Algebra 1

Grade 9

Prepared by:

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Superintendent of Schools:

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Algebra 1

Course Description:

Algebra I is taught in eight units throughout the school year. The Algebra I curriculum is a rigorous, open-ended and sequential process of connecting previously learned algebraic topics and expanding them to include polynomial expressions, quadratic equations and exponential functions. As part of the spiraling curriculum, aspects of Pre-Algebra and elementary Geometry are taught throughout the year. A guided inquiry program gives students the opportunity to explore topics and concepts through mathematical investigations.

Taking part in this course helps students:

1. To foster a lifelong enjoyment of learning mathematics.
2. To observe mathematics in the world around them.
3. To meet the mathematics standards for New Jersey Public Schools.

Course Sequence:

Unit 1: Number Properties and Operations in Algebra: 13 days
Unit 2: Equations and Inequalities: 32 days
Unit 3: Graphing Linear Equations and Functions: 27 days
Unit 4: Writing Linear Equations: 17 days
Unit 5: Systems of Equations and Inequalities: 24 days
Unit 6: Exponents and exponential Functions: 21 days
Unit 7: Polynomials and Factoring: 24 days
Unit 8: Quadratic Equations and Functions: 19 days

**The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 48 minutes of seat time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.*

Pre-requisite:

Pre-Algebra

Unit # 1 - Overview	
Content Area: Algebra 1	
Unit Title: Number Properties and Operations in Algebra	
Grade Level: 9	
Core Ideas: Students will learn the subsets of the real number system and will be able to categorize numbers into designated subcategories. Students will also simplify and evaluate algebraic expressions. They will identify patterns and apply order of operations to solve real-world problems.	
Unit # 1 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
NJSLS.A-SSE.A.1	Interpret expression that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity.
NJSLS.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture
8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA

Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
● What are the different sets of numbers that make up the number system? ● What are the rules of algebra and how are they used? ● How are patterns identified and used in real life?	● There are different sets of numbers: natural, whole, integers, rational, irrational, and real. ● The number line represents the entire set of real numbers. ● When opposites are added, the sum is always zero. ● The sum of zero and a number is always that number. ● To subtract a number, add its opposite. ● The product and quotient of two numbers with the same sign is positive.

	• The quotient and product of two numbers with opposite signs is negative. • There is a specific order for performing arithmetic operations. • All real numbers can be used in certain patterns, called properties: commutative, associative, and distributive. • To evaluate a variable expression, replace the variable with a number.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials: https://njctl.org/materials/courses/algebra-i-6-12/	**Key Vocabulary:** Natural numbers, whole numbers, integers, rational numbers, irrational numbers, real numbers, opposites, Commutative Property, Associative Property, Distributive Property

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
The Real Number System	-Defining, classifying, and using whole numbers, natural numbers, integers, rational numbers, irrational numbers, and real numbers	Lesson, Application, Review	2 days
Order of Operations	-Applying order of operations to simplify arithmetic expressions and to solve real-world problems	Lesson, Application, Review	2 days
Properties of Algebra	-Applying the properties of algebra to simplify expressions	Lesson, Application, Review	4 days
Algebraic Expressions	-Evaluating algebraic expressions by using direct substitution -Writing algebraic expressions	Lesson, Application, Review	2 days

Teacher Notes: 13 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP modifications/accommodations	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 2 - Overview	
Content Area: Algebra 1	
Unit Title: Equations and Inequalities	
Grade Level: 9	
Core Ideas: Students will learn the differences and similarities between an expression, an equation, an inequality, and absolute value equations and inequalities. They will be able to solve linear equations and inequalities in one variable by applying inverse operations. They will be able to represent the solution set of a linear equation or an inequality in one variable both algebraically and graphically on a number line. They will learn that the similarities and differences between equations and inequalities are reflected in the use of different symbols, procedures for determining the solution(s), and the type/number of solution(s). They will learn the properties of the absolutes value functions and the uniqueness of its solution set within equations and inequalities. Students will also be able to use linear equations and inequalities in one variable to solve real-life problems.	
Unit # 2 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients b. Interpret complicated expressions by viewing one or more of their parts as a single entity.
NJSLS.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
NJSLS.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
NJSLS.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
NJSLS.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture
8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.

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	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA
Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
● What are the relationships between expression and equations? ● What are equations and inequalities? How are they solved? How can their solutions be represented?	● Like terms can be combined. ● An equation is a statement that two numbers or expressions are equal. ● Addition and subtraction are inverse operations. ● Multiplication and division are inverse operations.

• How are variables, expressions, equations, inequalities and their solutions used to represent real world phenomena?	• Variables, expressions, and equations are used to translate, the representation of real world situations from verbal to symbolic which often models the extension of a specific instance to a general formula. • Similarities and differences between equations and inequalities are reflected in the use of different symbols and procedures for determining the solution(s) and the type/number of solution(s). • The solutions of an equation are the values of the variable that make the equation true. • Equations and inequalities may have one solution, infinitely many solutions, or no solutions. • A solution set for an equation or an inequality can be represented symbolically, algebraically, and graphically.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:	**Key Vocabulary:**
https://njctl.org/materials/courses/algebra-i-6-12/	Expressions, equations, inequalities, like terms, inverse operations, variables, absolute value, literal equations

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Solution Sets and Mathematical Statements	-Identifying the solution set when given a replacement set -Writing mathematical statements for given verbal phrases	Lesson, Application, Review	2 days
One and Two-Step Equations	-Solving one and two-step equations by applying order of operations and inverse operations	Lesson, Application, Review	3 days
Multi-Step Equations	-Solving multi-step equations with rational coefficients, including equations with variables on both sides	Lesson, Application, Review	4 days
Absolute Value Equations	-Solving multi-step absolute value equations -Graphing the solutions sets of absolute value equations	Lesson, Application, Review	4 days
Literal Equations	-Solving literal equations or formulas for given variables, including complex formulas	Lesson, Application, Review	2 days
Writing Inequalities	-Writing an inequality to describe a given situation -Writing inequalities for given graphs	Lesson, Application, Review	3 days
Multi-Step Inequalities	-Solving single-variable, multi-step inequalities -Graphing the solution sets on a number line	Lesson, Application, Review	4 days

Absolute Value Inequalities	-Solving absolute value inequalities, paying particular attention to conjunction and disjunction solution sets -Graphing the solution sets on a number line	Lesson, Application, Review	4 days
Applications of Equations and Inequalities	-Using formulas, equations, and inequalities to solve real-life problems	Lesson, Application, Review	3 days
Teacher Notes: 32 total days including assessment days (quizzes, test)			
Additional Resources:			

Differentiation/Modification Strategies				
Students with Disabilities	**English Language Learners**	**Gifted and Talented Students**	**Students at Risk**	**504 Students**
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP modifications/accommodations	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 3 - Overview	
Content Area: Algebra 1	
Unit Title: Graphing Linear Equations and Functions	
Grade Level: 9	
Core Ideas: Students will look at how to graph linear equations and the different forms the equations can be written in. Students will also learn how write the equation of a line with given qualities. The relationships between in vertical and horizontal lines, parallel lines, and perpendicular lines will be covered	
Unit # 3 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
NJSLS.A-REI.D.10	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 (which could be a line).
NJSLS.A-REI.D.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
NJSLS.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
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Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
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CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
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Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
• What is meant by the slope of a line? • How can knowing a line's slope help to graph a line? • How can knowing a line's slope help to find parallel and perpendicular lines? • What types of real-world situations can be modeled with linear functions?	• Slope (rate of change) • How to graph a line • Know the different forms the equation of a line can take • Intercepts of a line • Horizontal and vertical lines • Parallel lines and their slopes • Perpendicular lines and their slopes • How to write the equation of a line given characteristics of line

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:	**Key Vocabulary:**
https://njctl.org/materials/courses/algebra-i-6-12/	slope, intercepts, parallel lines, perpendicular lines, standard form of a linear equation, slope-intercept form of a linear equation, point-slope form of a linear equation, direct variation, constant of variation, one-to-one equation, function

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Plotting Points in a Coordinate Plane	-Identifying and plotting points in a coordinate plane	Lesson, Application, Review	1 day
Graphing Linear Equations	-Graphing linear equations in a coordinate plane given a table of values	Lesson, Application, Review	4 days
Graphing Using Intercepts	-Graphing linear equations in a coordinate plane using given intercepts -Finding the intercepts from a given equations -Re-writing the equation of a line in standard form	Lesson, Application, Review	3 days
Finding Slope and Rate of Change	-Finding the slope of a line -Interpreting the slope as a rate of change	Lesson, Application, Review	4 days
Graphing Using Slope-Intercept Form	-Graphing linear equations in a coordinate plane given an equation in slope-intercept form -Identifying the slope and y-intercept from an equation -Re-writing the equation of a line in slope-intercept form	Lesson, Application, Review	3 days
Modeling Direct Variation	-Writing and graphing direct variation equations -Identifying the constant of variation	Lesson, Application, Review	1 day
Graphing Linear Functions	-Using function notation to write linear functions -Identifying which equations can be classified as functions -Identifying the difference between a function and a one-to-one equation	Lesson, Application, Review	4 days
Graphing Linear Inequalities in Two Variables	-Graphing linear inequalities in two variables with emphasis on the connection to graphing single-variable inequalities	Lesson, Application, Review	4 days

Teacher Notes: 27 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees

modifications/accommodations			for specific behavior interventions -Provide extended time to complete tasks (on need basis)	to come up with procedures/504 accommodations

Unit # 4 - Overview	
Content Area: Algebra 1	
Unit Title: Writing Linear Equations	
Grade Level: 9	
Core Ideas: Students will work on writing equations of lines in slope-intercept form, given three situations: the slope and y-intercept; the slope and a point; or two points, writing and graphing equations using the slope and a point, using a graph of the line, or using real world data, writing equations of lines in standard form, and using these equations to solve real-world problems, writing and finding equations of lines parallel or perpendicular to a given line. Students will also learn to make scatter plots of data, and use lines of fit and the best-fitting line to model data and to make predictions	
Unit # 4 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.F-IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
NJSLS.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increases, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.
NJSLS.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
NJSLS.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
NJSLS.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases, and using technology for more complicated cases.
NJSLS.A-CED.A.1	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*
NJSLS.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales
NJSLS.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
NJSLS.F-BF.A.1	Write a function that describes a relationship between two quantities.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture

8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA
Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed

Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
• How can equations of lines be used to solve real world problems? • How can models of data be used to make predictions? • What role does slope play in real-word problems?	• Take a word problem, identify a variable, draw a diagram. • Write an equation, solve the equation, and answer the problem.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:	**Key Vocabulary:**
https://njctl.org/materials/courses/algebra-i-6-12/	linear models, slope-intercept form, point-slope forms

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Writing and Using Linear Equations in Slope-Intercept Form	-Writing equations of lines in slope-intercept form given two points -Writing equations of lines in slope-intercept form given the slope and a point	Lesson, Application, Review	4 days
Writing Linear Equation in Point-Slope Form	-Writing equations of line in point-slope form given two points -Writing equations of lines in point-slope form given the slope and a point	Lesson, Application, Review	3 days
Writing Linear Equations in Standard Form	-Writing equations of lines in standard form given two points -Writing equations of lines in standard form given the slope and a point	Lesson, Application, Review	3 days
Writing Equations of Parallel and Perpendicular Lines	-Writing equations of parallel and perpendicular lines given a description of characteristics -Writing equations of parallel and perpendicular lines given another equation	Lesson, Application, Review	2 days
Fitting a Line to Data	-Drawing scatter plots given a set of data -Identifying the line of best fit -Writing the equation of the line of best fit to model the given data	Lesson, Application, Review	1 day
Predicting with Linear Models	-Finding the line of best fit for a given set of data -Making predictions using the line of best fit	Lesson, Application, Review	1 day

Teacher Notes: 17 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments	-Allow errors in speaking -Rephrase questions, directions, and explanations	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans	-Rephrase questions, directions, and explanations -Allow extended time on assessments

-Consult with Case Managers and follow IEP modifications/accommodations	-Allow extended time on assessments		-Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 5 - Overview	
Content Area: Algebra 1	
Unit Title: Systems of Equations and Inequalities	
Grade Level: 9	
Core Ideas: Students will use graphing, substitution, and elimination to solve systems of linear equations. In this unit students will also identify linear systems as having one solution, no solution, or infinitely many solutions. Solving systems of linear inequalities will also be covered.	
Unit # 5 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
NJSLS.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a model context.
NJSLS.A-REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
NJSLS.A-REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
NJSLS.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equations 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.
NJSLS.A-REI.D.12	Graph the solution to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
NJSLS.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture
8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	

LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA
Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
● How can real world situations be modeled by systems?	● The point at which lines intersect is the solution

• How can solutions be found to a system? • What does a solution to a system represent?	to the system with those lines. • That the overlap of the half planes of a system of inequalities is the solution set of the system.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:	**Key Vocabulary:**
https://njctl.org/materials/courses/algebra-i-6-12/	System of equations, substitution, elimination, infinite solutions, point of intersection

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Solving Linear Systems by Graphing	-Graphing systems of linear equations -Identifying the point of intersections both exactly and approximately	Lesson, Application, Review	4 days
Solving Linear Systems by Substitution	-Solving systems of linear equations by substituting	Lesson, Application, Review	4 days
Solving Linear Systems by Adding or Subtracting	-Solving systems of linear equations using elimination by way of addition or subtraction	Lesson, Application, Review	3 days
Solving Linear Systems by Multiplying First	-Solving systems of linear equations using elimination but first multiplying by constants	Lesson, Application, Review	4 days
Solving Special Types of Linear Systems	-Identifying the number of solutions of a linear system -Distinguishing between infinite solutions and no solution	Lesson, Application, Review	2 days
Solving Systems of Linear Inequalities	-Graphing systems of linear inequalities -Identifying the solution region on the coordinate grid	Lesson, Application, Review	4 days

Teacher Notes: 24 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP modifications/accommodations	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 6 - Overview	
Content Area: Algebra 1	
Unit Title: Exponents and Exponential Functions	
Grade Level: 9	
Core Ideas: Students will examine the uses of the properties of exponents involving products and quotients. Students will apply the product of powers property, the power of a power property, the power of a product property, the quotient of powers property, and the power of a quotient property. Students will also use zero and negative exponents, scientific notation, and will write and graph rules for exponential functions, including exponential growth and decay.	
Unit # 6 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales
NJSLS.A-SSE.B.3c	Use the properties of exponents to transform expressions for exponential functions.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.1.12.CDM.8	Compare and compute interest and compound interest
9.1.12.PB.6	Describe and calculate interest and fees that are applied to various forms of spending, debt and saving
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture
8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA

Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
● How can we apply properties of exponents to simplify expressions? ● How can we write and graph exponential functions?	● Understand properties of exponents and product properties. ● Understand the rules for exponents. ● Understand what exponential growth and exponential decay is. ● Understand the difference between growth/decay rates and growth/decay factors.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials: https://njctl.org/materials/courses/algebra-i-6-12/	**Key Vocabulary:** base, exponent, exponential growth, exponential decay, growth/decay rates, growth/decay factors

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Applying Exponent Properties Involving Products	-Using the product property of exponents to simplify expressions -Extend the property to multiple bases	Lesson, Application, Review	4 days
Applying Exponent Properties Involving Quotients	-Using the quotient property of exponents to simplify expressions -Extend the property to multiple bases	Lesson, Application, Review	4 days
Defining and Using Zero and Negative Exponents	-Using the zero exponent property to simplify expressions -Using the negative exponent property to simplify expressions	Lesson, Application, Review	4 days
Writing and Graphing Exponential Growth Functions	-Identifying and graphing exponential growth -Identifying growth rates and factors	Lesson, Application, Review	3 days
Writing and Graphing Exponential Decay Functions	-Identifying and graphing exponential decay -Identifying decay rates and factors	Lesson, Application, Review	3 days

Teacher Notes: 21 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP modifications/accommodations	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 7 - Overview
Content Area: Algebra 1
Unit Title: Polynomials and Factoring
Grade Level: 9
Core Ideas: Students will explore the operations that can be done with polynomials. They will define, classify, add, subtract, and multiply polynomial expressions. Students will use the distributive property to find products and patterns, including the FOIL pattern, the square of a binomial pattern, and the sum and difference patterns. Students will use polynomials to describe and solve real world problems, as well as solve polynomial equations. They will factor polynomials in order to solve equations, to find zeros of functions, and to find the roots of equations.

Unit # 7 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it.
NJSLS.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
NJSLS.A-APR.A.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
NJSLS.A-APR.B.3	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.
NJSLS.A-REI.B.4b	Solve quadratic equations in one variable. b. Solve quadratic equations by inspection, 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.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture
8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.

Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA
Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed
Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):	**Unit Enduring Understandings:**
● What is a polynomial? ● What operations and/or procedures can be used to simplify polynomial expressions? ● How are polynomials applied to real-life situations? ● How is mathematical language use to describe a	● If the product of two factors is zero, one of the factors is zero. ● To add or subtract polynomials, only like terms can be combined. ● To multiply polynomials, each term of one

nonlinear change?	polynomial is multiplied to each term of the second polynomial. ● Factoring is another way or rewriting a polynomial. ● Polynomials are constant, linear, and nonlinear expressions that have specific characteristics.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:	**Key Vocabulary:**
https://njctl.org/materials/courses/algebra-i-6-12/	Polynomials, monomial, binomial, trinomial degree of a polynomial, factoring, quadratics, GCF, difference of two squares, perfect square trinomials, Quadratic Formula

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Classifying Polynomials	-Defining and using the terms polynomial, monomial, binomial, and trinomial to classify polynomials -Finding the degree of a polynomial and writing the expressions in standard form	Lesson, Application, Review	1 day
Add and Subtract Polynomials	-Adding and subtracting polynomial expressions by identifying and combining like terms	Lesson, Application, Review	2 days
Multiply Polynomials	-Multiplying polynomials using the distributive property	Lesson, Application, Review	4 days
Special Products of Polynomials	-Identifying and recognizing special patterns within multiplication of polynomials, including the difference of two squares and perfect square trinomials	Lesson, Application, Review	2 days
Factoring Quadratic Expressions	-Factoring quadratic expressions, recognizing differences in the methods when the trinomial has a=1 and when a>1	Lesson, Application, Review	6 days
Factoring Special Products	-Identifying and recognizing special patterns when factoring polynomials, including the difference of two squares and perfect square trinomials	Lesson, Application, Review	2 days
Factoring Polynomials Completely	-Factoring polynomials by taking a GCF out first and then factoring by grouping	Lesson, Application, Review	4 days

Teacher Notes: 24 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments	-Allow errors in speaking -Rephrase questions, directions, and explanations	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans	-Rephrase questions, directions, and explanations -Allow extended time on assessments

-Consult with Case Managers and follow IEP modifications/accommodations	-Allow extended time on assessments		-Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations

Unit # 8 - Overview	
Content Area: Algebra 1	
Unit Title: Quadratic Equations and Functions	
Grade Level: 9	
Core Ideas: Students will compare and contrast quadratic equations and the parent function. They will look at a graph of a quadratic functions and recognize the axis of symmetry, the vertex, and minimum/maximum values. Students will solve quadratic equations by factoring, graphing, using square roots, and using the quadratic formula. They will use the discriminant to determine the number and type of solutions of a quadratic equation. Students will be able to present linear, exponential, and quadratic expressions as models for different sets/types of data.	
Unit # 8 - Standards	
Standards (Content and Technology)**:**	
CPI#:	**Statement:**
Performance Expectations (NJSLS)	
NJSLS.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
NJSLS.A-REI.B.4b	Solve quadratic equations by inspection, 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.
NJSLS.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equations 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.
NJSLS.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increases, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.
NJSLS.F-IF.C.7a	Graphing linear and quadratic functions and show intercepts, maxima, and minima.
NJSLS.F-BF.B.3	Identify the effect on the graph by replacing f(x) by f(x)+k, kf(x), f(kh), f(x+h) 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*.
Mathematical Practices	
MP 1	Make sense of problems and persevere in solving them.
MP 2	Reason abstractly and quantitatively.
MP 3	Construct viable arguments and critique the reasoning of others.
MP 4	Model with mathematics.
MP 5	Use appropriate tools strategically.
MP 6	Attend to precision.
MP 7	Look for and make use of structure.
MP 8	Look for and express regularity in repeated reasoning.
Career Readiness, Life Literacies, and Key Skills	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition
9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problems
Computer Science and Design Thinking	
8.1.12.CS.2	Model interactions between application software, system software, and hardware
8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture

8.2.12.EC.2	Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
LGBTQ and Disabilities NJSA 18A:35-4.35	Explore mathematicians in the LGBTQ and disabled community, including but not limited to Ron Buckmire, Professor of Mathematics at Occidental College in Los Angeles, Emily Riehl, Associate Professor of Mathematics at Johns Hopkins University in Baltimore and Stephen Hawking, former Director of Research at the University of Cambridge.
Amistad Law NJSA 18A:35-4.43	Explore African-American mathematicians and scientists, including but not limited to Martha Euphemia Lofton Haynes, the first African-American woman to earn a Ph.D in mathematics , and Elbert Frank Cox, the first African-American man to earn a Ph.D in mathematics in the world.
	Discuss and analyze the movie *Hidden Figures*, the story of female African-American mathematicians and engineers who worked for NASA
Holocaust Law NJSA 18A:35-28	Explore Jewish mathematicians using the article *"Jewish Mathematicians Who Changed the Course of History"* from *jewishjournal.com*
AAPI Law NJSA 18A:25-4.44	Explore Asian-American and Pacific Islander mathematicians and scientists, including but not limited to Dr. Peter Tsai, inventor of the N95 respirator and Diana Ma, data scientist and statistician for the Lakers
Companion Standards	
RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose and audience.
Interdisciplinary Connection	
6.1.12.HistorySE.14.a	Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society
6.1.12.HistorySE.14.b	Use a variety of sources from diverse perspective to analyze the social, economic and political contributions of marginalized and underrepresented groups and/or individuals.
CASEL 5 SEL Framework	
Self-Awareness	-Demonstrate honesty and integrity -Experience self-efficacy -Develop interests and a sense of purpose
Social Awareness	-Recognize strengths in others -Understand and express gratitude
Self-Management	-Identify and use stress management strategies -Exhibit self-discipline and self-motivation -Use planning and organizational skills
Relationship Skills	-Communicate effectively -Practice teamwork and collaborative problem-solving -Seek or offer support and help when needed

Responsible Decision-Making	-Demonstrate curiosity and open-mindedness -Learn to make a reasoned judgment after analyzing information, data, facts -Recognize how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):

- How do we solve quadratic equations?
- How do we solve systems with quadratic equations?
- How can we compare linear, exponential, and quadratic models?
- How do we model relationships?

Unit Enduring Understandings:

- Know how to graph quadratic functions.
- Compare quadratic functions to the parent graph.
- Find the axis of symmetry, the vertex, and minimum and maximum values.
- Solve quadratic equations by factoring, graphing, using square roots, and using the quadratic formula.
- Determine number and type of solutions of a quadratic equation.
- Determine whether a linear, exponential, or quadratic function best models a set of data.

Evidence of Learning

Formative Assessments: Do Now, Homework, On-spot Checking for Understanding, Teacher Feedback
Summative/Benchmark Assessment(s): Quizzes, Chapter Reviews, Chapter Tests
Alternative Assessments: Portfolios, Online Assignments

Resources/Materials:
https://njctl.org/materials/courses/algebra-i-6-12/

Key Vocabulary:
axis of symmetry, vertex, maximum, minimum, parabola, square roots, Quadratic Formula

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Graphing Quadratic Functions	-Graphing quadratic equations by using a table of values -Comparing graphs of quadratic functions to the parent function $y=x^2$	Lesson, Application, Review	3 days
Solving Quadratic Equations by Graphing	-Solving quadratic equations by graphing the parabola and identifying the zeros (points that cross the x-axis)	Lesson, Application, Review	2 days
Use Square Roots to Solve Quadratic Equations	-Solving quadratic equations by taking square roots -Recognizing that square roots also have a positive and negative value	Lesson, Application, Review	3 days
The Quadratic Formula	-Recognizing when a quadratic equation is not factorable -Applying the Quadratic Formula to solve quadratic equations	Lesson, Application, Review	4 days
Solving Systems with Quadratic Equations	-Solving systems of equations involving quadratics by comparing the strategies to solving systems of linear equations	Lesson, Application, Review	2 days
Compare Linear, Exponential, and Quadratic Models	-Comparing and contrasting linear, exponential and quadratic functions -Using the appropriate function to model real-world relationships	Lesson, Application, Review	2 days

Teacher Notes: 19 total days including assessment days (quizzes, test)

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504 Students
-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Case Managers and follow IEP modifications/accommodations	-Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time on assessments	-Provide extension activities -Build on students' intrinsic motivations	-Consult with Guidance Counselors and follow I&RS procedures and action plans -Consult with classroom teacher(s) for specific behavior interventions -Provide extended time to complete tasks (on need basis)	-Rephrase questions, directions, and explanations -Allow extended time on assessments -Consult with Guidance Counselors and 504 Committees to come up with procedures/504 accommodations