



West Windsor-Plainsboro Regional School District Mathematics 8

Unit 1: Volume	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
Building upon their previous work with three-dimensional figures, students will use algebraic methods to efficiently solve real world and mathematical applications involving volume of cylinders, cones, and spheres. Students will expand upon the fundamental rules of solving and evaluating algebraic equations to develop a deeper understanding of the processes of mathematics.	
Recommended Pacing	
10 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Math Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
CPI #	Cumulative Progress Indicator (CPI)
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
Standard: Critical Thinking and Problem Solving	
CPI #	Cumulative Progress Indicator (CPI)
9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
Standard: Technology Literacy	
9.4.8.TL.3	Select appropriate tools to organize and present information digitally.

Interdisciplinary Standards Science	
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> ● Geometric awareness develops through practice in visualizing, diagramming and constructing. ● Geometry can be used to model many real life situations and to solve everyday problems. ● Formulas are derived from procedures that mathematicians use repeatedly. 	
Unit Essential Questions	
<ul style="list-style-type: none"> ● How are spatial relationships represented in sketches, drawings, and constructions? ● How can the application of the attributes of geometric figures support mathematical reasoning and problem solving? 	
Content Understandings	
<ul style="list-style-type: none"> ● Volume measures the capacity of a three dimensional object. ● Given the volume, we can develop a knowledge of manipulating formulas to find missing dimensions. 	
Content Questions	
<ul style="list-style-type: none"> ● How is volume found by deriving and applying formulas and using various strategies? ● How do you know which volume formula is appropriate? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> ● Vocabulary: cylinder, cone, sphere, radius, height, base, diameter <p>Students will be able to:</p> <ul style="list-style-type: none"> ● Find volume of cylinders and solve real world problems involving cylinders ● Find volume of cones and solve real world problems involving cones ● Find volume of spheres and solve real world problems involving spheres 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	

Unit 2: Equations	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
<p>Using equations to model real world problems and mathematical applications is a fundamental skill that will lead to future success in higher-level mathematics. This unit involves solving linear equations and simplifying expressions with rational and irrational numbers, including equations requiring the expanding of expressions using the distributive property and collecting like terms. Students will develop an understanding of the different types of solution sets including all real numbers and the null set. Students will understand the theory behind the procedures and the need for efficiency when solving. Not all numbers have an exact value on a number line. Irrational numbers can be expressed in their simplest form ($\sqrt{2}$) or can be estimated (1.4). This unit involves the study of integer exponents and roots.</p>	
Recommended Pacing	
20 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Analyze and solve linear equations and pairs of simultaneous linear equations.	
CPI #	Cumulative Progress Indicator (CPI)
8.EE.7	<p>Solve linear equations in one variable.</p> <p>a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</p> <p>b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</p>
Standard: Know that there are numbers that are not rational, and approximate them by rational numbers.	
CPI #	Cumulative Progress Indicator (CPI)
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).

	For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
Standard: Work with radicals and integer exponents	
CPI #	Cumulative Progress Indicator (CPI)
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • The structures of Algebra help us to find solutions efficiently. • In mathematics there is not always one solution. • There are different sets of numbers in the Real Number System. • Not all numbers have an exact value 	
Unit Essential Questions	
<ul style="list-style-type: none"> • How do you check the reasonableness of solutions to an equation? • How do you know when to use an estimate or an exact answer? 	
Content Understandings	
<ul style="list-style-type: none"> • Every one-variable equation does not have one solution. • Inverse operations help us solve equations. • Both rational and irrational numbers can be represented on a number line. 	
Content Questions	
<ul style="list-style-type: none"> • Why do we move the constant first? • How can you solve multi-step equations? • Can we determine the number of solutions prior to solving the equation? • How is the square root (or cube root) of a perfect square different from a square root (or cube root) of a non-perfect square (or cube)? 	
Objectives	
Students will know:	
<ul style="list-style-type: none"> • Vocabulary terms: equation, variable, inverse operation, distribute, distributive property, like terms, isolate 	

Students will be able to:

- Solve multi-step linear equations with rational number coefficients
- Solve and identify linear equations that have one solution, no solutions, or infinitely many solutions
- Solve multi-step linear equations with variables on both sides
- Identify perfect squares and perfect cubes
- Simplify perfect and non-perfect squares and cubes

Evidence of Learning**Assessment**

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.

Resources

Core Text: EdGems Math Core Math Course 3

Unit 3: The Pythagorean Theorem	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
Students will participate in explorations to inductively prove the Pythagorean Theorem. Students will use the Pythagorean Theorem to find missing side lengths in right triangles and to determine if three side lengths form a right triangle. They will apply their knowledge of the Pythagorean Theorem to real-world situations with missing measures, including situations in two and three dimensions. Students will also apply their knowledge of the Pythagorean Theorem to find distance on the coordinate plane.	
Recommended Pacing	
9 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Understand and apply the Pythagorean Theorem.	
CPI #	Cumulative Progress Indicator (CPI)
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
CPI #	Cumulative Progress Indicator (CPI)
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.
CPI #	Cumulative Progress Indicator (CPI)
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)

9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • The structures of Algebra help us to find solutions efficiently. • Formulas can be developed by observing patterns in real life phenomena. 	
Unit Essential Questions	
<ul style="list-style-type: none"> • How do geometric formulas help us make sense of the world around us? 	
Content Understandings	
<ul style="list-style-type: none"> • The Pythagorean Theorem is an important mathematical idea in both theory and real-world usage. • The distance formula helps find the distance between points efficiently. 	
Content Questions	
<ul style="list-style-type: none"> • How are the length of the sides of right triangles related? • How are the Pythagorean Theorem and the distance formula related? 	
Objectives	
<p>Students will be able to:</p> <ul style="list-style-type: none"> • Identify the various components of a triangle (legs, base, hypotenuse). • Calculate the square and square roots of given lengths on triangles. • Use the Pythagorean Theorem ($a^2 + b^2 = c^2$) to determine missing side lengths of triangles. • Determine the missing length of one side of a right triangle when the lengths of the other two sides are known, and to decide whether or not a triangle with three given side lengths is a right triangle. • Determine if 3 side lengths form a right triangle and solve application problems involving Pythagorean Theorem. • Find the distance between two points on a coordinate plane using the Pythagorean Theorem. 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	

Unit 4: Proportional Relationships and Slope

Content Area: Mathematics

Course & Grade Level: Math 8

Summary and Rationale

There are many relationships between sets of numbers. Functions are an important set of relationships that help us model phenomena, understand data and solve problems. This unit involves the study of proportional relationships using the concept of a function, the definition of slope, and by modeling the relationship between quantities. Students will explore these relationships and the different ways they are represented. Students will learn to understand why functions are important in math starting with an understanding of the definition as a rule that assigns each input to exactly one output.

Recommended Pacing

13 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice

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

Standard: Define, evaluate, and compare functions.

CPI #	Cumulative Progress Indicator (CPI)
8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
8.F.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

Standard: Use functions to model relationships between quantities

CPI #	Cumulative Progress Indicator (CPI)
8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values

8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Proportional relationships model and make sense of real world phenomena, help us predict outcomes and solve problems. There is a relationship between an equation, its graph and a table of values. 	
Unit Essential Questions	
<ul style="list-style-type: none"> How are proportional relationships displayed in different representations? What are the different ways to describe and ultimately graph a line? 	
Content Understandings	
<ul style="list-style-type: none"> Not every relationship is a function. Functions can be represented by an equation, table and graph. 	
Content Questions	
<ul style="list-style-type: none"> What is a relation and what is a function? How can you use different representations of functions to show the relationship between two data sets? What does the slope of a line tell you about the line? 	
Objectives	
Students will know:	
<ul style="list-style-type: none"> A function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Slope represents the steepness of a line. The slope formula. Vocabulary: constant of proportionality, domain, function, linear function, proportional relationship, range, slope, vertical line test 	
Students will be able to:	
<ul style="list-style-type: none"> Graph proportional relationships and functions. Recognize a proportional relationship from a graph, table and equation. Use the vertical line test to determine if a graph is a function. Interpret the constant of proportionality (unit rate) as the slope of the graph. 	

- Calculate slope from a graph, a table or two ordered pairs.
- Use similar triangles as a means of finding slopes and prove the unit rate is constant.

Evidence of Learning

Assessment

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.

Resources

Core Text: EdGems Math Core Math Course 3

Unit 5: Linear Functions and Scatterplots

Content Area: Mathematics

Course & Grade Level: Math 8

Summary and Rationale

Linear functions are a specific type of function that is used to model real life situations with a constant rate of change. This unit involves the study of linear functions and their characteristics including slope and intercepts. Students will graph and write linear functions, model real world relationships between quantities and compare

linear functions across multiple representations. Students will explore the differences between linear and nonlinear functions.

Students will explore and create scatterplots and use a line that describes the data to make predictions. They will look for positive or negative associations in the data as well as whether the data shows a linear or nonlinear association.

Recommended Pacing

25 days

New Jersey Student Learning Standards for Mathematics

Standard: Standards for Mathematical Practice

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

Standard: Define, evaluate, and compare functions.

CPI #	Cumulative Progress Indicator (CPI)
8.F.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line

Standard: Use functions to model relationships between quantities

CPI #	Cumulative Progress Indicator (CPI)
8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Standard: Understand the connections between proportional relationships, lines, and linear equations

CPI #	Cumulative Progress Indicator (CPI)
8.EE.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 .

Standard: Investigate patterns of association in bivariate data.

8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
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8.SP.2	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
9.4.8.IML.3	Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> ● Functions model real world phenomena, help us predict outcomes and solve problems. ● There is a relationship between an equation, its graph and a table of values. ● A function can be described by different, equivalent equations. ● Graphs are visual representations of real life phenomena. They tell the story behind the data/information that they represent. Mathematicians use graphs as a tool for analyzing data/information. ● Equations, graphs, and models help us to understand multi variable data. ● Collecting and using data helps us make predictions about future events. 	
Unit Essential Questions	
<ul style="list-style-type: none"> ● What information can we utilize from different forms of linear equations? ● What information can we utilize from a graph of a function? ● What stories do graphs tell us? ● How can two variable equations help us to understand bivariate data? ● How can mathematics help us analyze data and use it to make predictions? 	
Content Understandings	
<ul style="list-style-type: none"> ● An equation of a line can be written in Standard Form, Slope-Intercept Form and Point-Slope Form. ● We can look at a graph or equation to determine if it is linear or nonlinear. ● Two sets of data may or may not be correlated. 	
Content Questions	
<ul style="list-style-type: none"> ● Why are linear equations written in different forms? ● How can we use information from a graph to write a linear equation of a function? ● What is a linear and nonlinear function? ● How does a scatter plot help you understand a set of data? ● How can you use a line that describes data to predict an event? 	
Objectives	

Students will know:

- Vocabulary: Continuous, discrete, equivalent, non-linear, piecewise, Slope-intercept Form, y-intercept, Standard Form, Point-Slope Form
- The difference between a function and relation

Students will be able to:

- Graph linear equations using Slope-Intercept Form
- Write a linear equation for a given graph
- Write an equation in Slope-Intercept Form when given information about the line
- 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 .
- Convert different forms of a linear equation into Slope-Intercept Form
- Determine if a function is linear or nonlinear
- Interpret graphs representing real world applications
- Read, create and describe the association in scatter plots.
- Draw a line that simulates the data and use it to make a prediction.
- Describe the association between two sets of data.

Evidence of Learning

Assessment

Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.

Resources

Core Text: EdGems Math Core Math Course 3

Unit 6: Systems of Equations	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
<p>This unit involves the study of systems or sets of linear equations. Students will develop a graphical understanding of the solution(s) and non-solutions to a system as it relates to the point(s) of intersection of the two lines. Students will start the unit by looking at systems of two linear equations and determining whether the lines are parallel, intersecting or the same line. After this understanding of systems is developed, students will learn three methods for solving systems of equations (graphing, substitution and elimination). Students will then write and solve systems for real world situations. Students will learn how to solve systems by graphing and algebraically through substitution and elimination.</p>	
Recommended Pacing	
17 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Analyze and solve linear equations and pairs of simultaneous linear equations.	
CPI #	Cumulative Progress Indicator (CPI)
8.EE.8	<p>Analyze and solve pairs of simultaneous linear equations.</p> <p>a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.</p> <p>b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</p> <p>c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</p>
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics

RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> When one equation doesn't describe a relationship, real life phenomena can be modeled using a system of equations. Algebraic methods can help us to solve a system efficiently. 	
Unit Essential Questions	
<ul style="list-style-type: none"> Why would we need more than one equation to solve a problem? How can you determine the most efficient method for solving a system? 	
Content Understandings	
<ul style="list-style-type: none"> There are three types of systems of equations. There are three different methods for solving systems of equations. Variables can be used to represent unknowns in real world situations. 	
Content Questions	
<ul style="list-style-type: none"> How do we determine the most efficient method to solve systems of linear equations? How do you check a solution to a system of linear equations? How do we use systems of linear equations to model real world situations? 	
Objectives	
Students will know:	
<ul style="list-style-type: none"> Vocabulary: System of Equations, Substitution, Elimination, Solutions 	
Students will be able to:	
<ul style="list-style-type: none"> Solve a system of linear equations using the graphing, substitution and elimination method Write a system of equations and determine the most appropriate method of solving Interpret the solution set to a system of linear equations both algebraically and graphically Solve and interpret a system in terms of the context of a real world problem 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	

Unit 7: Angle Relationships	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
Geometric figures help us to describe and understand the world around us. By exploring geometric relationships, we can model real world situations and improve our inductive and deductive reasoning skills. This unit involves the study of angle relationships created when parallel lines are cut by transversals, the interior and exterior angle measures of polygons and similar triangles. Students will expand upon knowledge of supplementary and vertical angles and use construction to informally establish facts about angle pairs. Students will be able to name angle pairs and corresponding parts of similar figures and find measures of missing angles and sides.	
Recommended Pacing	
18 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Understand congruence and similarity using physical models, transparencies, or geometry software	
CPI #	Cumulative Progress Indicator (CPI)
8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)

9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> ● Inductive reasoning is the first step to proving theorems deductively. ● Geometric figures help us to organize, explain and describe the real world situations. ● Similarity can be used to solve real-world problems. 	
Unit Essential Questions	
<ul style="list-style-type: none"> ● How can we apply theorems that have already been proven to new situations? ● How can geometric figures be used to describe real world situations? ● What is the difference between similar and non-similar figures? 	
Content Understandings	
<ul style="list-style-type: none"> ● There are congruent pairs of angles formed when parallel lines are cut by a transversal. ● Similar figures have congruent angles and proportional sides. ● Triangles can be classified by their angles and their sides. 	
Content Questions	
<ul style="list-style-type: none"> ● How can you describe angles formed by parallel lines and transversals? ● How can you describe the relationship among the angles of polygons? ● How can you identify congruent triangles? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> ● Vocabulary: Transversal, Interior Angles, Exterior Angles, Corresponding Angles, Regular Polygons <p>Students will be able to:</p> <ul style="list-style-type: none"> ● Describe and apply the relationships between corresponding sides and angles of similar figures ● Identify and find measures of angles formed when parallel lines are cut by a transversal ● Understand and find the measures of interior angles and exterior angles of triangles ● Classify triangles by their side lengths and angle measures 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	

Unit 8: Exponent Properties	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
Students will explore the different exponent rules and their applications. The second half of the unit has students applying properties of exponents to operate numbers in scientific notation. Students use concepts of place value to understand scientific notation and write numbers in scientific notation from standard form or vice versa. Students can solve real world situations by computing with numbers in scientific notation.	
Recommended Pacing	
12 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Work with radicals and integer exponents.	
CPI #	Cumulative Progress Indicator (CPI)
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27$.
8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 , and determine that the world population is more than 20 times larger.
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • There are many ways to represent the same value. • Numerical operations apply to all real numbers. 	
Unit Essential Questions	
<ul style="list-style-type: none"> • How can you use inductive reasoning to observe patterns and write general rules involving operations with and properties of real numbers? • How do exponents simplify work with very large and very small numbers? 	
Content Understandings	
<ul style="list-style-type: none"> • There is no one right way to simplify an exponential expression. • Scientific notation helps us express very large and very small numbers efficiently. 	
Content Questions	
<ul style="list-style-type: none"> • How can you use properties of exponents to simplify expressions? • How can you evaluate a non-zero number with an exponent of zero or an integer? • How do you perform operations in scientific notation? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> • The properties of integer exponents. • The numerical forms for Scientific Notation or Standard (Decimal) Notation. <p>Students will be able to:</p> <ul style="list-style-type: none"> • Apply the properties of integer exponents to generate equivalent numerical expressions. • Express and compare numbers in Scientific Notation. • Perform operations with numbers expressed in Scientific Notation. • Interpret Scientific Notation that has been generated by technology. 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized tests and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	

Unit 9: Transformations	
Content Area: Mathematics	
Course & Grade Level: Math 8	
Summary and Rationale	
In this unit, students will perform transformations on points and polygons on a coordinate plane. These transformations include reflections, translations, and rotations. Students will learn that these transformations create congruent figures. Students will not only create graphs of images when given the pre-image but will also write and/or use transformation rules to describe transformations.	
Recommended Pacing	
11 days	
New Jersey Student Learning Standards for Mathematics	
Standard: Standards for Mathematical Practice	
CPI #	Cumulative Progress Indicator (CPI)
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning
Standard: Understand congruence and similarity using physical models, transparencies, or geometry software	
CPI #	Cumulative Progress Indicator (CPI)
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are transformed to lines, and line segments to line segments of the same length. b. Angles are transformed to angles of the same measure. c. Parallel lines are transformed to parallel lines.
8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RST.6-8.4	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 6-8 texts and topics

RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> ● Rigid transformations preserve congruence. Not all transformations are rigid. ● Geometric awareness develops through practice in visualizing, diagramming and constructing. 	
Unit Essential Questions	
<ul style="list-style-type: none"> ● How can you manipulate an object on a plane? ● How are spatial relationships represented in sketches, drawings, and constructions? ● How can the application of the attributes of geometric figures support mathematical reasoning and problem solving? 	
Content Understandings	
<ul style="list-style-type: none"> ● A sequence of transformations can be performed to prove that two figures are congruent. ● We use coordinates as a starting reference for the pre-image (original figure). 	
Content Questions	
<ul style="list-style-type: none"> ● How can we use transformations to prove two figures are congruent? ● How do different transformations affect the coordinate values in the image? ● How do we use mathematical vocabulary to describe the effect of a series of transformations? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> ● The properties of rotations, reflections and translations. <p>Students will be able to:</p> <ul style="list-style-type: none"> ● Prove that a two-dimensional figure is congruent to another if the second can be obtained by a sequence of transformations. ● Describe the effect of translations, rotations and reflections on two-dimensional figures using coordinates. ● Perform multiple transformations on a figure. 	
Evidence of Learning	
Assessment	
Assessment plan may include teacher designed formative and summative assessments, a district common assessment, analysis of standardized test and NJSLA data.	
Resources	
Core Text: EdGems Math Core Math Course 3	