Unit Title: Unit 1: The Set of Real Numbers, Linear Equations and Inequalities (18 days)

Stage 1: Desired Results

Standards & Indicators:

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

N-RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents

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

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.

N -Q A. 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formula.

N -Q A. 2. Define appropriate quantities for the purpose of descriptive modeling.

A-SSE A. Interpret the structure of expressions

A-SSE A1. Interpret expressions that represent a quantity in terms of its context.1 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.

A-SSE A 2. Use the structure of an expression to identify ways to rewrite it.

A-SSE B3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. \star Factor a quadratic expression to reveal the zeros of the function it defines.

A -APR A. Perform arithmetic operations on polynomials

A -APR A1. 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 -APR B3. Identify zeros of polynomials when suitable factorizations are available. C. Use polynomial identities to solve problems.

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

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.

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.

A -CED A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities.

A -REI A.Understand solving equations as a process of reasoning and explain the reasoning

A -REI A1. 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.

A -REI A2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A -REI B3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A-REI B4. Solve quadratic equations in one variable. a. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. b. Solve systems of equations

A-REI B5. 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.

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				
Standard	Performance Expectations	Core Ideas		
9.4.12.Cl.1	Demonstrate the ability to reflect, analyze, and	With a growth mindset,		
	use creative skills and ideas (e.g.,	failure is an important part		
	1.1.12prof.CR3a).	of success.		
9.4.12.CT.1 & 2	Identify problem-solving strategies used in the	Collaboration with		
	development of an innovative product or	individuals with diverse		
	practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	experiences can aid in the		
	Explain the potential benefits of collaborating to	problem-solving process,		
	enhance critical thinking and problem solving	particularly for global issues		
	(e.g., 1.3E.12profCR3.a).	where diverse solutions are		
		needed.		
9.4.12.TL.1	Assess digital tools based on features such as	Digital tools differ in		
	accessibility options, capacities, and utility for	features, capacities, and		
	accomplishing a specific task (e.g., W.11-12.6.).	styles. Knowledge of		
		different digital tools is		
		helpful in selecting the best		
		tool for a given task.		

Central Idea/Enduring Understanding:	Essential/Guiding Question:
Chapter 1	
Real numbers allow us to talk about parts of things, to	At the end of the Unit, students should be able to answer
expand our thinking, to explain phenomena in precise	the Essential Questions:
ways, and to operate with numbers in a consistent and	Chapter 1. How are symbols useful in mathematics?
predictable manner. In this chapter we will explore how	How can you find the solution to a math problem?
real numbers are used, and the way they open the	Chanter 2- How can mathematical ideas be represented?
door to algebra.	Chapter 2- now can mathematical deas be represented:
Chapter 2	
Equations are mathematical sentences that state a	
relationship between two or more mathematical	
expressions. Solutions for equations can be found by	
isolating the variable on one side of	
the equal sign using the Properties of Equality.	
Content:	Skills(Objectives):
<u>Content:</u> 1.3 Exponents, Square Roots, and the Order of	Skills(Objectives): Students will be able to:
<u>Content</u> : 1.3 Exponents, Square Roots, and the Order of Operations	Skills(Objectives): Students will be able to:
<u>Content</u> : 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality 2.2 Solving Linear Equations	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality Translate, set up and solve word problems some involving
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality 2.2 Solving Linear Equations 2.4 Introduction to Word Problems	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality Translate, set up and solve word problems some involving geometry
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality 2.2 Solving Linear Equations 2.4 Introduction to Word Problems 2.6 Formulas and Applications of Geometry	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality Translate, set up and solve word problems some involving geometry Set up and solve proportions
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality 2.2 Solving Linear Equations 2.4 Introduction to Word Problems 2.6 Formulas and Applications of Geometry 7.7 Applications of Rational Equations and Proportions	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality Translate, set up and solve word problems some involving geometry Set up and solve proportions Solve linear inequalities
Content: 1.3 Exponents, Square Roots, and the Order of Operations 1.4 Addition of Real Numbers 1.6 Multiplication and Division of Real Numbers 1.7 Properties of Real Numbers and Simplifying Expressions 2.1 Addition, Subtraction, Multiplication and Division Properties of Equality 2.2 Solving Linear Equations 2.4 Introduction to Word Problems 2.6 Formulas and Applications of Geometry 7.7 Applications of Rational Equations and Proportions 2.8 Solving Linear Inequalities	Skills(Objectives): Students will be able to: Simplify expressions by using the order of operations Simplify expressions with square roots Add, subtract, multiply and divide real numbers Translate verbal expressions into algebraic expressions and equations and vice versa Solve linear equations using the properties of equality Translate, set up and solve word problems some involving geometry Set up and solve proportions Solve linear inequalities

Interdisciplinary Connections: Interdisciplinary connections are integrated in each unit with connections to the mathematical practices.

Stage 2: Assessment Evidence

Performance Task(s):	Other Evidence:	
A -CED - Planning a Pizza Party	Do Nows	
https://curriculum.illustrativemathematics.org/HS/stude	Written Assignments	
nts/1/2/1/index.html	Exit Cards	
	Mid Chapter Quizzes	
Representing Situations with Inequalities	End of Chapter Assessments	
https://curriculum.illustrativemathematics.org/HS/stude		
nts/1/2/18/index.html		
Stage 3: Learning Plan		
Learning Opportunities/Strategies:	Resources:	
	Beginning Algebra by Miller, O'Neill, Hyde, 5th edition	
Think , Pair, Share	Calculator	
	Lesson Presentations	
Turn and talk	Video Presentations	
	Google Jamboards, Forms and Sheets	
Student driven activities	Kahoot	
	Desmos	

Help students to translate verbal sentences into	DeltaMath
equations and then solve the equations. For example,	
ask:	LGBT and Disabilities Resources:
sum, difference, product, and quotient	LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
 What are some words or phrases that describe addition? more than, increased by What are some words or phrases that describe subtraction? less than, decreased by How do you know when you need a variable? Phrases like "a number" or "a quantity" are used. The primary goal of solving an equation is to find the answer. What is a step that helps find the answer? Isolate the variable. What does it mean to "maintain equality" when 	 LGBTQ+ Books DEI Resources: Learning for Justice GLSEN Educator Resources Supporting LGBTQIA Youth Resource List Respect Ability: Fighting Stigmas, Advancing Opportunities NJDOE Diversity, Equity & Inclusion Educational Resources Diversity Calendar
solving an equation?	
Whatever operation you apply to one side of an equation, you must apply to the other side of the equation.	
Help students to solve linear inequalities using many of the same rules used for solving linear equations. For example, ask:	
 How can you isolate the variable x on one side of the inequality? Using inverse operations 	
• What step should you complete if you isolate the variable x by multiplication or division by a negative number? Reverse the inequality symbol.	
 What words or phrases in a word problem indicate an inequality? 	
at least: \geq , at most: \leq , less than: <, and greater than: >	
Differentiation	
*Please note: Teachers who have students with 504 plan Struggling and/or Special Needs Section for differentiation	s that require curricular accommodations are to refer to

Stugging and/or Special Needs Section for differentiation				
High-Achieving	On Grade Level	Struggling Students	Special Needs/ELL	
Students	Students			
Khan Academy Project based learning Tablets Challenging problems	Tutoring Tables Graphic organizers Differentiation of	Provide a highly structured, predictable learning environment	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might	

difficulty Higher order thinking Questions Differentiation of pacing and activities Differentiation of learning strategies: visual, auditory, kinetic and cooperative Enrichment and extension Technology connection Practice assignments Puzzle time activities Record and practice journals	isual, auditory, kinetic and cooperative Technology connection Practice Assignments Puzzle time activities Record and practice purnal Differentiating the esson activities Lesson tutorials Skills review handbook	organizers/study guides Lessons designed to the style of learning that matches the student Cooperative Learning Positive reinforcement Announce test with adequate prep time Lessons presentation available on google classroom Frequent check for understanding Break down task into manageable units One-on-one	breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries
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<u>Unit Title</u>: Unit 2 Graphing Linear Equations in Two Variables; Systems of Linear Equations in Two Variables (20 days)

Stage 1: Desired Results

Standards & Indicators:

F-IF A. -Understand the concept of a function and use function notation

F-IF A-1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

F-IFA.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F-IF B4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

F-IF B 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

F-IF B6. 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. Analyze functions using different representations

F-IF C7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

F-BF A-1 -Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities.

Mathematical Practices

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Career Readiness, Life Literacies and Key Skills				
Standard	Performance Expectations		Core Ideas	
9.4.12.Cl.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).		With a growth mindset, failure is an important part of success.	
9.4.12.CT.1 & 2	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).		Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).		Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	
Central Idea/Enduring Understanding: Chapter 3 In this chapter, we will study equations in x and y and their related graphs. This is important content for a variety of applications, including computer games Chapter 4 In this chapter, you will learn that the solution to systems are points of intersections. Also that some systems of linear equations have no solution,		Essential/Guiding Question: At the end of the Unit, students should be able to answer the Essential Questions: Chapter 3 - What are the 3 ways you can graph a linear equation? Chapter 4 - Why do we use different methods to solve math problems?		

indicating that the lines never intersect.Other systems may have infinitely many solutions. This occurs if the equations represent the same line.	
Content:	Skills(Objectives):
3.1 Rectangular Coordinate System	Students will be able to:
3.2 Linear Equations in Two Variables	-plot points in a coordinate plane
3.4 Slope Intercept Form of a Linear Equation	a system of linear systems
4.5 Graphing Linear Inequalities	-graph linear equations and inequalities
4.1 Solving Systems of Equations by Graphing Method	-find the slope given two points or an equation in standard
4.2 Solving Systems of Equations by Substitution	-determine if two lines are parallel perpendicular or neither
4.3 Solving Systems of Equations by Addition Method	-write an equation of a line given two points or a point and
	the slope
	-solve a system of equations by using three different methods to find both x and y
Interdisciplinary Connections:	
Interdisciplinary connections are integrated in each unit v	vith connections to the mathematical practices.
Stago 2: Asso	ssmont Evidonco
Stage 2. Asse	
Performance Task(s): F-BE Graphing Linear Inequalities in Two Variables	Other Evidence: Do Nows
https://curriculum.illustrativemathematics.org/HS/stude	Written Assignments
nts/1/2/21/index.html	Exit Cards
Solving Systems by Elimination	Mid Chapter Quizzes
https://curriculum.illustrativemathematics.org/HS/stude	
nts/1/2/14/index.html	
Stage 3: I	earning Plan
Learning Opportunities/Strategies:	
Think , Pair, Share	Beginning Algebra by Miller, O'Neill, Hyde, 5 th edition
	Calculator
Turn and talk	Lesson Presentations
Student driven activities	Google Jamboards Forms and Sheets
	Kahoot
Help students reason abstractly and quantitatively	Desmos
regarding the average rate of change and slope. Ask:	DeltaMath
	LGBT and Disabilities Resources:
• The rate of change is a ratio that compares what two	LGBTQ-Inclusive Lesson & Resources by Garden
quanules?	State Equality and Make it Better for Youth
Any two quantities; the rate of change is how much	• LODIQT DUUKS
one quantity changes, on average, relative to the	DEI Resources:
change in another quantity.	Learning for Justice
	GLSEN Educator Resources Supporting LGBTOIA Youth Resource List

 For linear functions, how do you find the rate of change? 	<u>Respect Ability: Fighting Stigmas, Advancing</u> <u>Opportunities</u>
Divide the change in the y-coordinates by the change in the x-coordinates.	 <u>NJDOE Diversity, Equity & Inclusion Educational</u> <u>Resources</u> <u>Diversity Calendar</u>
• What is another name for the average rate of change of a line? the slope	
Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. Help students to solve systems of linear equations both graphically and algebraically, and also to make sense of the key features of the graphs and equations. Ask:	
• How can you tell by looking at the graph whether or not there is a solution to a system of linear equations? by looking at the equations?	
There is a solution if the graphs of the lines intersect. There is a solution if the equations have different slopes or have the same slope and same y-intercept.	
• In a real-world problem involving a system of linear equations, what questions can you ask yourself to help you make sense of the problem?	
Sample answer: What do the variables in each equation represent? What does the slope of each equation tell me? Do the graphs of the lines intersect? If so, what does the intersection represent? Which solution method would work best to solve this problem?	
• After you find the x- and y-values for the intersection of two linear equations, how can you double-check your answer?	
Substitute your values for x and y into both equations and make sure that they are a solution of both equations.	
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life. Help students recognize situations in the real world that can be modeled with systems of inequalities. Ask:	
• Why are inequalities useful for many real-world situations?	

Because in the real world, solutions may not be exact but can consist of a range of values.
 Why is graphing a good way to show the solutions to a system of inequalities?
Because a graph shows the set of points that satisfy all of the inequalities. You can choose any point in that region and know that it will make each of the inequalities true. You don't have to guess which points might work
• What symbol should be used to show that x can be no more than a number n? to show that x must be at least n?
$x \le n; x \ge n$
 If the solution to a system of inequalities in a real-world problem is an enclosed region of a graph, does it mean that there must be an infinite number of solutions?
Not necessarily; in a real-world problem, the solutions might have to be whole numbers, for example, number of people. In that case, the solutions will include only the whole number coordinate pairs in the region, which will be a finite number.

Differentiation *Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Khan Academy	Tutoring	Provide a highly	Any student requiring further
Project based	Tables	structured,	accommodations and/or
learning Tablets	Graphic organizers	predictable	modifications will have them
Challenging problems	Differentiation of	learning	individually listed in their 504
with higher degree of	learning strategies:	environment	Plan or IEP. These might
difficulty Higher order	visual, auditory, kinetic	Provide	include, but are not limited to:
thinking	and cooperative	organizers/study	breaking assignments into
Questions	Technology connection	guides	smaller tasks, giving directions
Differentiation of	Practice	Lessons designed	through several channels
pacing and activities	Assignments	to the style of	(auditory, visual, kinesthetic,
Differentiation of	Puzzle time	learning that	model), and/or small group
learning strategies:	activities	matches the student	instruction for reading/writing
visual, auditory, kinetic	Record and practice	Cooperative Learning	ELL supports should include,
and cooperative	journal	Positive	but are not limited to, the
Enrichment and	Differentiating the	reinforcement	following::
extension Technology	lesson activities	Announce test	Extended time
connection Practice	Lesson tutorials	with	Provide visual aids

journals Frequent check for understanding Break down task into manageable units One-on-one instruction Tutoring Pair student with a high achieving	assignments Puzzle time activities Record and practice journals	Skills review handbook	adequate prep time Lessons presentation available on google classroom Frequent check for understanding Break down task into manageable units One-on-one instruction Tutoring Pair student with a high achieving	Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries
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<u>Unit Title</u>: Unit 3 Polynomials and Properties of Exponents and Factoring Polynomials (30 days) Unit 3 Assessment (2 days)

Stage 1: Desired Results

Standards & Indicators:

A-SSE A. Interpret the structure of expressions

A-SSE A1. Interpret expressions that represent a quantity in terms of its context.1 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.

A-SSE A 2. Use the structure of an expression to identify ways to rewrite it.

A-SSE B3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. \star Factor a quadratic expression to reveal the zeros of the function it defines.

A -APR A. Perform arithmetic operations on polynomials

A -APR A1. 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 -APR B3. Identify zeros of polynomials when suitable factorizations are available. C. Use polynomial identities to solve problems.

Mathematical Practices

MP.1 Make sense of problems and persevere in solving them

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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			
Standard	Performance	Expectations	Core Ideas
9.4.12.Cl.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).		With a growth mindset, failure is an important part of success.
9.4.12.CT.1 & 2	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).		Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).		Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
Central Idea/Enduring Understanding: Chapter 5 and 6 An expression made up of a sum of monomials that contain one variable is called a polynomial in one variable. Pascal's Triangle is an easy way to find the coefficients of the expansion of the powers of binomials. Tables of values can be used to explore graphs of polynomial functions. Factoring, synthetic substitution, and Descartes' Rule of Signs can be used to solve equations or find the zeros of polynomial functions.		Essential/Guiding Question: At the end of the Unit, students should be able to answer the Essential Questions: Chapter 5 - Why is math used to model real-world situations? Chapter 6 - How do we know which factoring method(s) to use to solve a problem? •	
Content:5.1 Multiplying and Dividing Expressions with CommonBases5.2 More Properties of Exponents5.3 Definition of bº and b-n5.4 Scientific Notations5.5 Addition and Subtraction of Polynomials5.6 Multiplication of Polynomials and Special Products5.7 Division of Polynomials6.1 Greatest Common Factor and Factoring byGrouping6.2 Factoring Trinomials of the Form x² + bx + c6.4 Factoring Trinomials - AC Method		Skills(Objectives): Students will be able to: -multiply, divide, add and si -apply the properties of exp with exponents -change numbers from star versa -multiply polynomials and a -dividing polynomials using -factor out the GCF -factor by grouping -factor trinomials	ubtract polynomials ponents to simplify expressions ndard form to scientific and vise applying special products g synthetic division

6.5 Difference of Squares and Perfect SquareTrinomials6.7 Solving Equations Using the Zero Product Rule	-solve equations by factoring and using the zero product rule		
Interdisciplinary Connections: Interdisciplinary connections are integrated in each unit with connections to the mathematical practices.			
Stage 2: Asse	ssment Evidence		
Performance Task(s): A-APR Introducing Polynomials <u>https://curriculum.illustrativemathematics.org/HS/stude</u> <u>nts/3/2/3/index.html</u> A-SSE Different Forms (Factoring) <u>https://curriculum.illustrativemathematics.org/HS/stude</u> <u>nts/3/2/6/index.html</u>	Other Evidence: Do Nows Written Assignments Exit Cards Mid Chapter Quizzes End of Chapter Assessments		
Stage 3: L	earning Plan		
Learning Opportunities/Strategies:	Resources:		
Think , Pair, Share	Calculator		
Turn and talk	Video Presentations Google Jamboards Forms and Sheets		
Student driven activities	Kahoot		
Help students to understand how to use the exponent laws as tools. Some students may need to separate and break the large table summarizing all of the laws into smaller, more manageable parts to avoid feeling overwhelmed. Help them to see that this is a manageable amount of information, particularly when they break it into parts.	DeltaMath LGBT and Disabilities Resources: • LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth • LGBTQ+ Books		
 Look at the exponent laws in the Concept Summary. Which ones are similar? Sample answer: Product of Powers and Quotient of Powers. Redraw the Concept Summary as a spider chart or concept chart in any shape that makes sense to you. Write each exponent law and at least one example of each type. Use color. Judge student work on its completeness, not its form. Encourage students to personally process the information and create a form that makes sense to themselves instead of trying to find the "right" answer or copy a model that makes sense to another student. Expand your concept summary by including an example of each exponent law using small real 	 DEI Resources: <u>Learning for Justice</u> <u>GLSEN Educator Resources</u> <u>Supporting LGBTQIA Youth Resource List</u> <u>Respect Ability: Fighting Stigmas, Advancing Opportunities</u> <u>NJDOE Diversity, Equity & Inclusion Educational Resources</u> <u>Diversity Calendar</u> 		
numbers for the base and exponent. How does using			

re la	eal numbers help you to make sense of the exponent aws?
: 0	Which exponent law do you find the easiest? Which ne do you find the hardest to understand? Why?
S a P n	cample answer: The easiest was Zero Power because Il answers are the same. The hardest was Quotient of Powers because it can be confusing to subtract egative numbers.
⊢ o tł w tł	lelp students compare and contrast the two methods ffered in this lesson. Encourage them to think about neir own learning style and which method is likely to vork best for them. Consider asking questions like nese:
• tł	What do you notice about Pascal's triangle? Discuss ne structure of it. x on one side of the inequality?
S s	ample answer: It has ones all along the left and right ide.
• w s a	After studying the structure of Pascal's triangle, try riting it out without looking in your textbook. What trategies help you?Sample answer: Add the row bove to get the next row.
• y tł	Write out the Binomial Theorem. What strategies can ou use to help you remember and make sense of this neorem?
S e	ample answer: Use examples, and practice it through xercises.
• P	When can you use the Binomial Theorem and not ascal's triangle?
Y p	ou can use the Binomial Theorem to expand olynomials with coefficients other than 1.
M c a d	lany errors in long division are the result of messy, ramped work. Encourage students to pay particular ttention to the alignment of terms when doing long ivision. For example, ask:
• d w	What do you do before performing long division on a olynomial if the terms are not organized in escending order? For example, what would you do <i>i</i> th 8x + 9x2 + 7 + 14x3 before dividing it by x + 2?
Y	ou rearrange the terms to be in descending order.

 Is it possible to do long division on a polynomial that does not include all of the terms in descending order? For example, one that includes an x3- and an x2- but no x-term. If it is possible, explain what you must do.
Add the missing term with a zero in front of it.
 What strategies do you use to make sure that you remember to subtract the polynomial you multiply through when doing long division, instead of adding it?
Sample answer: Change the sign of each term.
Help students understand polynomials. For example, ask:
 Think about factoring quadratics. What information can be easily determined when a quadratic is factored?
the zeros; the solutions; the x-intercepts
 What do you think you will know about a polynomial when it is completely factored?
the zeros; the solutions; the x-intercepts
• Expand (a + b)3. What is the resulting polynomial?
a3 + 3a2b + 3ab2 + b3
• How can you simplify a3 + 3a2b + 3ab2 + b3 ?
Because it is equivalent to (a + b)3 , it is a perfect cube

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving	On Grade Level	Struggling Students	Special Needs/ELL
Students	Students		
Khan Academy Project based learning Tablets Challenging problems with higher degree of difficulty Higher order thinking Questions Differentiation of pacing and activities Differentiation of learning strategies: visual, auditory, kinetic and cooperative	Tutoring Tables Graphic organizers Differentiation of learning strategies: visual, auditory, kinetic and cooperative Technology connection Practice Assignments Puzzle time activities Record and practice journal	Provide a highly structured, predictable learning environment Provide organizers/study guides Lessons designed to the style of learning that matches the student Cooperative Learning Positive	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the

Enrichment and extension Technology connection Practice assignments Puzzle time activities Record and practice journals	Differentiating the lesson activities Lesson tutorials Skills review handbook	reinforcement Announce test with adequate prep time Lessons presentation available on google classroom Frequent check for understanding Break down task into manageable units One-on-one instruction Tutoring Pair student with a high achieving student	following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries
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<u>Unit Title</u>: Unit 4 Rational Expressions and Equations and Radicals (20 days) Unit 2 Assessment (2 days)

Stage 1: Desired Results

Standards & Indicators:

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

N-RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents

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

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.

A-SSE A. Interpret the structure of expressions

A-SSE A1. Interpret expressions that represent a quantity in terms of its context.1 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.

A-SSE A 2. Use the structure of an expression to identify ways to rewrite it.

A-SSE B3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. \star Factor a quadratic expression to reveal the zeros of the function it defines.

A -APR A. Perform arithmetic operations on polynomials

A -APR A1. 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 -APR B3. Identify zeros of polynomials when suitable factorizations are available. C. Use polynomial identities to solve problems.

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			
Standard	Performance Expectations		Core Ideas
9.4.12.Cl.1	Demonstrate the ability to reflect, analyze, and		With a growth mindset,
	use creative skills and ide	eas (e.g.,	failure is an important part
	1.1.12prof.CR3a).		of success.
9.4.12.CT.1 & 2	Identify problem-solving	strategies used in the	Collaboration with
	development of an innov	ative product or	individuals with diverse
	practice (e.g., 1.1.12acc.0	C1b, 2.2.12.PF.3).	experiences can aid in the
	Explain the potential ben	efits of collaborating to	problem-solving process,
	enhance critical thinking	and problem solving	particularly for global issues
	(e.g., 1.3E.12profCR3.a).		where diverse solutions are
			needed.
9.4.12.TL.1	Assess digital tools based on features such as		Digital tools differ in
	accessibility options, capacities, and utility for		features, capacities, and
	accomplishing a specific task (e.g., W.11-12.6.).		styles. Knowledge of
			different digital tools is
			helpful in selecting the best
			tool for a given task.
Central Idea/Enduring Und	derstanding:	Essential/Guiding Questi	<u>on</u> :
Chapter 7		At the end of the linit of	tudants should be able to
Rational expressions are	ratios of two polynomial	answer the Essential Questions:	
expressions. Operations with rational expressions			
equations can be solved as polynomial equations		Chapter 7- How do you add, subtract, factor, and	
once the fractions are eliminated by multiplying		multiply algebraic expre	essions? How can you
by the LCD		rewrite expressions to r	telp you solve problems?
Chapter 8		Chapter 8- How do I us squares?	e perfect squares to simplify

In this chapter, we will perform operations on radical expressions and use radicals in applications.	
Content: 7.1 Introduction to Rational Expressions 7.2 Multiplication and Division of Rational Expressions 7.3 Least Common Denominator 7.4 Addition and Subtraction of Rational Expressions 7.6 Rational Equations 8.1 Introduction to Roots and Radicals 8.2 Simplifying Radicals 8.3 Addition and Subtraction of Radicals 8.4 Multiplication of Radicals	Skills(Objectives): Students will be able to: -simplify, multiply and divide rational expressions using common factors -factor out the GCF from a polynomial -add and subtract rational expressions but first find a common denominator -solve rational equations by factoring -simplify radicals -add, subtract and multiply radicals (find a perfect square factor and simplify)
Interdisciplinary Connections: Interdisciplinary connections are integrated in each unit v	vith connections to the mathematical practices.
Stage 2: Asse	ssment Evidence
Performance Task(s): A-APR Solving Rational Equations <u>https://curriculum.illustrativemathematics.org/HS/stude</u> <u>nts/3/2/22/index.html</u> Square and Square Roots <u>https://curriculum.illustrativemathematics.org/HS/stude</u> <u>nts/3/2/26/index.html</u>	Other Evidence: Do Nows Written Assignments Exit Cards Mid Chapter Quizzes End of Chapter Assessments
Stage 3: L	earning Plan
Learning Opportunities/Strategies: Think , Pair, Share	Resources: Beginning Algebra by Miller, O'Neill, Hyde, 5 th edition Calculator
Student driven activities	Lesson Presentations Video Presentations Google Jamboards, Forms and Sheets Kahoot Desmos
Help students understand polynomials. For example, ask:	DeltaMath
 Think about factoring quadratics. What information can be easily determined when a quadratic is factored? 	LGBT and Disabilities Resources: <u>LGBTQ-Inclusive Lesson & Resources by Garden</u> <u>State Equality and Make it Better for Youth</u> <u>LGBTQ+ Books</u>
the zeros; the solutions; the x-intercepts	DEI Resources:
 What do you think you will know about a polynomial when it is completely factored? 	 Learning for Justice GLSEN Educator Resources Supporting LGBTQIA Youth Resource List

the zeros; the solutions; the x-intercepts	Respect Ability: Fighting Stigmas, Advancing
 Expand (a + b)3. What is the resulting polynomial? 	<u>NJDOE Diversity, Equity & Inclusion Educational</u>
a3 + 3a2b + 3ab2 + b3	 <u>Resources</u> <u>Diversity Calendar</u>
• How can you simplify a3 + 3a2b + 3ab2 + b3 ?	
Because it is equivalent to (a + b)3 , it is a perfect cube.	
Look for and express regularity in repeated reasoning.	
Help students remember how to find lowest common multiples, and how to add and subtract fractions by showing some examples with real numbers. Choose one or two examples and work through them.	
Help students maintain oversight of the process of solving rational equations and rational inequalities. For example, ask:	
 How do you solve a rational equation or rational inequality? 	
Find the lowest common denominator and then eliminate the denominator and solve the equation.	
 What is an extraneous solution? 	
any answer that results in a denominator of 0	
 What is an important step in solving rational equations or rational inequalities that model real world situations?Sample answer: Check your answers to make sure they make sense in the context of the question 	
Differentiation	

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Khan Academy Project based learning Tablets Challenging problems with higher degree of difficulty Higher order thinking Questions Differentiation of	Tutoring Tables Graphic organizers Differentiation of learning strategies: visual, auditory, kinetic and cooperative Technology connection Practice	Provide a highly structured, predictable learning environment Provide organizers/study guides Lessons designed to the style of	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic,

pacing and activities Differentiation of learning strategies: visual, auditory, kinetic and cooperative Enrichment and extension Technology connection Practice assignments Puzzle time activities Record and practice journals	Assignments Puzzle time activities Record and practice journal Differentiating the lesson activities Lesson tutorials Skills review handbook	learning that matches the student Cooperative Learning Positive reinforcement Announce test with adequate prep time Lessons presentation available on google classroom Frequent check for understanding Break down task into manageable units One-on-one instruction Tutoring Pair student with a high achieving student	model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

Pacing Guide

Foundations of College Math	Beginning Algebra by Miller, O'Neill, Hyde, 5 th Edition	Standards		
Unit 1: The Set of Real Numbers, Linear Equations and Inequalities	CHAPTERS 1 (6 Days) 2 (12 Days) Paper Assessment: (2 Days)	N-RN.A.13 N -Q A. 1. N -Q A. 2. A-SSE A12 A-SSE B3. A -APR A1. A -APR B3. A -CED A.13 A -REI A12 A -REI A2. A -REI B3-5		
18 Days				
Unit 2: Graphing Linear Equations in Two Variables; Systems of Linear Equations in Two Variables	CHAPTERS 3 (12 Days) 4 (8 Days) Paper Assessment: (2 Days)	F-IF. A 1-2 F-IF B 4-6 F-IF C 7 F-BF A-1		
20 Days				

Unit 3: Polynomials and Properties of Exponents Factoring Polynomials	CHAPTERS 5 (18 Days) 6 (12 Days) Paper Assessment: (2 Days)	A-SSE A 1-2 A-SSE B3. A -APR A1. A -APR B3.
30 Days		
Unit 4 Rational Expressions and Equations and Radicals	CHAPTERS 7 (13 Days) 8 (7 Days) Paper Assessment: (2 Days)	N-RN.A.13 A-SSE A12 A-SSE B3. A -APR A1. A -APR B3.
20 Days		