Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 1: Solving Linear Equations	
In this unit, students will explore the foundational skills related to solving linear equations and the connected skills of solving absolute value equations and rewriting equations and formulas. Most students will have prior experience with the Properties of Equality and techniques presented in the first three sections. It will sound familiar that whatever operation is performed on one side of the equations, the same operations must be performed on the other side of the equations to keep equality or balance. The fourth section of the chapter applies the techniques of equation solving to the context of absolute value equations. Understanding absolute value as a function concept and not simply two vertical lines can be challenging for students. Solving literal equations in the last section requires students to see the structure of equations and perform operations on variable terms as they would perform operations on constants. Essential to success in this chapter is accuracy in computation..	
Essential Questions	**Learning Targets/Objectives**
1. How can you use simple equations to solve real-life problems? 2. How can you use multi-step equations to solve real-life problems? 3. How can you solve an equation that has variables on both sides? 4. How can you solve an absolute value equation? 5. How can you use a formula for one measurement to write a formula for a different measurement?	Students will be able to: • Solve linear equations using addition and subtraction. • Solve linear equations using multiplication and division. • Use linear equations to solve real-life problems. • Solve multi-step linear equations using inverse operations. • Use multi-step linear equations to solve real-life problems. • Use unit analysis to model real-life problems. • Solve linear equations that have variables on both sides. • Identify special solutions of linear equations. • Use linear equations to solve real-life problems.

	• Solve absolute value equations. • Solve equations involving two absolute values. • Identify special solutions of absolute value equations. • Rewrite literal equations. • Rewrite and use formulas for area. • Rewrite and use other common formulas
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Conjecture, rule, theorem, expression, equation, linear equation in one variable, solution, inverse operation, equivalent equation, identity, absolute value, opposite, absolute value equation, extraneous solution, formula, surface area, distributive property	equation, solution, inverse operation, ratio, proportion, literal equation

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-Q.A.1	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
2. A-CED.A.1	2. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. **Climate Change Example:** Students will create equations to represent the economic impact of climate change.
3. A-CED.A.4	3. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

4. A-REI.A.1 	4. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **Climate Change Example**: Students will rearrange formulas related to the economic impact of climate change to highlight a quantity of interest, using the same reasoning as in solving equations.
5. A-REI.B.3	5. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
6. A-SSE.A.1b	6. Interpret complicated expressions by viewing one or more of their parts as a single entity.
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-1	1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration
2. HS-PS2-2	2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system
3. L.KL.9-10.2.A	3. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
4. W.IW.9–10.2	4. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
5. SL.PE.9-10.1.D	5. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
6. SL.PI.9-10.4	6. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.1.12.CDM.1	1. Identify the purposes, advantages, and disadvantages of debt.
2. 9.1.12.CDM.8	2. Compare and compute interest and compound interest and develop an amortization table using business tools.

3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.2	2. Describe the trade-offs in how and where data is organized and stored.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results

- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources

- BigIdeas Math
- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Solving Multi-Step Equations
- Solving Equations with Variable on Both Sides
- Solving Absolute Value Equations
- Literal Equations
- Solving Literal Equations

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 1.1: Solving Simple Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, pg 8**
• Solve linear equations using addition and subtraction. • Solve linear equations using multiplication and division. • Use linear equations to solve real-life problems.	**Cumulative Practice**: verifying solutions to equations **Prerequisite Skills Practice:** simplifying numerical expressions	**Basic:** 9, 11, 15, 27, 29 **Proficient:** 14, 16, 28, 34, 43 **Advanced:** 15, 16, 20, 34, 46

Section 1.2: Solving Multi-Step Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, pg 16**
• Solve multi-step linear equations using inverse operations. • Use multi-step linear equations to solve real-life problems. • Use unit analysis to model real-life problems.	**Cumulative Practice**: solving equations **Prerequisite Skills Practice:** simplifying expressions	**Basic:** 3, 9, 13, 15, 21 **Proficient:** 10, 14, 16, 22, 37 **Advanced:** 6, 16, 20, 35, 44

Section 1.3: Solving Equations with Variables on Both Sides		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, pg 23**
• Solve linear equations that have variables on both sides. • Identify special solutions of linear equations. • Use linear equations to solve real-life problems.	**Cumulative Practice**: solving a two-step equation **Prerequisite Skills Practice:** using the distributive property to simplify expressions	**Basic:** 9, 15, 19, 21, 23 **Proficient:** 8, 18, 20, 22, 24 **Advanced:** 18, 24, 30, 32, 36

Section 1.4: Solving Absolute Value Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, pg 32**
• Solve absolute value equations. • Solve equations involving two absolute values. • Identify special solutions of absolute value equations.	**Cumulative Practice**: using complementary and supplementary angles to find a missing value **Prerequisite Skills Practice:** comparing absolute value	**Basic:** 19, 21, 23, 25, 37 **Proficient:** 20, 22, 24, 26, 38 **Advanced:** 21, 24, 26, 30, 40

Section 1.5: Rewriting Equations and Formulas		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, pg 40**
• Rewrite literal equations. • Rewrite and use formulas for area.	**Cumulative Practice**: using the Pythagorean Theorem	**Basic:** 7, 17, 23, 27, 31

• Rewrite and use other common formulas	**Prerequisite Skills Practice:** solving equations	**Proficient:** 12, 22, 30, 32, 34 **Advanced:** 12, 22, 35, 37, 40

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. • Diagnostic Pre-Test • Chapter Tests • Periodic Benchmark Tests • Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: • Teacher observations • Self-Assessments • Student record-keeping • Quizzes • Warm-ups • Exit Tickets • Participation in class discussions • Independent practice	The following assessments require students to utilize various strands of mathematics. • Projects • Performance Tasks • Homework • Classwork
List of Accommodations and Modifications • Special Education • 504 Students • At Risk Students • MLL • Gifted and Talented		

State Mandates and Resources

- New Jersey Student Learning Standards
- Standards for Mathematical Practices

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Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 2: Solving Linear Inequalities	
In this unit, students will apply the techniques used in solving linear equations to solving linear inequalities. The chapter begins with an introduction to writing and graphing inequalities. Color coding and verbal models are used to help students develop confidence in writing inequalities, a necessary skill for the chapter. The graphs are used to display and check solutions. The next three lessons focus on solving increasingly complex inequalities. Tools used in developing facility with these problems include symbolic manipulation, tables, and spreadsheets. Practice with real number operations is integrated throughout. The last two lessons of the chapter introduce compound inequalities, which are necessary in solving absolute value inequalities.	
Essential Questions	**Learning Targets/Objectives**
1. How can you use an inequality to describe a real-life statement? 2. How can you use addition or subtraction to solve an inequality? 3. How can you use division to solve an inequality? 4. How can you solve a multi-step inequality? 5. How can you use inequalities to describe intervals on the real number line? 6. How can you solve an absolute value inequality?	Students will be able to: • Write linear inequalities. • Sketch the graphs of linear inequalities. • Write linear inequalities from graphs. • Solve inequalities using addition. • Solve inequalities using subtraction. • Use inequalities to solve real-life problems. • Solve inequalities by multiplying or dividing by positive numbers. • Solve inequalities by multiplying or dividing by negative numbers. • Solve multi-step inequalities. • Use multi-step inequalities to solve real-life problems.

	• Write and graph compound inequalities. • Solve compound inequalities. • Use compound inequalities to solve real-life problems. • Solve absolute value inequalities. • Use absolute value inequalities to solve real-life problems.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Expression, is greater than, is less than, is equal to, is greater than or equal to, is less than or equal to, absolute value, solution, inverse operations	inequality, solution of an inequality, solution set, graph of an Inequality, equivalent inequalities, compound inequality, absolute value inequality, absolute deviation

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2. A-REI.B.3	2. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
3. A-SSE.A.1a	3. Interpret parts of an expression, such as terms, factors, and coefficients.
4. A-SSE.A.1b	4. Interpret complicated expressions by viewing one or more of their parts as a single entity. 5.

NJSLS	Interdisciplinary Connections
1. HS-PS2-2	1. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system
2. L.KL.9-10.2.A	2. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
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- Use Prior Results
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- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
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- Construct Arguments
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Resources

Textbook

Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

Online Resources

- BigIdeas Math
- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Solving Inequalities
- Solving Absolute Value Inequalities

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources
• Multi-Language Glossary
Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 2.1: Writing and Graphing Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.1**
• Write linear inequalities. • Sketch the graphs of linear inequalities. • Write linear inequalities from graphs..	**Cumulative Practice**: : writing phrases as expressions **Prerequisite Skills Practice:** comparing numbers using <, >, or =	**Basic:** 9, 17, 33, 41 **Proficient:** 10, 16, 32, 44 **Advanced:** 12, 24, 36, 44

Section 2.2: Solving Inequalities Using Addition and Subtraction		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.2**
• Solve inequalities using addition. • Solve inequalities using subtraction. • Use inequalities to solve real-life problems	**Cumulative Practice**: writing sentences as inequalities **Prerequisite Skills Practice:** solving equations using addition or subtraction	**Basic:** 5, 7, 13, 25 **Proficient:** : 8, 18, 22, 26 **Advanced:** 16, 17, 24, 25

Section 2.3: Solving Inequalities Using Multiplication or Division		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.3**
• Solve inequalities by multiplying or dividing by positive numbers. • Solve inequalities by multiplying or dividing by negative numbers. • Use inequalities to solve real-life problems.	**Cumulative Practice**: multiplying fractions and mixed numbers **Prerequisite Skills Practice:** solving equations using multiplication or division	**Basic:** 3, 7, 11, 15, 19 **Proficient:** 4, 8, 12, 16, 20 **Advanced:** 6, 8, 16, 18, 29

Section 2.4: Solving Multi-Step Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.4**
• Solve multi-step inequalities. • Use multi-step inequalities to solve real-life problems.	**Cumulative Practice**: solving equations with nonzero constants **Prerequisite Skills Practice:** solving multi-step equations	**Basic:** 7, 13, 17, 19, 31 **Proficient:** 8, 14, 18, 20, 32 **Advanced:** 14, 16, 22, 28, 32

Section 2.5: Solving Compound Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.5**
• Write and graph compound inequalities. • Solve compound inequalities. • Use compound inequalities to solve real-life problems.	**Cumulative Practice**: solving two-step equations **Prerequisite Skills Practice:** writing inequalities represented by graphs	**Basic:** 5, 7, 13, 15, 21 **Proficient:** 8, 10, 14, 16, 23 **Advanced:** 9, 10, 19, 20, 23

Section 2.6: Solving Absolute Value Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 2.6**
• Solve absolute value inequalities. • Use absolute value inequalities to solve real-life problems.	**Cumulative Practice**: using the distributive property to solve multi-step equations **Prerequisite Skills Practice:** solving absolute value equations	**Basic:** 5, 9, 11, 19 **Proficient:** 6, 10, 12, 20 **Advanced:** 10, 14, 16, 28

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmark Tests ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

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Algebra 1
Course Number: 031300

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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 3: Graphing Linear Functions

In this unit, students will expand on their conceptual understanding of functions. Their understanding may be of a "function machine" where there is an input, a function is performed, and an output results. There is a pairing of the input and output, and each input is associated with exactly one output. This chapter extends this introductory understanding of functions and presents the notation of functions. Consistent use of the notation and language of functions will help students become more confident. The early part of the chapter focuses on function notation, representing functions, discrete and continuous functions, and evaluating functions. Students may be resistant to using function notation, preferring the simpler "y =" notation. It is hard for students to appreciate what the broader notation enables us to do because they have not learned enough at this stage. When two equations are graphed on the same axes, we can clearly refer to f and g, versus saying "the first y =" and "the second y =". We compose functions and have functions with multiple inputs, two examples where function notation is useful. The middle portion of the chapter introduces two forms of linear equations – standard and slope intercept. The last lesson of the chapter looks absolute value functions.

Essential Questions	Learning Targets/Objectives
1. What is a function? 2. How can you determine whether a function is linear or nonlinear? 3. How can you use function notation to represent a function? 4. How can you describe the graph of the equation Ax + By = C? 5. How can you describe the graph of the equation y = mx + b?	Students will be able to: • Determine whether relations are functions. • Find the domain and range of a function. • Identify the independent and dependent variables of a function. • Identify linear functions using graphs, tables, and equations. • Graph linear functions using discrete and continuous data. • Write real-life problems to fit data. • Use function notation to evaluate and interpret functions.

6. How do the values of a, h, and k affect the graph of the absolute value function?	• Use function notation to solve and graph functions. • Graph equations of horizontal and vertical lines. • Graph linear equations in standard form using intercepts. • Find the slope of a line. • Use the slope-intercept form of a linear equation. • Translate graphs of absolute value functions. • Stretch, shrink, and reflect graphs of absolute value functions.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Relation, x-intercept, y-intercept, increasing, decreasing, input, output, slope, rise, run, independent variable, dependent variable, linear equation in two variables, translation	Function, domain, range, end behavior, linear function, nonlinear function, solution of a linear equation in two variables, discrete domain, continuous domain, function notation, standard form, slope-intercept form, constant function, parent function, transformation, reflection, horizontal shrink, horizontal stretch, vertical stretch, vertical shrink, absolute value function, vertex, vertex form

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A-CED.A.2	1. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
2. A-REI.D.10	2. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve
3. A-SSE.A.1a.	3. Interpret parts of an expression, such as terms, factors, and coefficients.

4. F-BF.B.3	4. 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 on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
5. F-IF.A.1	5. 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).
6. F-IF.A.2	6. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
7. F-IF.B.4	7. 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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity
8. F-IF.B.5	8. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **Climate Change Example:** Students may calculate the average rate of change of a function c(m) presented symbolically or as a table, where c(m) represents the amount of carbon dioxide produced by burning a given number of molecules of ethane (gasoline).
9. F-IF.C.7a	9. Graph linear and quadratic functions and show intercepts, maxima, and minima.
10. F-IF.C.9	10. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
11. F-LE.A.1b	11. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another
12. F-LE.B.5	12. Interpret the parameters in a linear or exponential function in terms of a context.
NJSLS	**Interdisciplinary Connections**
1. HS-PS2-2	1. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system

2. L.KL.9-10.2.A	2. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
3. SL.PE.9-10.1.D	3. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
4. SL.PI.9-10.4	4. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.1.12.CDM.1	1. Identify the purposes, advantages, and disadvantages of debt.
2. 9.3.12.AG-PST.1	2. Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.
3. 9.4.12.IML.3	3. Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
4. 9.4.12.CI.1	4. Demonstrate the ability to reflect, analyze, and use creative skills and ideas
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.12.DA.1	1. Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
2. 8.1.12.DA.2	2. Describe the trade-offs in how and where data is organized and stored.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

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- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

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- Use a Table
- Use a Graph
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Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

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- Use Technology to Explore

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- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

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Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

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Resources

Textbook

Algebra 1, A Common Core Curriculum – Big Ideas Math, Big Ideas Learning LLC., 2019

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- New Jersey Climate Education Hub

Videos

- What type of relations can be functions
- Using function notation
- Graphing linear equations in standard form
- Graphing linear equations in slope-intercept form
- Graphing Absolute value functions with transformations

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc...
- Big Ideas online program
- Devices:
    - Chromebooks
    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources
• Multi-Language Glossary
Gifted & Talented Resources
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PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 3.1: Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 3.1**
• Determine whether relations are functions. • Find the domain and range of a function. • Identify the independent and dependent variables of functions.	**Cumulative Practice**: solving literal equations for a variable **Prerequisite Skills Practice:** plotting points in a coordinate plane	**Basic:** 3, 7, 11, 13, 17 **Proficient:** 4, 8, 10, 14, 18 **Advanced:** 6, 12, 16, 18, 24

Section 3.2: Linear Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 3.2**
• Solve inequalities using addition. • Solve inequalities using subtraction. • Use inequalities to solve real-life problems	**Cumulative Practice**: solving equations using multiplication **Prerequisite Skills Practice:** using addition or subtraction to solve inequalities and graph the solutions	**Basic:** 5, 11, 17, 35, 39 **Proficient:** : 6, 12, 20, 36, 40 **Advanced:** 10, 14, 22, 36, 42

Section 3.3: Function Notation		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises, Section 3.3**
• Use function notation to evaluate and interpret functions. • Use function notation to solve and graph functions. • Solve real-life problems using function notation.	**Cumulative Practice**: using division to solve inequalities and graph the solutions **Prerequisite Skills Practice:** graphing using a table of values	**Basic:** 3, 11, 13, 23, 29 **Proficient:** 6, 12, 14, 24, 30 **Advanced:** 8, 12, 18, 26, 30

Section 3.4: Graphing Linear Equations in Standard Form

Specific Learning Objective	Warm-Up/Starting Options	Practice & Apply Exercises, Section 3.5
• Graph equations of horizontal and vertical lines. • Graph linear equations in standard form using intercepts. • Use linear equations in standard form to solve real-life problems.	**Cumulative Practice**: solving two-step inequalities **Prerequisite Skills Practice:** evaluating expressions	**Basic:** 3, 7, 13, 23 **Proficient:** 4, 8, 14, 24 **Advanced:** 10, 20, 24, 30

Section 3.5: Graphing Linear Equations in Slope-Intercept Form

Specific Learning Objective	Warm-Up/Starting Options	Practice & Apply Exercises, Section 3.5
• Find the slope of a line. • Use the slope-intercept form of a linear equation. • Use slopes and y-intercepts to solve real-life problems.	**Cumulative Practice**: writing and solving linear equations in real-life situations **Prerequisite Skills Practice:** writing rules that relate two variables in a table	**Basic:** 5, 15, 25, 33, 37 **Proficient:** 6, 16, 26, 34, 38 **Advanced:** 8, 20, 32, 34, 38

Section 3.7: Graphing Absolute Value Functions

Specific Learning Objective	Warm-Up/Starting Options	Practice & Apply Exercises, pg 40
• Translate graphs of absolute value functions. • Stretch, shrink, and refl ect graphs of absolute value functions. • Combine transformations of graphs of absolute value functions	**Cumulative Practice**: solving equations with variables on both sides **Prerequisite Skills Practice:** graphing points and their image after a reflection over an axis	**Basic:** 5, 9, 27, 35 **Proficient:** 6, 12, 28, 36 **Advanced:** 8, 12, 30, 38

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmark Tests ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 4: Writing Linear Functions	
In this unit, students begin writing linear equations in slope-intercept form, point-slope form, and standard form. These forms are extended in the next lesson to include the cases of parallel and perpendicular lines.	
Essential Questions	**Learning Targets/Objectives**
1. Given the graph of a linear function, how can you write an equation of the line? 2. How can you write the equation of a line when you are given the slope and a point on the line? 3. How can you recognize lines that are parallel or perpendicular?	Students will be able to: • Write equations in slope-intercept form. • Use linear equations to solve real-life problems. • Write an equation of a line given its slope and a point on the line • Write an equation of a line given two points on the line • Use linear equations to solve real-life problems • Identify and write equations of parallel lines • Identify and write equations of perpendicular lines • Use parallel and perpendicular lines in real-life problems • Rewrite equations in two variables in Standard Form
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Slope, intercept, function, rate, line, function, graph, opposite	slope -intercept form, point slope form, reciprocal, perpendicular lines,

	parallel lines, standard form

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A-CED.A.2	1. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. Climate Change Example: Students could graph linear functions to show the change in weather patterns over a course of years.
2. F-BFA.1a	2. Determine an explicit expression, a recursive process, or steps for calculation from a context.
3. F-LE.A.1b	3. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
4. F.LE.A.2	4. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
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1. 9.2.12.CAP.5	1. Assess and modify a personal plan to support current interests and postsecondary plans.
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The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

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- Check Progress
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- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

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- Use Defi nitions
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- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

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- Use a Graph

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- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

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- Communicate Precisely
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- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
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- Writing Equations in Slope-Intercept Form

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- Devices:
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    - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

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PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 4.1 Writing Equations in Slope-Intercept Form		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Write equations in slope-intercept form. • Use linear equations to solve real-life problems.	**Cumulative Practice**: identifying linear functions using tables **Prerequisite Skills Practice:** graphing linear equations	**Basic:** 3, 11, 13, 19, 29 **Proficient:** : 6, 12, 14, 20, 29 **Advanced:** 8, 12, 18, 24, 30

Section 4.2 Writing Equations in Point-Slope Form		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Write an equation of a line given its slope and a point on the line • Write an equation of a line given two points on the line	**Warm-Up:** **Cumulative Practice**: estimating intercepts using graphs **Prerequisite Skills Practice:** writing equations in slope-intercept form	**Basic:** 3, 13, 21, 27 **Proficient:** : 4, 14, 22, 28 **Advanced:** 8, 12, 18, 30

Supplemental Section- Writing Equations in Standard Form		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Rewrite equations in two variables in Standard Form	**Cumulative Practice**: writing equations in slope-intercept form **Prerequisite Skills Practice:** solving literal equations	Teacher created worksheet using Kuta software or other supplemental material.

Section 4.3 Writing Equations of Parallel and Perpendicular Lines		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use linear equations to solve real-life problems • Identify and write equations of parallel lines • Identify and write equations of perpendicular lines • Use parallel and perpendicular lines in real-life problems	**Cumulative Practice**: solving inequalities and graphing the solutions **Prerequisite Skills Practice:** writing equations in point-slope form	**Basic:** 7, 9, 13, 15 **Proficient:** : 8, 10, 14, 16 **Advanced:** 8, 12, 14, 16

PART IV: EVIDENCE OF LEARNING

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Assessments		
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Algebra 1
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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 5: Solving Systems of Linear Equations	
In this unit, students will study the three common techniques for solving a system of equations: graphing, substitution, and elimination. These techniques are presented in the first three sections of this chapter. Students are introduced to the definition of a linear system, and they learn to check their solutions. The fourth section looks at special linear systems, where there is no solution because the lines are parallel or there are infinitely many solutions because the lines coincide. The last section combines prior skills with new knowledge to allow students to graph systems of linear inequalities.	
Essential Questions	**Learning Targets/Objectives**
1. How can you solve a system of linear equations? 2. How can you use substitution to solve a system of linear equations? 3. How can you use elimination to solve a system of linear equations? 4. Can a system of linear equations have no solution or infinitely many solutions? 5. How can you graph a linear inequality in two variables? 6. How can you graph a system of linear inequalities?	Students will be able to: • Check solutions of systems of linear equations • Solve systems of linear equations by graphing • Use systems of linear equations by substitution • Solve systems of linear equations by elimination • Determine the number of solutions of linear systems • Use linear systems to solve real-life problems • Check solutions of linear inequalities • Graph linear inequalities in two variables • Use linear inequalities to solve real life problems • Check solutions of system of linear inequalities • Graph systems of linear inequalities

	• Use systems of linear inequalities to solve real life problems
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Point, ordered pair, linear, variable, graph, solution	System of linear equations, solution of a system, graph of a linear inequality

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A-CED.A.3	1. 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. Climate Change Example: Students may represent constraints describing the economic impact of climate change by equations, inequalities, and/or by systems of inequalities, and interpret solutions as viable or nonviable options.
2. A-REI.C.5	2. 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.
3. A-REI.C.6	3. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
4. A-REI.D.11	4. 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
5. A-REI.D.12	5. 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 a graph the solution set to a system of linear inequalities in two variables as the intersection

	of the corresponding half-planes.
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A 2. SL.PE.9-10.1.D 3. SL.PI.9-10.4	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level. 2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented. 3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
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PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 5.1 Solving Systems of Linear Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Check solutions of systems of linear equations • Solve systems of linear equations by graphing	**Cumulative Practice**: writing equations in point-slope form **Prerequisite Skills Practice:** verifying solutions to equations	**Basic:** 3, 9, 13, 27 **Proficient:** : 4, 10, 14, 28 **Advanced:** 6, 10, 18, 28

Section 5.2 Solving Systems of Linear Equations by Substitution		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use systems of linear equations by substitution •	**Cumulative Practice**: evaluating functions **Prerequisite Skills Practice:** solving two-step equations	**Basic:** 3, 9, 13, 19 **Proficient:** : 6, 10, 14, 20 **Advanced:** 8, 12, 14, 20

Section 5.3 Solving Systems of Linear Equations by Elimination		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve systems of linear equations by elimination	**Cumulative Practice**: identifying linear functions using equations **Prerequisite Skills Practice:** simplifying expressions	**Basic:** 3, 11, 15, 21 **Proficient:** : 4, 12, 16, 22 **Advanced:** 8, 16, 18, 22

Section 5.4 Solving Special Systems of Linear Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Determine the number of solutions of linear systems • Use linear systems to solve real-life problems	**Cumulative Practice**: writing equations of parallel lines **Prerequisite Skills Practice:** solving equations with variables on both sides	**Basic:** 3, 5, 9, 17, 25 **Proficient:** : 4, 10, 14, 18, 26 **Advanced:** 8, 14, 18, 25, 26

Section 5.6 Graphing Linear Inequalities in Two Variables		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Check solutions of linear inequalities • Graph linear inequalities in two variables • Use linear inequalities to solve real life problems	**Warm-Up:** **Cumulative Practice**: using intercepts to graph linear equations **Prerequisite Skills Practice:** verifying solutions to inequalities	**Basic:** 3, 19, 25, 33 **Proficient:** : 4, 20, 26, 34 **Advanced:** 8, 24, 30, 34

Section 5.7 Systems of Linear Inequalities		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Check solutions of system of linear inequalities • Graph systems of linear inequalities • Use systems of linear inequalities to solve real life problems	**Cumulative Practice**: solving inequalities using subtraction **Prerequisite Skills Practice:** graphing inequalities	**Basic:** 7, 11, 21, 29 **Proficient:** : 8, 14, 22, 30 **Advanced:** 10, 18, 24, 30

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmarks ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 6: Exponential Functions and Sequences

In this unit, students will begin working with nonlinear functions. This chapter introduces students to exponential functions. Students will revisit exponential functions in Algebra 2. The properties of exponents presented in the first lesson should be a review for students. Many of the problems involve numeric expressions, although there are algebraic expressions as well. The next lessons are about exponential functions and the attributes of exponential growth and decay functions.

Essential Questions	Learning Targets/Objectives
1. How can you write general rules involving properties of exponents? 2. What are some of the characteristics of the graph of an exponential function? 3. What are some of the characteristics of exponential growth and exponential decay functions?	Students will be able to: • Use zero and negative exponents • Use the properties of exponents • Solve real-life problems involving exponents • Identify and evaluate exponential functions • Graph exponential functions • Solve real-life problems involving exponential functions • Use and identify exponential growth and decay functions • Interpret and rewrite exponential growth and decay functions • Solve real-life problems involving exponential growth and decay
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*

Fraction, square root, function, base, growth, decay	Exponents, power, base, scientific notation, radical, index (of a radical), exponential function, parent function, transformation, exponential growth, exponential decay, compound interest, interest, exponential equation

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-RN.A.2	1. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
2. A-CED.A.2	2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3. F-IF.B.4	3. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch the graphs showing key features given a verbal description of the relationship. Climate Change Example: Students may relate the domain of a function c(m) representing the amount of carbon dioxide produced by burning m molecules of ethane (gasoline), to its graph in order to determine the appropriate domain for c(m).
4. F-IF.C.7e	4. Graph exponential and logarithmic functions, showing intercepts and end behavior.
5. F-IF.C.9	5. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
6. F-LE.A.1c	6. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
7. F-LE.A.2	7. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

NJSLS	Interdisciplinary Connections
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
3. SL.PI.9-10.4	3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
4. HS-LS2-1	4. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.2.12.CAP.5	1. Assess and modify a personal plan to support current interests and postsecondary plans.
2. 9.4.12.CI.1	2. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
3. 9.4.5.DC.4	3. Model safe, legal, and ethical behavior when using online or offline technology
4. 9.4.12.CT.2	4. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.2.AP.4	1. Break down a task into a sequence of steps.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Textbook: Algebra I, A Common Core Curriculum– Big Ideas Math, Big Ideas Learning LLC, 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Exponential Functions

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc…
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources
• Leveled Assessments • Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 6.1 Properties of Exponents		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use zero and negative exponents • Use the properties of exponents • Solve real-life problems involving exponents	**Warm-Up:** **Cumulative Practice**: graphing from a verbal description **Prerequisite Skills Practice:** evaluating numerical expressions	**Basic:** 5, 13, 23, 37, 55 **Proficient:** : 8, 16, 24, 38, 56 **Advanced:** 10, 18, 32, 40, 56

Section 6.3 Exponential Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Identify and evaluate exponential functions • Graph exponential functions • Solve real-life problems involving exponential functions	**Warm-Up:** **Cumulative Practice**: graphing horizontal and vertical translations of linear functions **Prerequisite Skills Practice:** identifying linear functions using equations	**Basic:** 11, 15, 25, 31, 51 **Proficient:** : 12, 16, 26, 32, 52 **Advanced:** 14, 20, 28, 36, 52

Section 6.4 Exponential Growth and Decay		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use and identify exponential growth and decay functions • Interpret and rewrite exponential growth and decay functions • Solve real-life problems involving exponential growth and decay	**Warm-Up:** **Cumulative Practice**: modeling with slope **Prerequisite Skills Practice:** using the simple interest formula	**Basic:** 17, 33, 41, 53, 61 **Proficient:** :18, 34, 42, 50, 62 **Advanced:** 18, 38, 44, 54, 64

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 7: Polynomial Equations and Factoring	
In this unit, students identify, classify, add, subtract, and multiply polynomials. They use vertical and horizontal formats to find sums and differences of polynomials and use the distributive property, tables of products and patterns, (including the FOIL pattern, the square of a binomial pattern and the sum and difference pattern) to find products. They use polynomial equations to describe and solve real-world problems. Students will then factor polynomials and use factoring to solve equations, to find the zeros of functions, and to find the roots of equations. Finally they factor polynomials completely using a variety of techniques.	
Essential Questions	**Learning Targets/Objectives**
1. How do I add, subtract, and multiply polynomials? 2. How do I factor polynomials? 3. How do I write and solve polynomial equations to solve problems?	Students will be able to: • Add and subtract polynomials • Multiply polynomials • Use the square of a binomial pattern • Use the sum and difference pattern • Use the Zero Product Property • Solve polynomial equations by factoring • Factor x^2+bx+c • Factor ax^2+bx+c • Factor special products • Factor polynomials completely

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Term, divide, exponent	Monomial, binomial, trinomial, polynomial, degree of a monomial, degree of a polynomial, standard form, factor, coefficient, leading coefficient

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A.APR.A.1	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 Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.
2. A-APR.B.3	2. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
3. A.CED.A.1	3. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
4. A.REI.B.4b	4. Solve quadratic equations in one variable. 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 equation. Recognize when the quadratic formula gies complex solutions and write them as a+/-bi for real numbers a and b.
5. A-SSE.A.1a	5. Interpret parts of an expression, such as terms, factors, and coefficients.
6. A-SSE.A.2	6. Use the structure of an expression to identify ways to rewrite it

7. A.SSE.B.3.a	7. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines.
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
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- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
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- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
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- Justify Conclusions
- Compare Arguments
- Construct Arguments
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- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
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- Use a Graph
- Use a Formula
- Analyze Relationships
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- Model Real Life

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- Use Clear Definitions
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- Specify Units
- Label Axes
- Calculate Accurately
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Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

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- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
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- Maintain Oversight
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Textbook: Algebra I, A Common Core Curriculum– Big Ideas Math, Big Ideas Learning LLC, 2019
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- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Factoring a Greatest Common Factor from a Trinomial
- Adding Polynomials

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc…
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 7.1 Adding and Subtracting Polynomials		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Add and subtract polynomials	**Warm-Up:** **Cumulative Practice**: solving systems by substitution **Prerequisite Skills Practice:** simplifying numerical expressions	**Basic:** 5, 13, 23, 33, 53 **Proficient:** :10, 16, 24, 34, 53 **Advanced:** 12, 18, 28, 36, 54

Section 7.2 Multiplying Polynomials		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Multiply polynomials	**Warm-Up:** **Cumulative Practice**: using exponent rules to simplify expressions **Prerequisite Skills Practice:** using the distributive property to simplify expressions	**Basic:** 3, 13, 21, 35, 43 **Proficient:** :4, 14, 22, 38, 44 **Advanced:** 8, 16, 28, 40, 44

Section 7.3 Special Products of Polynomials		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use the square of a binomial pattern • Use the sum and difference pattern	**Warm-Up:** **Cumulative Practice**: writing equations in slope-intercept form **Prerequisite Skills Practice:** using the FOIL method to simplify expressions	**Basic:** 3, 15, 17, 25, 35 **Proficient:** :4, 16, 18, 26, 35 **Advanced:** 10, 22, 24, 28, 35

Section 7.4 Solving Polynomial Equations in Factored Form		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use the Zero Product Property • Solve polynomial equations by factoring	**Warm-Up:** **Cumulative Practice**: solving compound inequalities **Prerequisite Skills Practice:** solving equations	**Basic:** 3, 9, 25, 33, 39 **Proficient:** : 4, 10, 26, 32, 40 **Advanced:** 8, 16, 28, 32, 40

Section 7.5 Factoring x^2+bx+c		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Factor x^2+bx+c	**Warm-Up:** **Cumulative Practice**: solving linear systems of equations by elimination **Prerequisite Skills Practice:** finding factors of a number	**Basic:** 3, 9, 15, 39 **Proficient:** : 4, 10, 16, 40 **Advanced:** : 8, 14, 22, 40

Section 7.6 ax^2+bx+c		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Factor ax^2+bx+c	**Warm-Up:** **Cumulative Practice**: using exponent rules to simplify expressions **Prerequisite Skills Practice:** using the GCF to factor polynomials	**Basic:** 3, 9, 13, 17, 35 **Proficient:** : 4, 10, 14, 18, 34 **Advanced:** 8, 12, 16, 20, 36

Section 7.7 Factoring Special Products		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Factor special products	**Warm-Up:** **Cumulative Practice**: solving special systems of linear equations **Prerequisite Skills Practice:** using the square of a binomial pattern to simplify expressions	**Basic:** 3, 9, 15, 29, 41 **Proficient:** : 4, 12, 16, 30, 42 **Advanced:** 8, 14, 22, 32, 42

Section 7.8 Factoring Polynomials Completely		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Factor polynomials completely	**Warm-Up:** **Cumulative Practice**: identifying functions **Prerequisite Skills Practice:** factoring polynomials	**Basic:** 3, 11, 23, 35 **Proficient:** : 4, 12, 26, 36 **Advanced:** 8, 20, 28, 36

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmarks ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

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Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 8: Graphing Quadratic Functions

In this unit students graph quadratic functions and compare them to the parent graph. They find the axis of symmetry, the vertex, and minimum or maximum values. They solve quadratic equations by factoring, graphing, using square roots, completing the square, and using the quadratic formula. Students use the discriminant to determine the number of type of solutions of a quadratic equation. Finally, students determine whether a linear, exponential, or quadratic function best models a set of data.

Essential Questions	Learning Targets/Objectives
1. How do I graph quadratic functions? 2. How do I compare linear, exponential, and quadratic models? 3. What are some of the characteristics of the graph of a quadratic function in the form $f(x) = ax^2$? 4. How does the value of c affect the graph of $f(x) = ax^2 + c$? 5. How can you find the vertex of the graph of $f(x) = ax^2 + bx + c$? 6. How can you describe the graph of $f(x) = a(x - h)^2$? 7. How can you compare the growth rates of linear, exponential, and quadratic functions?	Students will be able to: • Identify characteristics of quadratic functions • Graph $f(x)=ax^2$ • Graph $f(x)=ax^2+c$ • Graph $f(x)=ax^2+bx+c$ • Graph $f(x)=a(x-h)^2+k$ • Compare linear, exponential, and quadratic models • Choose functions to model data • Write functions to model data • Compare functions using average rates of change • Solve real-life problems involving different function types

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Point, reflection, translation, zero, shrink, stretch, intercept, independent variable, dependent variable, average rate of change	Quadratic function, parabola, vertex, axis of symmetry, vertical shrink, vertical stretch, zero of a function, maximum value, minimum value, even function, odd function, vertex form, intercept form

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. A.CED.A.2	1. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
2. F.IF.B.4	2. 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. Key features include: intercepts, intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
3. F.IF.B.5	3. Relate the domain of a function to its graph, and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
4. F.IF.C.7a	4. Graph linear and quadratic functions and show intercepts, maxima, and minima.
5. F.BF.B.3	5. Identify the effect on the graph of replacing f(x) by f(x) +k, kf(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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
6. F.BF.A.1a	6. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
7. F.IF.A.1.c	7. Distinguish between situations that can be modeled with linear functions and with exponential functions. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

8. F.LE.B.5	8. Interpret the parameters in a linear or exponential function in terms of a context.
9. F-IF.C.9	9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
10. F-LE.A.1b	10. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
11. F-LE.A.3	11. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
3. SL.PI.9-10.4	3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.2.12.CAP.5	1. Assess and modify a personal plan to support current interests and postsecondary plans.
2. 9.4.12.CI.1	2. Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
3. 9.4.5.DC.4	3. Model safe, legal, and ethical behavior when using online or offline technology
4. 9.4.12.CT.2	4. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.2.AP.4	1. Break down a task into a sequence of steps.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures

- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
- Use Clear Definitions
- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately

- Understand Mathematical Terms

Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components
- Look for Patterns
- Look for Structure

Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Textbook: Algebra I, A Common Core Curriculum– Big Ideas Math, Big Ideas Learning LLC, 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL

- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Graphing Quadratics in Vertex From

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc…
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 8.1 Graphing $f(x)=ax^2$		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Identify characteristics of quadratic functions • Graph $f(x)=ax^2$	**Warm-Up:** **Cumulative Practice**: finding a power of a product **Prerequisite Skills Practice:** graphing linear equations	**Basic:** 3, 5, 9, 18 **Proficient:** :4, 6, 12, 18 **Advanced:** 4, 8, 12, 18

Section 8.2 Graphing $f(x)=ax^2+c$		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Graph $f(x)=ax^2+c$	**Warm-Up:** **Cumulative Practice**:graphing transformations of absolute value functions **Prerequisite Skills Practice:** finding intercepts of linear equations	**Basic:** 3, 7, 13, 27 **Proficient:** : 4, 10, 14, 27 **Advanced:** 6, 10, 16, 28

Section 8.3 Graphing $f(x)=ax^2+bx+c$		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Graph $f(x)=ax^2+bx+c$	**Warm-Up:** **Cumulative Practice**: graphing equations in the form y=ab^x **Prerequisite Skills Practice:** verifying solutions to quadratic equations	**Basic:** 7, 13, 23, 27, 37 **Proficient: :** 8, 16, 24, 28, 37 **Advanced:** 12, 16, 24, 32, 38

Section 8.4 Graphing $f(x)=a(x-h)^2+k$		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Graph $f(x)=a(x-h)^2+k$	**Warm-Up:** **Cumulative Practice**: solving compound inequalities **Prerequisite Skills Practice:** finding the vertex of a quadratic equation	**Basic:** 5, 23, 39, 49, 63 **Proficient:** : 8, 24, 40, 50, 64 **Advanced:** 12, 26, 42, 52, 64

Section 8.6 Comparing Linear, Exponential, and Quadratic Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Choose functions to model data • Write functions to model data • Compare functions using average rates of change • Solve real-life problems involving different function types	**Warm-Up:** **Cumulative Practice**: using graphs to find characteristics of functions **Prerequisite Skills Practice:** identifying linear functions from tables	**Basic:** 9, 15, 21, 32, 34 **Proficient:** : 12, 16, 22, 32, 34 **Advanced:** 14, 18, 24, 32, 38

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmarks ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
● New Jersey Student Learning Standards ● Standards for Mathematical Practices

Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 9: Solving Quadratic Equations

In this unit students solve quadratic equations by factoring, graphing, using square roots, completing the square, and using the quadratic formula. Students use the discriminant to determine the number of type of solutions of a quadratic equation. Students will simplify radical expressions, including rationalizing denominators. Students also add, subtract, and multiply radicals.

Essential Questions	Learning Targets/Objectives
1. How do I solve quadratic equations? 2. How do I use properties of radicals in expressions and equations? 3. How can you multiply and divide square roots? 4. How can you use a graph to solve a quadratic equation in one variable? 5. How can you determine the number of solutions of a quadratic equation of the form $ax^2 + c = 0$? 6. How can you use "completing the square" to solve a quadratic equation? 7. How can you derive a formula that can be used to write the solutions of any quadratic equation in standard form?	Students will be able to: • Use properties of radicals to simplify expressions • Simplify expressions by rationalizing the denominator. • Perform operations with radicals. • Solve quadratic equations by graphing. • Use graphs to find and approximate the zeros of functions. • Solve real-life problems using graphs of quadratic functions. • Solve quadratic equations using square roots • Approximate the solutions of quadratic equations. • Complete the square for expressions of the form $x^2 + bx$ • Solve quadratic equations by completing the square. • Find and use maximum and minimum values. • Solve real-life problems by completing the square.

	• Solve quadratic equations using the Quadratic Formula. • Interpret the discriminant. • Choose efficient methods for solving quadratic equations.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Square root, expression, square, perfect square, denominator, numerator, zero of a function, quadratic	Radical, radicand, radical expression, root, quadratic formula

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-RN.A.3	1. Simplify radicals, including algebraic radicals
2. A-REI.A.2	2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
3. A-CED.A.1	3. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.
4. A-CED.A.2	4. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales .
5. A-CED.A.3	5. 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. For example, represent inequalities describing

	nutritional and cost constraints on combinations of different foods.
6. A-CED.A.4	6. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
7. A-REI.B.4a	7. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form.
8. A-REI.B.4b	8. Solve quadratic equations in one variable. 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 equation. Recognize when the quadratic formula gives complex solutions and write them as a+/-bi for real numbers a and b.
9. A-REI.D.11	9. 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
10. A-SSE.B.3b	10. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines.
11. F-BF.B.3	11. 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 on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
12. F-IF.B.4	12. 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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity
13. F-IF.C.7a	13. Graph linear and quadratic functions and show intercepts, maxima, and minima.
14. F-IF.C.8a	14. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
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1. 9.2.12.CAP.5 2. 9.4.12.CI.1 3. 9.4.5.DC.4 4. 9.4.12.CT.2	1. Assess and modify a personal plan to support current interests and postsecondary plans. 2. Demonstrate the ability to reflect, analyze, and use creative skills and ideas. 3. Model safe, legal, and ethical behavior when using online or offline technology 4. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
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1. 8.1.2.AP.4	1. Break down a task into a sequence of steps.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

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- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

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- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples
- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions

- Critique Reasoning
- Use Logic
- Error Analysis

Model with mathematics: Apply the mathematics to a real-life problem, and you interpret mathematical results in the context of the situation. Throughout the unit students are given problems that require them to:

- Apply Mathematics
- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
- Interpret Results
- Model Real Life

Use appropriate tools strategically: Know what tools are available and think about how each tool might help solve a mathematical problem. Use a tool for its advantages, while being aware of its limitations. Throughout the unit students are given problems that require them to:

- Choose Tools
- Recognize Usefulness of Tools
- Use Other Resources
- Use Technology to Explore

Attend to precision: Develop a habit of being careful how you talk about concepts, label your work, and write your answers. Throughout the unit students are given problems that require them to:

- Communicate Precisely
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- State the Meaning of Symbols
- Specify Units
- Label Axes
- Calculate Accurately
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Look for and make use of structure: Look closely to see structure within a mathematical statement, or step back for an overview to see how individual parts make one single object. Throughout the unit students are given problems that require them to:

- View as Components

- Look for Patterns
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Look for and express regularity in repeated reasoning: Notice patterns and make generalizations. Keeping in mind the goal of a problem helps you evaluate reasonableness of answers along the way. Throughout the unit students are given problems that require them to:

- Repeat Calculations
- Find General Methods
- Maintain Oversight
- Evaluate Results

Resources

Textbook

Textbook: Algebra I, A Common Core Curriculum– Big Ideas Math, Big Ideas Learning LLC, 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Simplifying Square Roots

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc…
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources

- Leveled Assessments
- Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 9.1 Properties of Radicals		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use properties of radicals to simplify expressions. • Simplify expressions by rationalizing the denominator. • Perform operations with radicals.	**Warm-Up:** **Cumulative Practice**: identifying exponential growth and decay **Prerequisite Skills Practice:** evaluating square roots	**Basic:** 13, 29, 55, 75, 83 **Proficient:** : 14, 32, 56, 76, 84 **Advanced:** 20, 34, 56, 80, 84

Section 9.2 Solving Quadratic Expressions by Graphing		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations by graphing. • Use graphs to find and approximate the zeros of functions. • Solve real-life problems using graphs of quadratic functions.	**Warm-Up:** **Cumulative Practice**: solving equations by graphing **Prerequisite Skills Practice:** using the distributive property to solve equations	**Basic:** 13, 19, 37, 43, 53 **Proficient:** : 14, 20, 38, 44, 54 **Advanced:** 20, 24, 40, 44, 54

Section 9.3 Solving Quadratic Expressions Using Square Roots		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations using square roots. • Approximate the solutions of quadratic equations.	**Warm-Up:** **Cumulative Practice**: factoring polynomials **Prerequisite Skills Practice:** solving linear equations	**Basic:** 9, 19, 25, 33, 36 **Proficient:** : 10, 20, 26, 32, 36 **Advanced:** 16, 22, 28, 32, 36

Section 9.4: Solving Quadratic Equations by Completing the Square		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Complete the square for expressions of the form $x^2 + bx$ • Solve quadratic equations by completing the square. • Find and use maximum and minimum values. • Solve real-life problems by completing the square.	**Warm-Up:** **Cumulative Practice**: multiplying binomials **Prerequisite Skills Practice:** factoring polynomials	**Basic:** 11, 17, 25, 41, 53 **Proficient:** : 12, 20, 26, 42, 54 **Advanced:** 16, 22, 30, 44, 54

Section 9.5: Solving Quadratic Equations Using the Quadratic Formula		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve quadratic equations using the Quadratic Formula. • Interpret the discriminant. • Choose efficient methods for solving quadratic equations.	**Warm-Up:** **Cumulative Practice**: finding terms of a geometric sequence **Prerequisite Skills Practice:** evaluating numerical expressions	**Basic:** 9, 23, 25, 31, 37 **Proficient:** : 10, 24, 26, 32, 38 **Advanced:** 20, 24, 28, 34, 38

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmarks ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
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Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 10: Radical Functions and Equations	
In this unit students interpret data displays. Students describe the shapes of data distributions. Students represent data in different ways. Finally students analyze data.	
Essential Questions	**Learning Targets/Objectives**
1. What are some of the characteristics of the graph of a square root function? 2. How can you solve an equation that contains square roots?	Students will be able to: • Graph square root functions. • Compare square root functions using average rates of change. • Solve real-life problems involving square root functions. • Solve radical equations. • Identify extraneous solutions. • Solve real-life problems involving radical equations.
Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Square root, expression, square, perfect square, quadratic, radical, radicand, transformation, average rate of change, extraneous solution, radical expression	Square root function, radical functions, radical equations

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
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3. A-REI.A.2	3. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise..
4. F-BF.B.3	4. 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 on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
5. F-IF.B.6	5. 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.
6. F-IF.C.7b	6. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions..
7. F-IF.C.9	7. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
NJSLS	**Interdisciplinary Connections**
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Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

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- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
- Compare Arguments
- Construct Arguments
- Listen and Ask Questions
- Critique Reasoning
- Use Logic
- Error Analysis

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- Simplify a Solution
- Use a Diagram
- Use a Table
- Use a Graph
- Use a Formula
- Analyze Relationships
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- Model Real Life

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- State the Meaning of Symbols
- Specify Units
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Resources

Textbook

Textbook: Algebra I, A Common Core Curriculum– Big Ideas Math, Big Ideas Learning LLC, 2019

Online Resources

- Desmos Activities
- Pear Assessment
- IXL
- Quizizz
- EdPuzzle
- Canva
- Khan Academy
- Inside Mathematics
- NJDOE Digital Item Library
- New Jersey Center for Teaching and Learning
- New Jersey Climate Education Hub

Videos

- Square Root Functions and Their Graphs
- Solving Radical Equations

Integrated Technology

- Google Suite: Google Classroom, Docs, Drive, Mail, etc…
- Devices:
  - Chromebooks
  - Texas Instrument TI-84 Plus Graphing Calculator

ML Resources

- Multi-Language Glossary

Gifted & Talented Resources
• Leveled Assessments Enrichment worksheets

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Section 10.1: Graphing Square Root Functions		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Graph square root functions. • Compare square root functions using average rates of change. • Solve real-life problems involving square root functions.	**Warm-Up:** **Cumulative Practice**: finding the domain and range from a graph **Prerequisite Skills Practice:** graphing linear functions	**Basic:** 5, 19, 27, 45, 49 **Proficient:** : 6, 20, 28, 46, 50 **Advanced:** 12, 24, 32, 46, 50

Section 10.3: Solving Radical Equations		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Solve radical equations. • Identify extraneous solutions. • Solve real-life problems involving radical equations.	**Warm-Up:** **Cumulative Practice**: solving equations by factoring **Prerequisite Skills Practice:** using the Pythagorean Theorem to find missing lengths of triangles	**Basic:** 5, 13, 37, 49, 63 **Proficient:** : 6, 14, 38, 50, 64 **Advanced:** 10, 16, 42, 54, 64

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

Assessments		
Summative	**Formative**	**Performance**
The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the Algebra 1 curriculum/syllabus at the conclusion of an instructional time period. ● Diagnostic Pre-Test ● Chapter Tests ● Periodic Benchmarks ● Standardized Tests	The effectiveness of the instructional program will be based on numerous activities and strategies including the following and are not limited to: ● Teacher observations ● Self-Assessments ● Student record-keeping ● Quizzes ● Warm-ups ● Exit Tickets ● Participation in class discussions ● Independent practice	The following assessments require students to utilize various strands of mathematics. ● Projects ● Performance Tasks ● Homework ● Classwork
List of Accommodations and Modifications ● Special Education ● 504 Students ● At Risk Students ● MLL ● Gifted and Talented		

State Mandates and Resources
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Black Horse Pike Regional School District

Where inspiring excellence is our standard, and student achievement is the result.

Algebra 1
Course Number: 031300

Updated: June 2024

PART I: UNIT RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Chapter 11: Data Analysis and Displays	
In this unit students graph square root functions. They solve radical equations, including equations with extraneous solutions.	
Essential Questions	**Learning Targets/Objectives**
1. How can you describe the variation of a data set? 2. How can you use a box-and-whisker plot to describe a data set? 3. How can you use a histogram to characterize the basic shape of a distribution? 4. How can you read and make a two-way table?	Students will be able to: • Compare the mean, median, and mode of a data set. • Find the range and standard deviation of a data set. • Identify the effects of transformations on data. • Use box-and-whisker plots. • Interpret box-and-whisker plots. • Use box-and-whisker plots to compare data sets. • Describe the shapes of distributions. • Use the shapes of data distributions to choose appropriate measures. • Compare data distributions. • Find and interpret marginal frequencies. • Make two-way tables. • Find relative and conditional relative frequencies. • Use two-way tables to recognize associations in data.

Tier 2 Vocabulary *High-frequency words used throughout the unit*	**Tier 3 Vocabulary** *Discipline-specific words used throughout the unit*
Measure of Center, Mean, Median, Mode, Range, Outlier, histogram, frequency table	Measure of variation, Standard deviation, Data transformation, box-and-whisker plot, quartile, five-number summary, interquartile range, two-way table, joint frequency, marginal frequency, marginal relative frequency, conditional relative frequency

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

New Jersey Student Learning Standards That Support Learning Targets	
2023 New Jersey Student Learning Standards for Mathematics	
1. N-Q.A.1	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.
2. S-ID.A.1	2. Represent data with plots on the real number line (dot plots, histograms, and box plots).
3. S-ID.A.2	3. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
4. S-ID.A.3	4. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
NJSLS	**Interdisciplinary Connections**
1. L.KL.9-10.2.A	1. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level.
2. SL.PE.9-10.1.D	2. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
3. SL.PI.9-10.4	3. Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills	
1. 9.2.12.CAP.5 2. 9.4.12.CI.1 3. 9.4.5.DC.4 4. 9.4.12.CT.2	1. Assess and modify a personal plan to support current interests and postsecondary plans. 2. Demonstrate the ability to reflect, analyze, and use creative skills and ideas. 3. Model safe, legal, and ethical behavior when using online or offline technology 4. Explain the potential benefits of collaborating to enhance critical thinking and problem-solving.
2020 New Jersey Student Learning Standards for Computer Science and Design Thinking	
1. 8.1.2.AP.4	1. Break down a task into a sequence of steps.

The 8 Mathematical Practices are embedded throughout the course and are evident in daily lessons, assignments, activities, assessments, and projects:

Make sense of problems and persevere in solving them: Take time to analyze the given information and what the problem is asking to help you to plan a solution pathway. Throughout the unit students are given problems that require them to:

- Explain the Meaning
- Find Entry Points
- Analyze Givens
- Interpret a Solution
- Make a Plan
- Consider Similar Problems
- Check Progress
- Consider Simpler Forms
- Problem Solve

Reason abstractly and quantitatively: Investigate specific examples and represent them symbolically, and observe the relationships in numbers or symbols to derive conclusions about a concrete instance. Throughout the unit students are given problems that require them to:

- Make Sense of Quantities
- Use Equations
- Use Expressions
- Understand Quantities
- Use Operations
- Contextualize
- Relationships
- Reason Abstractly

Construct viable arguments and critique the reasoning of others: Make and justify conclusions and decide whether others' arguments are correct or flawed. Throughout the unit students are given problems that require them to:

- Use Assumptions
- Use Defi nitions
- Use Prior Results
- Make Conjectures
- Build Arguments
- Analyze Conjectures
- Use Counterexamples

- Justify Conclusions
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Section 11.1: Measures of Center and Variation		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Compare the mean, median, and mode of a data set. • Find the range and standard deviation of a data set. • Identify the effects of transformations on data.	**Warm-Up:** **Cumulative Practice**: identifying characteristics of a quadratic function **Prerequisite Skills Practice:** evaluating numerical expressions	**Basic:** 5, 15, 17, 23, 27 **Proficient:** : 6, 12, 18, 22, 28 **Advanced:** 8, 16, 18, 24, 28

Section 11.2: Box-and-Whisker Plots		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Use box-and-whisker plots to represent data sets. • Interpret box-and-whisker plots. • Use box-and-whisker plots to compare data sets..	**Warm-Up:** **Cumulative Practice**: factoring perfect square trinomials **Prerequisite Skills Practice:** finding the median of a data set	**Basic:** 9, 13, 15, 17 **Proficient:** : 10, 14, 16, 17 **Advanced:** 12, 14, 16, 17

Section 11.3: Shapes of Distribution		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Describe the shapes of data distributions. • Use the shapes of data distributions to choose appropriate measures. • Compare data distributions.	**Warm-Up:** **Cumulative Practice**: identifying functions **Prerequisite Skills Practice:** finding mean, median, and mode of a data set	**Basic:** 3, 9, 15, 19 **Proficient:** : 4, 10, 16, 20 **Advanced:** 4, 10, 14, 20

Section 11.4: Two-Way Tables		
Specific Learning Objective	**Warm-Up/Starting Options**	**Practice & Apply Exercises**
• Find and interpret marginal frequencies. • Make two-way tables. • Find relative and conditional relative frequencies. • Use two-way tables to recognize associations in data.	**Warm-Up:** **Cumulative Practice**: writing recursive rules **Prerequisite Skills Practice:** simplifying fractions	**Basic:** 9, 15, 17, 23, 25 **Proficient:** : 10, 16, 18, 24, 26 **Advanced:** 12, 16, 18, 24, 28

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