.9-10.4. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
A.REI.10 F.IF.7a F.LE.5	• 4.1 Graphing Linear Functions: The graph of a linear function is a line. The coordinate of the points on the line are the solutions of the related linear equation. If you know at least two solutions of the equation, you can use them to graph the line. You can also use the x and y intercepts to graph the line. The intercepts can be found alternately replacing an and y with zero. The line that connects the intercepts is the graph of the linear equation.	Weeks 13-18

F.IF.6 F.LE.5	• 4.2 Rate of Change: Rate of change is a ratio that describes, on average, how one quantity changes with respect to a change in another quality. Slope can be used to describe rate of change. The slope of a line is the ratio of the vertical change (the rise) to the horizontal change (the run). The slope formula m= (y2-y1)/(x2-x1), where (x1, y1) and (x2, y2), are two points that lie on the line, can be used to find the slope of a line without graphing.	
A.CED.2 F.IF.7a F.LE.5 F.IF.7b F.BF.3	• 4.3 Slope Intercept Form: The slope intercept form of a linear equation is $y=mx+b$, where m is the slope and b is the y-intercept. Writing a linear equation in this form is helpful when you want to graph the function. There are two methods that can be used. The first is to select two values of x, substitute those values into the equation to calculate the corresponding values of y, plot the resulting ordered pairs, and draw the line that passes through the points. The second method is to plot the y-intercept, use it as a starting point, and then use the slope to determine another point on the line. The line can then be drawn through the points. • 4.7 Absolute Value Function: The graph of the absolute value parent function is V-shaped, with the vertex at the origin. The right side of the V is the graph of y=x and the left side of the graph is y=-x. Translations, dilations, and reflections of the graph of the absolute value parent function, $f(x) = |x|$, results in shifts, stretches or compressions, and flips (respectively) of the V-shaped graph.	
A.CED.2 S.ID.7	• 5.1 Writing Equations in Slope Intercept Form: The slope intercept form of the equation of a line is y=mx+b, where m is the slope of the line, and b is the y-intercept of the line. This general equation can be used to write the equation of a line when its slope and y-intercept are known.	
A.CED.2 A.CED.3	• 5.2 Writing Equations in Standard and Point-Slope Forms: Point-slope form is derived from the definition of slope using the coordinates of two points on a line. Suppose the two points on the line are given as (x,y) and $(X1, Y1)$. Using	

S.ID.6a S.ID.6c A.CED.3 A.REI.12	the definition of the slope, *m= (y-y1)/(x-x1).* If each side of the equation is multiplied by (x-x1), the result is y-y1=m(x-x1), the point-slope form of a linear equation. • 5.3 Scatter Plots and Lines of Fit: A scatter plot consists of graphs of ordered pairs that belong to a set in which the x-coordinate represents one real-world measurement and the y-coordinate represents another. • 6.5 Graphing Inequalities in Two Variables: Inequalities in two variables are solved by graphing the inequality as if it were an equation, and then shading the half-plane that makes the inequality true.	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content, student products, and assessment tools (rubrics for example)
• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

Examples of Strategies and Practices that Support Gifted & Talented Students:
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Unit 5: Linear Systems

Pacing/Days: Week 19

Unit Summary: Solve Systems of Linear Equations by graphing, substitution, and elimination. Solve Systems of Inequalities by graphing.

Learning Targets

Unit Big Ideas: Learning about linear systems in algebra helps students to understand how multiple linear equations can be related to each other and how they can be solved simultaneously. Linear systems involve sets of equations with multiple variables, and they are essential for solving problems that require finding common solutions.

Unit Essential Questions:

- How are systems of equations useful in the real world?
- How can you rewrite a system of equations as a single equation with only one variable?
- How can you produce a new system of equations with the same solution as the given system?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • Writing and solving systems of equations can help you find unknown values in real-world situations. • If one equation is solved for a variable, then you know the value of that variable. Then you can replace that variable in the other equation.	Students will be able to… • A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. • A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations y=*f(x)* and y=*g(x)* intersect are the solutions of the equation *f(x)=g(x)*; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f(x)* and/or *g(x)* are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

• Change the equations in the original system using multiplication and addition. When the equations are manipulated, the point of intersection of the graphs remains the same.	• A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities,and interpret solutions as viable or nonviable options in modeling context. • A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Evidence of Learning :

Formative: Warm-ups, Exit Tickets, Interactive classwork

Summative: Quizzes and Unit Test

New Jersey State Learning Standards

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
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7. Look for and make use of structure.
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NJSLS Standards:

- A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations y=*f(x)* and y=*g(x)* intersect are the solutions of the equation *f(x)=g(x)*; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f(x)* and/or *g(x)* are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
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Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

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Primary Interdisciplinary Connections: (Use Font: Times, Size:12, Not Bold) (List content areas and standards)

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Lesson Plans		
Standard	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***

Student Learning Targets		
A.REI.6 A.REI.11	• 7.1 Graphing Systems of Equations: A solution of a system of two linear equations is an ordered pair that satisfies both equations in the system. A system of equations can be solved by graphing the equations on the same coordinate plane, which can intersect at one point (exactly one solutions), be parallel (no solution), or be on the same line (infinitely many solutions)	Week 19
A.CED.3 A.REI.6	• 7.2 Substitution: Solving a system by substitution involves solving one equation for a specific variable and then substituting the resulting expression in for the variable in the other equation.	
A.CED.3 A.REI.6	• 7.3 Elimination Using Addition and Subtraction: Elimination using addition or subtraction involves manipulating one or both equations so that one variable is eliminated when the equations are added or subtracted. The solution is the ordered pair consisting of the two values. This is the point of intersection of the graphs of the two equations.	
A.REI.5 A.REI.6	• 7.4 Elimination Using Multiplication: When the coefficients of like variable terms are neither the same nor additive inverses, elimination using multiplication can be used to solve the system of equations. This method requires that either one or both of the equations be multiplied by a number so that when the equations are added or subtracted, a variable is eliminated. The system can then be solved using elimination by addition or subtraction.	
Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students		

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Unit 6: Exponents and Radical Expressions

Pacing/Days: Weeks 20-21

Unit Summary: Apply all properties of all real number exponents, and evaluate expressions involving exponents.

Learning Targets

Unit Big Ideas: Working with exponents and radical expressions helps students to know how to manipulate quantities that involve repeated multiplication and the extraction of roots. These concepts provide powerful tools for simplifying expressions, solving equations, and analyzing exponential growth or decay.

Unit Essential Questions:

- How do you perform operations and represent real-world situations with exponents?
- How can you determine the product of two powers a^m and a^p?
- How can you determine the quotient of two powers a^m and a^p?
- How can you simplify expressions with negative exponents?
- How can you simplify expressions with rational exponents?
- Why is it not possible to take the square root of x^3 if x is a negative number?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • Exponents are a way of representing repeated multiplication. There are rules that allow exponential expressions to be combined to result in a single expression.	Students will be able to… • A.SSE.2 Use the structure of an expression to identify ways to rewrite it • A.SSE.3c Use the properties of exponents to transform expressions for exponential functions.

• You can add the exponents and write the product as the base a, to the sum, m+p. • Subtract the exponents and write the product as the base, a, to the difference m-p. • Rewrite the expression as a fraction with 1 in the numerator and the expression with the exponent changed to its opposite in the denominator. • If the exponent is ½, find the square root of the base. If the exponent is ⅓, find the cube root of the base. If the exponent is not a unit fraction, use the denominator to identify the root and the numerator to identify the power. • If x is a negative number, then so is x^3. No number times itself is a negative number, so there is no square root of a negative number.	• N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation of radicals in terms of rational exponents. • N.RN.2 Rewrite expressions involving radicals and rational exponents using properties of exponents
Evidence of Learning : **Formative:** Warm-ups, Exit Tickets, Interactive classwork **Summative:** Quizzes and Unit Test	

New Jersey State Learning Standards

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

NJSLS Standards:

- A.SSE.2 Use the structure of an expression to identify ways to rewrite it
- A.SSE.3c Use the properties of exponents to transform expressions for exponential functions.
- N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation of radicals in terms of rational exponents.
- N.RN.2 Rewrite expressions involving radicals and rational exponents using properties of exponents

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g.,

1.1.12prof.CR3a).
Primary Interdisciplinary Connections: (Use Font: Times, Size:12, Not Bold) (List content areas and standards) 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2). 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3) 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
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NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
A.SSE.2 A.SSE.3c	• 8.1 Multiplication Properties of Exponents: The lesson introduces the multiplication properties of exponents. To multiply two powers that have the same base, add their exponents. To find the power of a power, multiply the exponents. To find the power of a product, find the power of each factor and multiply.	Weeks 20-21
A.SSE.2 A.SSE.3c	• 8.2 Division Properties of Exponents: To divide two powers that have the same base, subtract the exponents. To find the power of a quotient written as a fraction, find the power of the numerator and the power of the denominator	
A.SSE.2	• 8.3 Negative Exponents: A nonzero number raised to a negative exponent is the reciprocal of the number raised to the opposite power. A fraction raised to a negative exponent can be written as its reciprocal to the opposite power.	
N.RN.1 N.RN.2	• 8.4 Rational Exponents: Exponents can be fractions. For any real numbers a and b, and any positive integer n, if a ^n=b, then a is the nth root of b. If a^n=b, then nth root b=a. For any positive real number b, and any integers m and n with n >1, b^(m/n)= nth root (b^m).	
N.RN.2	• 8.5 Simplify Radical Expressions: The Product Property and Quotient Property can be used to simplify radical expressions. For all nonnegative numbers, the square root of their product is equal to the product of the principal square root	

N.RN.2	of each number. For all nonnegative dividends and positive divisors, the square root of their quotient is equal to the quotient of the principal square root of each number. • 8.6 Operations with Radical Expressions: This lesson provis=des instruction on how to add, subtract, and multiply radical expressions. In order to add or subtract radical expressions, the radicands must be the same. The expressions can be added or subtracted using the process of combining like terms. The radicands do not need to be the same when multiplying radicals. Multiply the radicands and simplify the resulting radical.	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
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• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

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• Adjusting the pace and content of lessons
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•Sentence frames
•Think-pair-share
•Cooperative learning groups

Unit 7: Polynomials, Rational Expressions, Factoring

Pacing/Days: Weeks 22-26

Unit Summary: Simplify polynomial Expressions ad factor polynomials

Learning Targets

Unit Big Ideas: Students need to understand and manipulate algebraic expressions, analyze their properties, and solve equations involving these expressions. These concepts provide a framework for working with more complex mathematical expressions and equations.

Unit Essential Questions:

- How can you perform operations on polynomials and use them to represent real-world situations?
- How are the processes for adding and subtracting polynomials similar?
- How can you use the Distributive Property to find the product of a polynomial and a monomial?
- How can you use the Distributive Property to find the product of two binomials?
- How can you write the square of a sum?
- How is factoring polynomials related to multiplying polynomials?
- How can you use the constant and coefficients in a polynomial to find its factors?
- Why do some special products seem particularly useful in factoring polynomials?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • Much like combining like terms, polynomials can be added and subtracted. The Distributive Property is used to multiply and factor polynomials. Polynomials can represent areas and volumes of three dimensional solids. • When subtracting polynomials, add the additive inverse, then follow the process for adding polynomials. • Multiply the monomial by each term in the polynomial.	Students will be able to… • A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction and multiplication; add, subtract, and multiply polynomials. • A.SSE.1a Interpret parts of an expression, such as terms, factors and coefficients. • A.SSE.2 Use the structure of an expression to identify ways to rewrite it.

• Multiply each term in the first polynomial by the second polynomial and combine like terms to simplify. • The square of a sum is the square of the first term plus two times the product of the first and second terms plus the square of the second term. • Factoring is working backward from multiplying polynomials. When multiplying polynomials, you use the factors to find the product, and when factoring polynomials you use the product, or area, to find the factors of the polynomials. • Find the factors of a polynomial by finding two numbers with a sum equal to the coefficient of the middle term and a product equal to the constant. • The special products follow predictable patterns. After recognizing the patterns in the polynomials, you can quickly and easily identify the types of factors to look for in these situations.	
Evidence of Learning : **Formative:** Warm-ups, Exit Tickets, Interactive classwork **Summative:** Quizzes and Unit Test	

New Jersey State Learning Standards

Standards for Mathematical Practice

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4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

NJSLS Standards:

- A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction and multiplication; add, subtract, and multiply polynomials.
- A.SSE.1a Interpret parts of an expression, such as terms, factors and coefficients.
- A.SSE.2 Use the structure of an expression to identify ways to rewrite it.

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3). 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Primary Interdisciplinary Connections: (Use Font: Times, Size:12, Not Bold) (List content areas and standards) 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2). 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3) 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
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Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
A.APR.1 A.SSE.1a	• 10.1 Adding and Subtracting Polynomials: A monomial consists of a number, a variable, or a product of a number and one or more variables, such as 2, 3ab, or 8xy^5. A polynomial is a sum of monomials or a single monomial. The highest exponent in any monomial within the polynomial is the degree of the polynomial.	Weeks 22-26
A.APR.1	• 10.2 Multiplying Polynomials by Monomials": A polynomial times a monomial is multiplied by applying the Distributive Property. The monomial is multiplied times each term in the polynomial. Any constant factors are multiplied times each other, while like variables bases are multiplied times each other, increasing the degree of the monomial.	
A.APR.1	• 10.3 Multiplying Polynomials: Multiplying polynomials involves multiplying all terms in one of the polynomial factors times all of the terms in the other polynomial factors. The resulting polynomial is the product of the two polynomials. The FOIL method is a common technique for multiplying two binomials, though vertical and horizontal methods can also be applied.	

A.APR.1	• 10.4 Special Products: When squaring a sum of the form a+b, the result is (a+b)^2= a^2+2ab+b^2. When multiplying a difference of the form a-b, the result is (a-b)^2= a^2-2ab+b^2. When multiplying a sum times a difference, the result of (a+b)(a-b)= a^2-b^2 will establish the foundation for the difference of squares relationship.	
A.SSE.2	• 10.5 Using the Distributive Property to Factor: Factoring a polynomial requires applying the methods of calculating products of polynomials in the reverse direction. The first method, as with any factoring, is to determine if there is a common factor among all of the monomial terms within the polynomial. A common term can be factored out of the polynomial using the Distributive Property. The common factor may itself by a polynomial with more than one term, as in this case, where the common factor of (a+b) is factored out of the full polynomial ax+bx+ay+by= x(a+b) +y(a+b)= (x+y)(a+b).	
A.SSE.2	• 10.6 Factoring Quadratic Trinomials: A trinomial in the form ax^2+bx+c is a quadratic trinomial. In cases where a polynomial can be factored with integer coefficients, the degrees of the coefficients a, b, and c, provide clues into the strategy for factoring the trinomial. Factoring such a polynomial involves identifying integer values m and p with a sum of b and a product of ac, so the trinomial can be written as ax^2+mx+px+c and then factored by grouping.	
A.SSE.2	• 10.7 Factoring Special Products: A polynomial of the form a^a-b^2 is called a difference of squares. This special product is equivalent to (a+b)(a-b). THis relationship can be applied to factor polynomials that possess the difference of square structure. The more elaborate equations a^2+2ab+b^2= (a+b)^2 and a^2-2ab+b^2= (a-b)^2 can also be applied to factor polynomials with the appropriate structure.	

Differentiating Instruction:
Students with Disabilities, English Language Learners, and Gifted & Talented Students

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Examples of Strategies and Practices that Support Gifted & Talented Students:
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Unit 8: Quadratic Functions

Pacing/Days: Weeks 27-32

Unit Summary: Graph and Solve Quadratic Functions

Learning Targets

Unit Big Ideas: Understand how to analyze the behavior of parabolic curves, solve quadratic equations, and apply quadratic functions to real-world situations. Quadratic functions represent relationships involving squared variables and are fundamental in various areas of mathematics and science.

Unit Essential Questions:

- Why is it helpful to have different methods to analyze quadratic functions and solve quadratic equations?
- How can you use the values of a, b, and c in the equation of a quadratic function to visualize its graph?
- How does performing an operation on a quadratic function change its graph?
- How can you use x-intercepts of a quadratic function to identify the solutions of its related equations?
- How can you use factoring to find the solutions of a quadratic equation?
- Is there one method you can use to solve all quadratic equations?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… ● Depending on the information given, one method may be easier to use than another. It also depends on whether an approximate or exact answer is needed. For example, approximate the answer using a graph or mental math to find an exact answer using algebraic techniques. ● The value of a represents how wide the graph will be and whether it opens up or down. The value of b represents whether the graph is shifted horizontally. The value of c represents the y-intercept. ● Adding a value to the function moves the graph up and down. Subtracting a value from x moves the graph left or right. Multiplying a value by the function makes the graph wider or narrower or flips it over the x-axis. ● The x-values of the x-intercepts of the graph of quadratic function are the solutions of its related equation.	Students will be able to… ● F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. ● F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima. ● F.BF.3 Identify the effect on the graph of replacing f9x0 by f(x) +k, k f(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. ● F.IF.8a Use the process of factoring and completing the square in a quadratic function to show zero, extreme values, and symmetry of the graph, and interpret these in terms of a context. ● A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines. ● A.REI.4b Solve quadratic equations by inspection (e.g., for x^2=49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equations. Recognize when the quadratic formula gives complex solutions and write them as a +-bi for real numbers a and b. ● A.CED.1 Create equations and inequalities in one variable and use them to solve problems. ● A.REI.4 Solve quadratic equations in one variable.

• Factor the expression in the equation, set each factor equal to zero, and solve each of the resulting equations. • The quadratic formula can be used to solve any quadratic equation.	

Evidence of Learning :

Formative: Warm-ups, Exit Tickets, Interactive classwork

Summative: Quizzes and Unit Test

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Standards for Mathematical Practice

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5. Use appropriate tools strategically.
6. Attend to precision.
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NJSLS Standards:

- F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
- F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.
- F.BF.3 Identify the effect on the graph of replacing f9x0 by f(x) +k, k f(x), f(kx), and f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
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- A.REI.4 Solve quadratic equations in one variable.

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

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9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Primary Interdisciplinary Connections:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

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Lesson Plans		
Standard ***Student Learning Targets***	***Learning Experiences and Instructional Strategies*** ***(Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***

		Weeks 27-32
F.IF.4 F.IF.7a	• 11.1 Graphing Quadratic Functions: The standard form of a quadratic function is y= ax^2+bx+c, where a does not equal zero. The graph of a quadratic function is a parabola. When a is positive, the parabola opens up, and the vertex, which is the turning point of the parabola, is a minimum of the function. When a is negative, that parabola opens down, and the vertex is a maximum of the function. The axis of symmetry of a parabola is the line that divides the parabola into two congruent halves. The equation of the axis of symmetry is x= -(b/2a).	
F.IF.7 F.BF.3	• 11.2 Transformations of Quadratic Functions: A family of functions is a group of functions, the graphs of which share the same basic characteristics. Theparetn graph, which is the graph of the parent function, is the simplest of the graphs in a family. All other functions in the family are transformations of the parent function. Translations, dilations, and reflections are three types of transformations that can be performed on the graph of the parent quadratic function.	
F.IF.7a F.IF.8a	• 11.3 Solving Quadratic Equations by Graphing: The solutions of a quadratic equation are called roots. All quadratic equations have two roots. If the related parabola crosses the x-axis at two distinct points, the roots are real. If the vertex of the parabola is on the x-axis, the root is a double real root. If the parabola does not intersect the x-axis, the roots are imaginary.	
A.SSE.3a A.REI.4b F.IF.8a	• 11.4 Solving Quadratic Equations by Factoring: The Square Root Property states that if x^2=n, then (+- square root n). To apply this property to solving a quadratic equation, write the equation in the form x^2=n, and then take the square root of both sides of the equation. The Zero Product Property states that if the product of two factors is zero, then at least one of the factors must be zero. To apply this property to solving a quadratic equation, factor the equation, set each factor equal to zero, and solve for the variable.	

A.CED.1 A.REI.4	• 11.6 Solve Quadratic Equations by Using the Quadratic Formula: A quadratic equation in the standard form ax^2+bx+c=0, where a does not equal zero, can be solved using the Quadratic Formula: x= ((-b+-(square root b^2-4ac))/2a).	

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- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups

Unit 9: Data Analysis

Pacing/Days: Weeks 33-38

Unit Summary: Find Measures of Central Tendency and Variation, and represent data using various methods.

Learning Targets

Unit Big Ideas: It's important to understand and interpret data, analyze patterns and trends, and make predictions based on probability concepts. These topics provide tools for making informed decisions and understanding uncertainty in various real-world contexts.

Unit Essential Questions:

- How do you summarize and interpret data?
- What is the difference between a percentile and a percent?
- Why is it useful to know how to create and interpret different types of data displays?
- Why might you describe a data set with more than one mean?

Unit Enduring Understandings:	**Student Learning Targets/Learning Objectives :**
Students will understand that… • By using statistics, you can analyze data to find meaningful results. Calculating measures of center and spread and making a dot plot, bar graph, or histogram can be used to interpret the data. • A percent is a ratio that compares a number to 100. A percentile is a	Students will be able to… • N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. • S.ID.1 Representing data with plots on the real number line (dot plots, histograms, and box and whisker plots).

statistic that tells you the percent of the data that falls below a certain value. • Not all data can be displayed on the same type of graph. Because the type of display chosen is dependent on the type of data, it is important to know about the different types of data displays. • Data sets may have the same mean but be very different from each other. Other statistics can provide more information about the spread of the data.	• S.ID.3 Interpret differences in shape, center,and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). • S.ID.2 Use statistics appropriate to the shape of the data distributed to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Evidence of Learning :

Formative: Warm-ups, Exit Tickets, Interactive classwork

Summative: Quizzes and Unit Test

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Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
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NJSLS Standards:

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- S.ID.1 Representing data with plots on the real number line (dot plots, histograms, and box and whisker plots).
- S.ID.3 Interpret differences in shape, center,and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S.ID.2 Use statistics appropriate to the shape of the data distributed to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Career Readiness, Life Literacies, and Key Skills (CLKS):

9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Primary Interdisciplinary Connections: 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2). 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3) 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
Computer Science and Design Thinking Standards: 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
Climate Change Standards: NA
ELA Companion Standards: NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. NJSLSA.SL4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. SL.9-10.4. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

Lesson Plans		
Standard Student Learning Targets	***Learning Experiences and Instructional Strategies (Tag: Amistad & Holocaust, DEI, LGBTQ, AAPI)***	***Timeframe***
N.Q.1 S.ID.1	• 12.1 Measures of Center: The mean of a set of data is the average of the data values. To find the mean, add the numbers and divide the sum by the number of addends. The mode is the number that occurs most often in a data set. Some data sets have no mode; others may have one, or more than one, mode. The median is the middle number in a data set aht has been ordered from least to greatest. When there are two middle numbers, the medium is the man of these two numbers. An outlier is a number that is distant from most of the other data. A percentile indicates that percent of the total number of data values fall below a particular number.	Weeks 33-38
N.Q.1 S.ID.1	• 12.2 Representing Data: There are many ways to represent data graphically. The type of data, and the purpose of the display, typically dictate which type of display would be the most appropriate. A dot plot is used for small sets of data that fall into discrete categories. A bar graph is useful for comparing data. A histogram is similar to a bar graph, but each bar represents a range of data values.	
N.Q.1 S.ID.1	• 12.4 Measure of Spread: Measures of variation describe the spread of the data in a data set. The range describes the overall spread and is the difference between the greatest and the least data values. Quartiles and interquartile range provide information about how the data is distributed. The variance and	

S.ID.3 S.ID.2 S.ID.3	standard deviation describe the spread around the mean. Two data sets can have the same range and mean, but the spread around the mean can be quite different. • 12.5 Distributions of Data: A distribution of data shows the frequency of each possible data value. The shape of a distribution can be determined by looking at its histogram or box-and-whisker plot. When describing a distribution, use the mean and standard deviation if the graph is symmetric and the five-number summary if the distribution is skewed. • 12.6 Comparing Sets of Data: If a real number k is added to every value in a set of data, the mean, medium and mode of the data set can be found by adding k to the mean, median and mode of the original data set. The range and standard deviation will be the same. If every value in the set of data is multiplied by a constant k, k>0, then the mean, median, mode, range and standard deviation of the new data set can be found by multiplying each original statistic by k.	

Differentiating Instruction:
Students with Disabilities, English Language Learners, and Gifted & Talented Students

Examples of Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content, student products, and assessment tools (rubrics for example)
• Testing accommodations
• Authentic assessments (ex: write an email to your state senator about a current event issue you are passionate about, design/implement a class debate, create and balance a college freshman budget, create a commercial that dispels a myth about climate change)

Examples of Strategies and Practices that Support Gifted & Talented Students:

- Adjusting the pace and content of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven instruction
- Real-world problems and scenarios

Examples of Strategies and Practices that Support English Language Learners:

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls
- Sentence frames
- Think-pair-share
- Cooperative learning groups