E^4

Excellence through Equity, Engagement, and Environment

Washington Township School District

Course Title:	**Essentials for Algebra (course #317)**
Grade Level(s):	**Grade 9**

Duration:	*Full Year:*	**X**	*Semester:*		*Marking Period:*	
Course Description:	This course is designed to strengthen a student's foundational mathematical skills and conceptual understanding by focusing on essential pre-algebraic concepts. It will ease the transition from basic mathematical concepts learned in middle school to more abstract algebraic concepts and equip students with the necessary skills and confidence to excel in Algebra 1. Students will work on operations within the real number system; proportional reasoning with similarity, rates and ratios; algebraic expressions, equations and inequalities; and real-world applications.					
Grading Procedures:	Each semester will be a composite of quiz scores, test scores, and supportive assignments such as homework and classwork reflecting a student's mastery of the areas outlined above. The student can pass the course with an overall average of 60%. The individual teacher will explain the grading system to the student.					
Primary Resources:	**NJ Student Learning Standards**					

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

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Under the Direction of:	Allison Krzyminski

Written: **August 2024**

Revised: _____

BOE Approval: _____

Unit 1: Understanding Real Numbers

Unit Description: This unit gives the foundations of the real number system, combined with prior knowledge of operations with integers. The unit starts with vocabulary pertaining to the real number system such as rational and irrational. This foundation leads the way to comparing integers and rational numbers on a number line, and performing operations such as adding, subtracting, multiplying and dividing. The unit then moves into order of operations which will be pertinent to evaluating expressions in later units.

Unit Duration: 15 Days

Desired Results

Standard(s):

6-NS.C: Apply and extend previous understandings of numbers to the system of rational numbers

7-NS.A: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP5: Use Appropriate Tools Strategically
MP6: Attend to precision..
MP8: Look for and Express Regularity in Repeated Reasoning

Indicators:

6-NS.C.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6-NS.C.6: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
6-NS.C.6.a: Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3)=3, and that 0 is its own opposite.
6-NS.C.7.a: Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
7-NS.A.1a: Describe situations in which opposite quantities combine to make 0.

7-NS.A.1b: Understand $p+q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

7-NS.A.1c: Understand subtraction of rational numbers as adding the additive inverse, $p-q=p+(-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply th principle in real-world contexts.
7-NS.A.1d: Apply properties of operations as strategies to add and subtract rational numbers.
7-NS.A.2a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1)=1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

7-NS.A.2b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number.

7-NS-A.2c: Apply properties of operations as strategies to multiply and divide rational numbers.

Understandings:
Students will understand that…

- All numbers can fall under two categories: rational or irrational.
- The subset of rational numbers are integers, whole numbers, and natural numbers.
- That they can use a number line to add and subtract integers.
- The effects of multiplying with and without negative integers.
- The order of operations is important to correctly use operations with integers.
- The place value system (what it means to round to tenths, hundreds, etc)

Essential Questions:

- What happens when you add, subtract, multiply, and divide integers?
- What happens when you add, subtract, multiply, and divide fractions?
- How do you classify numbers in the real number system?
- How does the order in which you perform operations affect the solution?

Assessment Evidence

Formative Assessment Opportunities:

- Classwork assignments (practice worksheets, stations, group work, online assignments and activities, explorations, investigations, etc.)
- Homework Assignments (worksheets, online assignments, etc.)
- Class participation and preparation
- Use of digital platforms (Quizizz, Formative, Kahoot, Schoology, iready)

Summative Assessments:

- Quizzes
- Tests
- Projects

Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics: Guided Notes, Worksheets, Do Nows, Practice Activities

Section 1: Classifying Real Numbers (~~2~~ 3 Days)

- Vocabulary: Rational, Irrational, Integer, Whole Number, Natural Number
- Classify numbers into the real number system

Section 2: Comparing and Ordering Integers (~~2~~ 1/2 Days~~s~~)

- Placing integers in order on a number line

Section 3 Part 1: Operations with Integers (~~3~~ 1.5 Days)

- Add integers
- Subtract integers

Quiz Review & Quiz (2 Days)

Section 3 Part 2: Operations with Integers (4 2 Days)

- Multiply and compare integers
- Divide integers and round using place value

Section 4: Order of Operations (~~2~~ 1 Days)

- PEMDAS

Section 5: Evaluating Expressions (3 Days)

- Substituting variables with integers and simplifying using order of operations.

Test Review & Test (2 Days)

Resources: Desmos, online resources, i-ready, IXL, etc.

Unit Accommodations and Modifications for Special Population Students	
Advanced Learners	Continue working towards mastery of i-Ready skills.
Struggling Learners	Anchor charts/computation tables: Provide students with computation charts to shift the focus from the memorization of the facts (automaticity) to thinking critically about the problem itself. Anchor charts make thinking visible and are used as a management tool for students to self-monitor their learning. Manipulatives: Manipulatives give students an opportunity to use concrete objects to practice math concepts. The objects provide more engagement, which helps students stay more connected to the assignment. The size and type of manipulatives can be modified based on student needs (e.g., six sided vs. polyhedral dice or numerical dice vs. dot dice). Graph paper: Used to assist students in organizing their rows/columns in an algorithm. Provide answers: When students are provided the answers to a calculation or word problem at the onset of the work, the focus is placed on the modeling, reasoning and communication of mathematics.
English Language Learners	Modifications are **required** to be used in content-area classrooms where a student has limited English proficiency. These modifications are given based on the English proficiency of the student while maintaining the rigor of the content. Sheltered English Instruction strategies are utilized to provide students with limited English proficiency access to grade-level, mainstream content while promoting English proficiency development. NJDOE ELL Resources Can-Do Descriptions for Proficiency Levels Grades 9-12
Learners with an IEP	Each special education student has an Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: ● Variation of time: adapting the time allotted for learning, task completion, or testing ● Variation of input: adapting the way instruction is delivered ● Variation of output: adapting how a student can respond to instruction ● Variation of size: adapting the number of items the student is expected to complete ● Modifying the content, process or product Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities.
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

New Jersey Student Learning Standards for English Language Arts

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

New Jersey Student Learning Standards for Technology Education

9.4.12.O.11: Apply active listening skills to obtain and clarify information.

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life Literacies & Key Skills

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.

Integration of 21st Century Skills, Technology, and Career Education

Indicators:

The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning:

Collaboration
Communication
Creativity

Unit 2: Understanding Equations

Unit Description:-This unit gives the foundations of solving linear equations by connecting it to students' prior skills with properties of equality. The unit starts by introducing the concept of a solution to a linear equation. This leads the way to applying inverse operations to solve one, two and eventually multi-step equations and equations with variables on both sides. Students will model real life scenarios to tie solving equations to real world concepts. By the end of this unit students will have mastered solving various types of linear equations.

Unit Duration: 22 Days

Desired Results

Standard(s):

A-SSE.A: Interpret the structure of expressions.

A-SSE.B: Write expressions in equivalent forms to solve problems.

7-EE.A: Use properties of operations to generate equivalent expressions.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP3: Construct viable arguments and critique the reasoning of others..
MP6: Attend to precision.
MP7: Look for and make use of structure.

Indicators:

A-SSE.A.1a: Interpret parts of an expression such as terms, factors, and coefficients.

A-SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

7-EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7-EE.A.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

Understandings:
Students will understand that…

- A variable represents an unknown value.
- parts of an expression can be defined with algebraic terminology
- There is an order to simplifying expressions
- Given the value of a variable, expressions can be evaluated using that value.
- Expressions may be simplified using the distributive property and combining like terms.
- Word phrases can be translated into algebraic expressions and vice versa.

Essential Questions:

- How would you use the distributive property to write an equivalent variable expression?
- How do you simplify an expression that has several terms?
- What is the difference between evaluating an expression and simplifying an expression?
- What is the correct way to simplify and evaluate an expressions
- How do we discuss algebraic and mathematical concepts in a common way?

Assessment Evidence

Formative Assessment Opportunities:

- Classwork assignments (practice worksheets, stations, group work, online assignments and activities, explorations, investigations, etc.)
- Homework Assignments (worksheets, online assignments, etc.)
- Class participation and preparation
- Use of digital platforms (Quizizz, Formative, Kahoot, Schoology, iready)

Summative Assessments:

- Quizzes
- Tests
- Projects

Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics:

Section 1: One Step Equations (3 Days)
- Solving a one step equation by adding and subtracting
- Solving a one step equation by multiplying and Dividing

Section 2: 2 Step Equations (3 Days)
- Solving a two step equation

Quiz Review and Quiz (2 Days)

Section 3: Combining Like Terms & Distributive Property (2 Days)
- Adding and subtracting variable expressions
- Apply the distributive property to simplify expressions.
- Distributing and combining like terms.

Section 4: Multi Step Equations (3 Days)
- Solving Multi-Step equations
- Combining like terms to solve an equation
- Using the distributive property to solve an equation

Quiz Review and Quiz (2 Days)

Section 5: Equations with Variables on both sides (5 Days)
- Solving an equation with variables on both sides
- Solving an equation using the distributive property
- Solving an equation with variables on both sides (Special Solutions)

Test Review and Test (2 Days)

Resources: Desmos, online resources, i-ready, IXL, etc.

Unit Accommodations and Modifications for Special Population Students

Advanced Learners	Continue working towards mastery of iready skills.
Struggling Learners	Anchor charts/computation tables: Provide students with computation charts to shift the focus from the memorization of the facts (automaticity) to thinking critically about the problem itself. Anchor charts make thinking visible and are used as a management tool for students to self-monitor their learning. Manipulatives: Manipulatives give students an opportunity to use concrete objects to practice math concepts. The objects provide more engagement, which helps students stay more connected to the assignment. The size and type of manipulatives can be modified based on student needs (e.g., six sided vs. polyhedral dice or numerical dice vs. dot dice). Graph paper: Used to assist students in organizing their rows/columns in an algorithm. Provide answers: When students are provided the answers to a calculation or word problem at the onset of the work, the focus is placed on the modeling, reasoning and communication of mathematics.

English Language Learners	Modifications are **required** to be used in content-area classrooms where a student has limited English proficiency. These modifications are given based on the English proficiency of the student while maintaining the rigor of the content. Sheltered English Instruction strategies are utilized to provide students with limited English proficiency access to grade-level, mainstream content while promoting English proficiency development. NJDOE ELL Resources Can-Do Descriptions for Proficiency Levels Grades 9-12
Learners with an IEP	Each special education student has an Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: ● Variation of time: adapting the time allotted for learning, task completion, or testing ● Variation of input: adapting the way instruction is delivered ● Variation of output: adapting how a student can respond to instruction ● Variation of size: adapting the number of items the student is expected to complete ● Modifying the content, process or product Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities.
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Interdisciplinary Connections

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Life Literacies & Key Skills

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.

Integration of 21st Century Skills, Technology, and Career Education

Indicators:
The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning:

Collaboration
Communication

Unit 3: Modeling Real World Scenarios (Word Problems)

Unit Description: In this unit, students will develop the skills necessary to translate real-world scenarios into mathematical equations, specifically focusing on linear equations. By analyzing a variety of word problems, students will learn to identify relevant information, formulate equations, and apply problem-solving strategies to find solutions.

Unit Duration: 3 Days

Desired Results

Standard(s):

A-CED: A- Create equations that describe numbers or relationships.

A-REI: A- Understand solving equations as a process of reasoning and explain the reasoning.
A-REI: B- Solve equations and inequalities in one variable.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP2: Reason abstractly and quantitatively.
MP3: Construct viable arguments and critique the reasoning of others..
MP4: Model with Mathematics.
MP6: Attend to precision.
MP7: Look for and make use of structure.
MP8: Look for and Express Regularity in Repeated Reasoning

Indicators:
HSA-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. Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.
HSA-REI.A.1: 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
HSA-REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Understandings:
Students will understand that…
- Creating equations in one variable can be used to solve real-life problems.
- Isolating the variable is key to solving linear equations.
- Properties of equality can be used to solve equations.

Essential Questions:
- How do equations help us solve problems?
- How do equations affect the way we think about solutions?
- What should be your first step when solving an equation?
- How do you solve an equation with the variables on both sides?

Assessment Evidence

Formative Assessment Opportunities:
- Classwork assignments (practice worksheets, stations, group work, online assignments and activities, explorations, investigations, etc.)
- Homework Assignments (worksheets, online assignments, etc.)
- Class participation and preparation
- Use of digital platforms (Quizizz, Formative, Kahoot, Schoology, iready)

Summative Assessments:
- Quizzes
- Tests
- Projects

Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics:

Section 1: Writing Algebraic Expressions (1 Day)
- Translate sentences into algebraic expressions.

Section 2: Modeling Real Life (1-2 step equations) (1 Day)
- Reading one and two step linear equation word problems and solving by writing the equation.
- Finding the perimeter of a shape using polynomials
- Finding the area of a rectangle using polynomials.

Review & Quiz (1 Day)

Resources: Desmos, online resources, i-ready, IXL, etc.

Unit Accommodations and Modifications for Special Population Students

Advanced Learners	Continue working towards mastery of i-Ready skills.
Struggling Learners	Anchor charts/computation tables: Provide students with computation charts to shift the focus from the memorization of the facts (automaticity) to thinking critically about the problem itself. Anchor charts make thinking visible and are used as a management tool for students to self-monitor their learning. Manipulatives: Manipulatives give students an opportunity to use concrete objects to practice math concepts. The objects provide more engagement, which helps students stay more connected to the assignment. The size and type of manipulatives can be modified based on student needs (e.g., six sided vs. polyhedral dice or numerical dice vs. dot dice). Graph paper: Used to assist students in organizing their rows/columns in an algorithm. Provide answers: When students are provided the answers to a calculation or word problem at the onset of the work, the focus is placed on the modeling, reasoning and communication of mathematics.
English Language Learners	Modifications are **required** to be used in content-area classrooms where a student has limited English proficiency. These modifications are given based on the English proficiency of the student while maintaining the rigor of the content. Sheltered English Instruction strategies are utilized to provide students with limited English proficiency access to grade-level, mainstream content while promoting English proficiency development. NJDOE ELL Resources Can-Do Descriptions for Proficiency Levels Grades 9-12

Learners with an IEP	Each special education student has an Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: ● Variation of time: adapting the time allotted for learning, task completion, or testing ● Variation of input: adapting the way instruction is delivered ● Variation of output: adapting how a student can respond to instruction ● Variation of size: adapting the number of items the student is expected to complete ● Modifying the content, process or product Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities.
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

New Jersey Student Learning Standards for English Language Arts

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

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New Jersey Student Learning Standards for Technology Education

9.4.12.O.11: Apply active listening skills to obtain and clarify information.

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life Literacies & Key Skills

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.

Integration of 21st Century Skills, Technology, and Career Education

Indicators:

The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning:

Collaboration
Communication
Critical Thinking
Creativity

Unit 4: Understanding Inequalities

Unit Description: In this unit, students will explore inequalities. The unit will start by getting familiar with the symbols used in inequalities and what they mean. Next, students will learn how to graph these inequalities on a number line to see the solutions visually. Finally, the unit will move into solving inequalities, where students will practice finding answers and representing them on a number line. By the end of the unit, students will have a solid understanding of inequalities and be able to work with them confidently.

Unit Duration: 11 Days

Desired Results

Standard(s):

A-CED: A- Create equations that describe numbers or relationships.
A-REI: B- Solve equations and inequalities in one variable.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP2: Reason abstractly and quantitatively.
MP3: Construct viable arguments and critique the reasoning of others..
MP4: Model with Mathematics.
MP6: Attend to precision.
MP8: Look for and Express Regularity in Repeated Reasoning

Indicators:

HSA-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. Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.

HSA-REI.B.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Understandings:
Students will understand that…

- An inequality symbol is different from an equality symbol.
- Each inequality symbol has a specific meaning.
- Solving an inequality in one variable has multiple solutions
- Solving a one variable linear inequality uses a similar procedure as solving an equation.
- The solutions to an inequality in one variable can be graphed on a number line.
- Multiplying or dividing by a negative integer when solving an inequality will affect the solution set.

Essential Questions:

- What is an inequality and how does it relate to real world modeling?
- How do inequalities help us solve problems?
- How do inequalities affect the way we think about solutions?
- What should be your first step when solving an inequality?
- What is an example of an inequality that can be solved using the addition or subtraction property of inequality?
- When does the inequality symbol need to be reversed when solving an inequality?
- How are linear inequalities similar to and different from linear equations?

Assessment Evidence

Formative Assessment Opportunities:

- Classwork assignments (practice worksheets, stations, group work, online assignments and activities, explorations, investigations, etc.)
- Homework Assignments (worksheets, online assignments, etc.)
- Class participation and preparation
- Use of digital platforms (Quizizz, Formative, Kahoot, Schoology, iready)

Summative Assessments:

- Quizzes
- Tests
- Projects

Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics:

Section 1: Understanding and Applying Inequality Symbols (2 Days)
- Define inequality symbols.
- Comparing integers using inequality symbols.
- Graphing inequalities on a number line.
- Writing inequalities based on the graph.

Section 2: Solution Sets and Graphing Inequalities (1 Days)
- Graph an inequality in one variable on a number line
- Identify possible solutions to a inequality expression

Quiz Review and Quiz (2 Days)

Section 3: Solving One Step Inequalities (2 Days)
- Adding and Subtracting
- Multiplying and Dividing with positive integers

Section 4: Solving Multi- Step Inequalities (4 Days)
- Solving a two-step inequality in one variable
- Solving a multi-step inequality in one variable

Test Review & Test (2 Days)
This Test combines Units 3 and 4.

Resources: Desmos, online resources, i-ready, IXL, etc.

Unit Accommodations and Modifications for Special Population Students

Advanced Learners	Continue working towards mastery of i-Ready skills.
Struggling Learners	Anchor charts/computation tables: Provide students with computation charts to shift the focus from the memorization of the facts (automaticity) to thinking critically about the problem itself. Anchor charts make thinking visible and are used as a management tool for students to self-monitor their learning. Manipulatives: Manipulatives give students an opportunity to use concrete objects to practice math concepts. The objects provide more engagement, which helps students stay more connected to the assignment. The size and type of manipulatives can be modified based on student needs (e.g., six sided vs. polyhedral dice or numerical dice vs. dot dice). Graph paper: Used to assist students in organizing their rows/columns in an algorithm. Provide answers: When students are provided the answers to a calculation or word problem at the onset of the work, the focus is placed on the modeling, reasoning and communication of mathematics.
English Language Learners	Modifications are **required** to be used in content-area classrooms where a student has limited English proficiency. These modifications are given based on the English proficiency of the student while maintaining the rigor of the content. Sheltered English Instruction strategies are utilized to provide students with limited English proficiency access to grade-level, mainstream content while promoting English proficiency development. NJDOE ELL Resources

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Interdisciplinary Connections

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Life Literacies & Key Skills

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Integration of 21st Century Skills, Technology, and Career Education

Indicators:

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Communication
Critical Thinking

Unit 5: Graphing Linear Functions

Unit Description: This unit provides a comprehensive foundation in graphing linear equations, beginning with a review of the Cartesian plane. Students will examine key concepts including quadrants, axes, and ordered pairs. This review facilitates an introduction to the concept of slope, emphasizing its significance in determining the steepness of a line. Additionally, students will learn to graph linear functions, starting with manual table construction and progressing to the use of graphing calculators. The unit ends with the application of graphing linear equations in slope-intercept form, where students will analyze and identify the slope and y-intercept of the line.

Unit Duration: 22 Days

Desired Results

Standard(s):

6-NS.C: Apply and extend previous understandings of numbers to the system of rational numbers.

8-EE.B: Understand the connections between proportional relationships, lines, and linear equations.

HSF-IF.B: Interpret functions that arise in applications in terms of the context.

HSF-IF.C: Analyze functions using different representations.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP4: Model with Mathematics.
MP5: Use Appropriate Tools Strategically
MP6: Attend to precision.
MP7: Look for and make use of structure.

Indicators:

6-NS.C.8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

8-EE.B.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

8-EE.B.6: Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

HSF-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.

HSF-IF.C.7a: Graph linear and quadratic functions and show intercepts, maxima, and minima.

Understandings:
Students will understand that…

- an ordered pair has a specific location on the coordinate plane.
- slope is related to the steepness of a line.
- linear equations can be graphed by a table of values, intercepts, or slope-intercept form.

Essential Questions:

- How would you graph an equation in y = mx + b form?
- How do you find the slope and y - intercept of a line from the equation of the line?
- How can I use graphs to describe relationships?
- What is slope?
- What do intercepts mean?

Assessment Evidence

Formative Assessment Opportunities:

- Classwork assignments (practice worksheets, stations, group work, online assignments and activities, explorations, investigations, etc.)

Summative Assessments:

- Quizzes
- Tests
- Projects

• Homework Assignments (worksheets, online assignments, etc.) • Class participation and preparation • Use of digital platforms (Quizizz, Formative, Kahoot, Schoology, iready)	

Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics:

Section 1: Understanding the Cartesian Plane (2 Days)
- Vocabulary- axes and quadrants
- Plotting Ordered Pairs
- Identifying Location of ordered pairs

Section 2: Modeling Linear Data (2 Days)
- Making xy tables to graph linear equations

Quiz Review & Quiz (2 Days)

Section 3: Interpreting Slope of a Line (2 Days)
- Understanding steepness of a line (Slope)
- Understanding and identifying positive, negative, zero and undefined slopes
- Counting Rise over Run on a graph

Section 4: Graphing Linear Equations in Slope Intercept Form (3 Days)
- Identifying slope(m) and y-intercept(b)
- Graphing equation on a coordinate plane in slope intercept form
- Writing equations in slope intercept form from a graph.
- Writing equations in slope intercept form from a table.

Quiz Review & Quiz (2 Days)

Section 5: Writing Equations in slope intercept form (3 Days)
- Rewrite equations from standard form to slope intercept form. Identify slope, y-intercept and graph.

Test Review & Test (2 Days)

Resources: Desmos, online resources, i-ready, IXL, etc.

Unit Accommodations and Modifications for Special Population Students

Advanced Learners	Continue working towards mastery of i-Ready skills.
Struggling Learners	Anchor charts/computation tables: Provide students with computation charts to shift the focus from the memorization of the facts (automaticity) to thinking critically about the problem itself. Anchor charts make thinking visible and are used as a management tool for students to self-monitor their learning. Manipulatives: Manipulatives give students an opportunity to use concrete objects to practice math concepts. The objects provide more engagement, which helps students stay more connected to the assignment. The size and type of manipulatives can be modified based on student needs (e.g., six sided vs. polyhedral dice or numerical dice vs. dot dice). Graph paper: Used to assist students in organizing their rows/columns in an algorithm.

	Provide answers: When students are provided the answers to a calculation or word problem at the onset of the work, the focus is placed on the modeling, reasoning and communication of mathematics.
English Language Learners	Modifications are **required** to be used in content-area classrooms where a student has limited English proficiency. These modifications are given based on the English proficiency of the student while maintaining the rigor of the content. Sheltered English Instruction strategies are utilized to provide students with limited English proficiency access to grade-level, mainstream content while promoting English proficiency development. NJDOE ELL Resources Can-Do Descriptions for Proficiency Levels Grades 9-12
Learners with an IEP	Each special education student has an Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: ● Variation of time: adapting the time allotted for learning, task completion, or testing ● Variation of input: adapting the way instruction is delivered ● Variation of output: adapting how a student can respond to instruction ● Variation of size: adapting the number of items the student is expected to complete ● Modifying the content, process or product Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities.
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

New Jersey Student Learning Standards for English Language Arts

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

New Jersey Student Learning Standards for Computer Science and Design Thinking

8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

New Jersey Student Learning Standards for Technology Education

9.3.ST.1: Use technology to acquire, manipulate, analyze and report data.

9.4.12.O.11: Apply active listening skills to obtain and clarify information.

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

Life Literacies & Key Skills
9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions

Integration of 21st Century Skills, Technology, and Career Education

Indicators:

The P21 organization conducted research that identified deeper learning competencies and skills they called the Four Cs of 21st century learning:

Communication
Critical Thinking
Creativity

Unit 6: Understanding Exponents and Polynomials

Unit Description: This unit begins with a review of exponent properties, which are essential for successfully performing operations on polynomials. Students will explore the definition of polynomial functions and investigate specific types, including monomials, binomials, and trinomials. Following this foundational understanding, students will engage in operations on polynomials, encompassing addition, subtraction, and multiplication. The unit concludes with a review of techniques for determining the greatest common factor of whole numbers, thereby equipping students with the necessary skills for factoring polynomials in future algebraic studies.

Unit Duration: 22 Days

Desired Results

Standard(s):

N-RN.A: Extend the properties of exponents to rational exponents.

A-APR.A: Perform arithmetic operations on polynomials.

A-SSE.A: Interpret the structure of expressions.

6-NS.B: Compute fluently with multi-digit numbers & find common factors & multiples.

Mathematical Practices:
MP1: Make sense of problems and persevere in solving them.
MP2: Reason abstractly and quantitatively.
MP6: Attend to precision.
MP7: Look for and make use of structure.
MP8: Look for and Express Regularity in Repeated Reasoning

Indicators:

HSN-RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.

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.

A-SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficients.

6-NS.B.4: Find the greatest common factor of two whole numbers less than or equal to 100, and the least common multiple of two whole numbers less than or equal to 12.

Understandings:
Students will understand that…

- Exponential expressions can be simplified by applying the properties of exponents.
- Some polynomials can be further classified into a monomial, binomial and trinomial.
- Polynomials should be written in a standard form to easily identify degree and leading coefficient.
- Operations can be performed on polynomials.
- Two numbers have a greatest common factor.

Essential Questions:

- Why is it helpful to write numbers in different ways?
- How do you multiply two powers with the same base?
- How do you add two powers with the same base?
- How do you add two polynomials?
- How do you subtract two polynomials?
- How do you multiply two polynomials?
- How can you find the greatest common factor between two or more whole numbers?

Assessment Evidence

Formative Assessment Opportunities:

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Summative Assessments:

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Benchmarks: Successful completion of quizzes and test

Learning Plan

Learning topics:

Section 1: Applying Properties of Exponents (2 Days)
- Combining like terms with exponents
- Product Rule

Section 2: Polynomial Vocabulary (2 Days)
- Degree, Leading Coefficient
- Classifying a polynomial by the number of terms (Monomial, Binomial, Trinomial, and Polynomial)
- Standard Form of Polynomials

Section 3: Operations with Polynomials (3 Days)
- Adding Polynomials
- Subtracting Polynomials

Quiz Review & Quiz (2 Days)

Section 4: Operations with Polynomials (4 Days)
- Multiplication with polynomials FOIL

Section 5: Finding Factors
- Listing Factors of whole numbers
- Finding GCF between sets of numbers
- x Puzzles

Test Review & Test (2 Days)

Resources: Desmos, online resources, i-ready, IXL, etc.

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New Jersey Student Learning Standards for Computer Science and Design Thinking

Recognizing and Defining Computational Problems

The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.

New Jersey Student Learning Standards for Technology Education

9.4.12.O.17: Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.

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