Hainesport Township School District
211 Broad Street Hainesport, NJ 08036

Course Title: Algebra Math Grade 8
Board of Education Adoption Date: January, 2017
Board of Education Re-adoption Date: 8/28/2018, 1/2/2024

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Course Description and Concepts

ALGEBRA I – This course is offered to 8th grade students who not only have exceptional math ability, and have demonstrated a comprehensive knowledge of the math objectives, but who, as 8th graders, have the self-discipline and maturity for this rigid, intense course. Major topics include algebraic properties and the real number system, functions and their graphs, linear equations and inequalities, polynomials and factoring, radicals, algebraic fractions and real world applications.

Algebra 1 Placement Criteria

To be considered for Algebra, students must earn at least 5 out of 8 possible points based upon the following criteria:

CRITERIA		SCORE RANGE	POINTS EARNED
*Points earned for this criteria based on previous year's placement.	**MATH 7 FINAL GRADE AVERAGE**	96-100%	1 point
		Less than 96%	0 points
	PRE-ALGEBRA FINAL GRADE AVERAGE	96%-100%	2 points
		90%-95%	1 point
		Less than 90%	0 points
MATHEMATICS PARCC SCORE		Level 5	2 points
		Level 4	1 point
		Levels 1 - 3	0 points
MATHEMATICS READINESS ASSESSMENT		90-100%	2 points
		80-89%	1 point
		Less than 80%	0 points
MATHEMATICS BENCHMARK ASSESSMENT SCORE AVERAGE		85-100%	2 points
		70-84%	1 point
		Less than 70%	0 points

New Jersey Student Learning Standards Math

New Jersey Student Learning Standards for Mathematics

NJ Technology Standards

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

8.2 Technology Education, Engineering, Design and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

http://www.state.nj.us/education/cccs/2014/career/CareerReadyPractices.pdf

Pacing Guide

Unit Topic	Unit #	APX Unit Length
Expressions, Equations and Powers	I	6 weeks (28 days)
Geometry and Graphing Linear Equations	II	7 Weeks (29 days)
Solving Equation and Inequalities	III	8 weeks (37.5 days)
Functions and Exponential Functions	IV	4 Weeks (19 days)

Polynomials and Quadratics	V	5 weeks (23 days)
Non-Linear Functions and Statistics	VI	5 weeks

Algebra Math 8 Curriculum Unit 1 (4 Parts)	
Title: Expressions, Equations and Powers	
Subject: Algebra Math 8	**Length of Time:** 6 weeks (28 days)
Unit Summary: Part 1 introduces the concepts of Algebra and reviews some skills from 8th grade. Part 2 introduces linear equations. Students learn to solve equations starting from equations with variables on both sides and progressing to more complex equations. The part concludes with using the skills to transform literal equations so that they are solved for a named variable. Part 3 will allow students to evaluate squares and radicals in equations. They will explore how to simplify and approximate square roots to help solve expressions. Part 4 will introduce the concept of scientific notation to students. It will demonstrate the purpose of scientific notation and how to write numbers using this form. They will be able to convert numbers between scientific notation and standard form, as well as perform different operations within equations.	
Learning Targets	

PARCC ■ Major Clusters; ▣ Supporting Clusters; ○ Additional Clusters	
Standard#:	**Standard:**
A-SSE.1	Interpret expressions that represent a quantity in terms of its context.
N-RN.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.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
A-CED.1	Create equations and inequalities in one variable and use them to solve problems.
A-CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
A-REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
F-BF.1	Write a function that describes the relationship between two quantities.*
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 √2 is irrational.
8.EE.3	Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
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.

Technology 8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
Technology 8.1.8.D.4	Assess the credibility and accuracy of digital content
Technology 8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
Technology 8.2.8.C.2	Explain the need for optimization in a design process.
Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.
Modifications	
Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities	
Interdisciplinary Connections	

Science, Language Arts, and Technology
Integration of 21st Century Themes and Skills
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Algebra Math 8 Curriculum **Part 1**	
Title: Numbers, Operations, and Expressions	
Subject: Algebra Math 8	**Length of Time:** 1 week (5 days)
Unit 1 Part 1 Summary: Section 1 introduces the concepts of Algebra and reviews some skills from 8th grade.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters	
Conceptual Category: Algebra Domain: Seeing Structure in Expressions	
Cluster: Interpret the structure of expressions, create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-SSE.1	Interpret expressions that represent a quantity in terms of its context.
Conceptual Category: Number and Quantity	

Cluster: Use properties of rational and irrational numbers.	
Standard#:	**Standard:**
N-RN.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.

Unit 1 Part 1 Essential Question:	**Unit 1 Part 1 Enduring Understandings:**
● What are the basic skills needed for Algebra I?	● What are irrational numbers? ● What are like terms and how to combine them. ● Using substitution to evaluate an expression for a value.

Unit 1 Part 1 Objectives:

- Students will be able to classify numbers in the real number system.
- Students will be able to identify and combine like terms.
- Students will be able to evaluate an expression for given values.
- Students will be able to put terms in order by the degree of a variable.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 1 Quiz

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	**Timeframe**
Topic #1: Review of Natural Numbers, Whole Numbers, Integers, and Rational Numbers Lab: Choose one from the posted list	1 day

Topic #2: Review of Exponents, Squares, and Square Roots	2/3 day
Topic #3: Review of Irrational Numbers & Real Numbers	1/3 day
Topic #4: Properties of Exponents	1/3 day
Topic #5: Future Topics for Algebra II	1/3 day
Topic #6: Like Terms	1/3 day
Topic #7: Evaluating Expressions	½ day
Topic #8: Ordering Terms	½ day
Review and Cumulative Assessment	1 day

Instructional Materials/Resources:

- Textbook and online resources
- http://www.njctl.org/courses/math/algebra-i/numbers-operations-and-expressions-algebra-1/ (Notebook Presentations)

Algebra Math 8 Curriculum **Part 2**	
Title: Reasoning With Equations	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (9 days)
Unit 1 Part 2 Summary: Unit 1 Part 2 introduces linear equations. Students learn to solve equations starting from equations with variables on both sides and progressing to more complex equations. This part concludes with using the skills to transform literal equations so that they are solved for a named variable.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters	

Conceptual Category: Number and Quantity Domain: Quantities	
Cluster: Reason quantitatively and use units to solve problems.	
Standard#:	**Standard:**
N-Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Conceptual Category: Algebra Domain: Creating Equations	
Cluster: Create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-CED.1	Create equations and inequalities in one variable and use them to solve problems.
A-CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Understand solving equations as a process of reasoning and explain the reasoning	
Standard#:	**Standard:**
A-REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
Cluster: Solve equations and inequalities in one variable	
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Conceptual Category: Function Domain: Building Functions	

Cluster: Build a function that represents the relationship between two quantities.	
Standard#:	**Standard:**
F-BF.1	Write a function that describes the relationship between two quantities.*

Unit 1 Part 2 Essential Question:	**Unit 1 Part 2 Enduring Understandings:**
● How do we represent unknown quantities? ● How can the value of an unknown variable be found?	● How to solve an equation in one variable. ● How can an equation be solved for a variable in the equation.

Unit 1 Part 2 Objectives:

- Students will be able to solve equations that contain the same variable on both sides.
- Students will be able transform a formula to a different form of that equation.
- Students will be able to find the value of unknown quantities using Literal Equations and Substitution.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 2 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Lessons	**Timeframe**
Lesson #1: Equations with the Same Variable on Both Sides	1.5 days
Quiz #1: Equations with the Same Variable on Both Sides	0.5 day
Lesson #2: Solving Literal Equations	2 days
Quiz #2: Literal Equations	1 day

Lab: Falling Rocks and Glowsticks	1 day
Lesson #3: Substituting Values into an Equation	1 day
Review and Cumulative Assessment	2 days

Instruction Materials/Resources:

- Textbook and online resources with it
- www.njctl.org/courses/math/algebra/
- http://threeacts.mrmeyer.com/fallingrocks/
- http://threeacts.mrmeyer.com/fallingglowsticks/
- http://blog.mrmeyer.com/2013/teaching-with-three-act-tasks-act-one/ HYPERLINK "http://blog.mrmeyer.com/2013/teaching-with-three-act-tasks-act-one/"

Algebra Math 8 **Part 3**	
Title: Equations with Roots and Radicals (8th)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (9 days)
Unit 1 Part 3 Summary: Unit 1 Part 3 will allow students to evaluate squares and radicals in equations. They will explore how to simplify and approximate square roots to help solve expressions.	
Learning Targets	
PARCC ■ Major Clusters; ▣ Supporting Clusters; ○ Additional Clusters	
Domain: Expressions and Equations	
Cluster: Expressions and Equations work with radicals and integer exponents.	

Standard #s:	**Standards:**
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 √2 is irrational.

Unit 1 Part 3 Essential Questions:	**Unit 1 Part 3 Enduring Understanding:**
● How do radicals and squares help solve real world problems? ● How are radicals and squares useful for solving equations and manipulating numbers?	● Squares and Radicals can help solve real world problems. ● Squares and Radicals affect the numbers that are being used within an operation. ● The rules for radicals can be applied to variable expressions.

Unit 1 Part 3 Objectives:

- Students will be able to use their understanding of square roots to simplify roots of variables.
- Students will evaluate square and cube roots of perfect square and cubes to solve equations.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit..
- 3 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Radical Expressions Containing Variables	1 days
Topic #2: Simplifying Non-Perfect Square Radicands **Quiz #1**	2 days

Topic #3: Simplifying Roots of Variables *Activity: Radical Makeover* **Quiz #2**	2 days
Topic #4: Solving Equations with Perfect Square & Cube Roots **Quiz #3**	2 days
Review and Cumulative Assessment	2 days

Curriculum Development Resources:

- Textbook and online resources
- http://njctl.org/courses/math/8th-grade-math/ HYPERLINK "http://njctl.org/courses/math/8th-grade-math/"

Algebra Math 8 Curriculum **Part 4**	
Title: Scientific Notation	
Subject: Algebra Math 8	**Length of Time:** 1 week (5 days)
Unit 1 Part 4 Summary: This part will introduce the concept of scientific notation to students. It will demonstrate the purpose of scientific notation and how to write numbers using this form. They will be able to convert numbers between scientific notation and standard form, as well as perform different operations within equations.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters	
Domain: Expressions & Equations	
Cluster: Expressions and equations work with radicals and integer exponents.	
Standard #s:	**Standards:**
8.EE.3	Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

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.
Unit 1 Part 4 Essential Question: · How will scientific notation help when writing numbers and equations? · How is scientific notation used in real world application problems? · How numbers are compared and manipulated using scientific notation?	**Unit 1 Part 4 Enduring Understanding:** · Scientific notation will help demonstrate very large and very small numbers when solving real world application problems. · Numbers can be represented in scientific notation and still be manipulated using operations such as addition, subtraction, multiplication, and division.

Unit 1 Part 4 Objectives:

- Students will express numbers using scientific notation.
- Students will recognize the difference between scientific notation and standard form.
- Students will distinguish the difference between different numbers written in scientific notation.
- Students will solve equations with addition, subtraction, multiplication, and division using numbers in scientific notation.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 5 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Purpose of Scientific Notation Lab: RAFT – One in a Million Quiz #1	0.25 day
Topic #2: How to Write Numbers in Scientific Notation	0.25 day
Topic #3: How to Convert between Scientific Notation and Standard Form Quiz #2	0.5 day

Topic #4: Magnitude Quiz #3	1 day
Topic #5: Comparing Numbers in Scientific Notation Quiz #4	0.5 day
Topic #6: Multiply and Divide with Scientific Notation	0.5 day
Topic #7: Addition and Subtraction with Scientific Notation Quiz #5	1 day
Review and Cumulative Assessment	1 day

Curriculum Development Resources:

- Textbook and online resources
- https://njctl.org/courses/math/8th-grade-math/
- http://www.raftbayarea.org/ideas/One%20in%20a%20Million.pdf HYPERLINK "http://www.raftbayarea.org/ideas/One%20in%20a%20Million.pdf"

Algebra Math 8 Curriculum **Unit 2 (3 Parts)**	
Title: Geometry and Graphing Linear Equations	
Subject: Algebra Math 8	**Length of Time:** 7 Weeks (29 days)
Unit Summary: Unit 2 Part 1 teaches students to use models to show their understanding of congruent and similar one and two-dimensional figures. Unit 2 Part 1 also covers 3-dimensional solids and how to calculate their volume with a focus on using formulas to solve real world problems. Unit 2 Part 2 will provide a deeper understanding of the Pythagorean Theorem and its converse for students. They will apply the theorem to problems involving right triangles that model real world problems. They will also find distances and midpoints between two points. Unit 2 Part 3 covers how to graph linear equations and different forms the equations can be written in. Students will also learn how write the equation of a line with given qualities. The relationships between vertical and horizontal lines will be covered.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Standard#:	**Standard:**
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length.

	b. Angles are taken to angles of the same measure. c. Parallel lines are taken 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.
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-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.*
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
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.
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
8.EE.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
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.
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.

A-CED.2	Create equations and inequalities in one variable and use them to solve problems.
A-REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
S-ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Mathematical Practice Standards:	
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Modifications

Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities

Interdisciplinary Connections

Science, Social Studies, Language Arts, and Technology

Integration of 21st Century Themes and Skills

21st Century Skills
- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes
- Critical Thinking and Problem Solving
- Communication and Collaboration

- Life and Career Skills

Algebra Math 8 Curriculum Unit 2 Part 1	
Title: 2D and 3D Geometry (NJCTL resources from 8th)	
Subject: Algebra Math 8	**Length of Time:** 3 weeks (13 days)
Unit 2 Part 1 Summary: Unit 2 Part 1 teaches students to use models to show their understanding of congruent and similar one and two-dimensional figures. Unit 2 Part 1 also covers 3-dimensional solids and how to calculate their volume with a focus on using formulas to solve real world problems.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Domain: Geometry	
Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.	
Standard #s:	**Standards:**
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken 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.
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-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.)*

Domain: Geometry	
Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Unit 2 Part 1 Essential Questions:

- How can you use models of one and two-dimensional figures to show congruent figures?
- How can you use models of one and two-dimensional figures to show similar figures?
- What is a 3-dimensional figure?
- How can I find the volume of a 3-dimensional figure?
- How can the volume of a 3-dimensional figure help me solve real world problems?

Unit 2 Part 1 Objectives:

- Students will be able to transform figures on a coordinate plane.
- Students will be able to use their understanding of angle relationships to find unknown angles.
- Students will be able to describe a sequence of transformations that will result in congruent figures.
- Students will be able to describe a sequence of transformations and dilations that will result in similar figures.
- Students will identify what a 3-dimensional figure is.
- Students will use a formula to find the volume of a prism and cylinder.
- Students will use a formula to find the volume of pyramids, cones & spheres.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the chapter.
- Exit Tickets
- Lab Reflections
- Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe

Topic #1: Translations Lab: Translations **Quiz #1**	1.5 days
Topic #2: Rotations **Quiz #2**	1.5 days
Topic #3: Reflections **Quiz #3**	0.5 days
Topic #4: Dilations Lab: Dilations	1.5 days
Topic #5: Symmetry **Quiz #4**	0.5 day
Topic #6: Congruence & Similarity **Quiz #5**	1.5 days
Topic #7: Special Pairs of Angles **Quiz #6**	0.5 day
Topic #8: Remote Exterior Angles **Quiz #7**	0.5 day
Topic #9: 3-Dimensional Solids **Quiz #8**	1 day
Lab: Volume Activity Topic #10: Volume-Prisms and Cylinders	1 days
Topic #11: Volume-Pyramids, Cones & Spheres Lab: RAFT – Volume Verification **Quiz #9**	2 days
Review and Cumulative Assessment	1 days

Curriculum Development Resources

- https://njctl.org/courses/math/8th-grade-math/
- https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-overview

- http://www.njctl.org/courses/math/8th-grade-math/3d-geometry/volume-activity/
- http://www.raftbayarea.org/ideas/Volume%20Verification.pdf HYPERLINK "https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-overview"

Algebra Math 8 Curriculum **Unit 2 Part 2**	
Title: Pythagorean Theorem, Distance and Midpoints	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (6 days)
Unit 2 Part 2 Summary: Unit 2 Part 2 will provide a deeper understanding of the Pythagorean Theorem and its converse for students. They will apply the theorem to problems involving right triangles that model real world problems. They will also find distances and midpoints between two points.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Domain: Geometry	
Cluster: Understand and apply the Pythagorean Theorem	
Standard #s:	**Standards:**
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
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.
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Unit 2 Part 2 Essential Question: · How does the Pythagorean Theorem help solve real world problems? · How do we compute the distance and midpoint within problems?	**Unit 2 Part 2 Enduring Understanding:** · The Pythagorean Theorem can be used to solve real world problems. · The Pythagorean Theorem aids in solving problems involving right triangles.
Unit 2 Part 2 Objectives:	

- Students will be able to explain the proof of the Pythagorean Theorem.
- Students will find unknown side lengths using the Pythagorean Theorem.
- Students will use the Pythagorean Theorem to solve problems involving distance and midpoints.
- Students will solve real world application problems using the Pythagorean Theorem.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 2 Quizzes

Summative Assessment:

- Cumulative Quiz

Lesson Plan

Topics	Timeframe
Topic #1: Proofs Lab #1: Introduction to Proofs	1 day
Topic #1: Pythagorean Theorem **Quiz #1**	1 day
Topic #2: Distance Formula	1.5 days
Topic #3: Midpoints **Quiz #2**	1.5 days
Review and Chapter Test	1 day

Curriculum Development Resources:

- HYPERLINK "http://njctl.org/courses/math/8th-grade-math/" http://njctl.org/courses/math/8th-grade-math/

Algebra Math 8 Curriculum
Unit 2 Part 3

Title: Graphing Linear Equations (from NJCTL Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (10 days)
Unit 2 Part 3 Summary: Unit 2 Part 3 covers how to graph linear equations and different forms the equations can be written in. Students will also learn how write the equation of a line with given qualities. The relationships between vertical and horizontal lines will be covered.	
Learning Targets	
PARCC ■ Major Clusters; ▣ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Domain: Expressions & Equations	
Cluster: Understand the connections between proportional relationships, lines, and linear equations.	
Standard #s:	**Standards:**
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
8.EE.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
Domain: Functions	
Cluster: Define, evaluate, and compare functions	
Standard #s:	**Standards:**
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.
Cluster: Use functions to model relationships between quantities	

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.
Conceptual Category: Algebra Domain: Creating Equations	
Cluster: Create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-CED.2	Create equations and inequalities in one variable and use them to solve problems.
Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Represent and solve equations and inequalities graphically	
Standard#:	**Standard:**
A-REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
Conceptual Category: Functions: Interpreting Functions	
Cluster: Analyze functions using different representations	
Standard#:	**Standard**
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Conceptual Category: Statistics Domain: Interpreting Categorical and Quantitative Data	
Cluster: Summarize, represent, and interpret data on two categorical and quantitative variables	
Standard#:	**Standard:**
S-ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
Cluster: Interpret linear models	

Standard#:	Standard:
S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Unit 2 Part 3 Essential Question:

- What is meant by the slope of a line, and how can knowing a line's slope help to graph a line and find parallel and perpendicular lines?

Unit 2 Part 3 Enduring Understandings:

- Slope (rate of change)
- How to graph a line.
- Know the different forms the equation a line can take
- Intercepts of a line
- Horizontal and Vertical lines
- How to write the equation of a line given characteristics of the line.
- Scatter plot
- Line of Best Fit

Unit 2 Part 3 Objectives:

- Students will be able to graph a line using intercepts.
- Students will be able to graph horizontal and vertical lines.
- Students will be able to calculate the slope of a line when given a graph, or two points.
- Students will be able to describe how slope relates to horizontal and vertical lines.
- Students will be able to write and graph the equation of a line using point-slope form.
- Students will be able to write and graph the equation of a line using slope-intercept form.
- Students will be able to determine if a proportional relationship exists between sets of points.
- Students will be able to write and graph the equation of a line that has a proportional relationship.
- Students will be able to write the equation of a line based on the given information.
- Students will be able to solve problems using the equation of a line.
- Students will be able to determine whether or not a scatter plot has a linear relationship.
- Students will be able to draw the line of best fit to model the data in a scatter plot that has a linear relationship and use the line of best fit to solve problems.

Evidence of Learning

Formative Assessments:

· Questioning strategies used throughout the unit. · 3 Quizzes
Summative Assessment: · Cumulative Assessment

Lesson Plan	
Topics	**Timeframe**
Topic #1: Linear Equations	1 day
Topic #2: Graphing a Linear Equations Using Intercepts	1 day
Topic #3: Horizontal & Vertical Lines	0.5 day
Quiz #1	0.5 day
Topic #4: Slope of a Line	1 day
Topic #5: Point-Slope Form (This may be excluded.)	0 days
Topic #6: Slope-Intercept Form Lab: RAFT – Marble Masters Labs: (from 8th) - Connect Three - Slippery Slopes!	1 days
Quiz #2	0.25 day
Lab: Proportional Relationships Topic #7: Proportional Relationships	1.75 days
Topic #8: Solving Linear Equations	1.75 days
Quiz #3	0.25 day
Topic 9: Scatter Plots and Line of Best Fit Lab: Candles	1 day
Topic #10: Review and Unit Test	1 days
Curriculum Resources:	

- www.njctl.org/courses/math/algebra/
- www.raftbayarea.org/ideas/Marble%20Masters.pdf

Algebra Math 8 Curriculum **Unit 3 (4 Parts)**	
Title: Solving Equation and Inequalities	
Subject: Algebra Math 8	**Length of Time:** 8 weeks (37.5 days)
Unit Summary: Part 1 uses graphing, elimination, and substitution to solve systems of equations. Situations will be modeled with systems and solved. Part 2 builds upon the methods of solving equations and demonstrates the similarities and differences between solving equations and solving inequalities. Part 2 concludes with graphing linear inequalities and systems of linear inequalities in the coordinate plane. Part 3 reviews the inverse operations used to solve equations and inequalities. Students learn to solve absolute value equations and graph their solutions on a number line. Part 3 concludes with the derivation of the compound inequalities required to graph absolute value inequalities. Word problems are also solved throughout this section. Part 4 covers how to convert different units using conversion factors. Part 4 will also discuss how to pick the unit that is the most appropriate for a given situation, and what the most appropriate accuracy is for a given situation.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Standard#:	**Standard:**
A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A-REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A-REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A-REI.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.
A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A-REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
A-CED.1	Create equations and inequalities in one variable and use them to solve problems.
A-REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
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 formulas; choose and interpret the scale and the origin in graphs and data displays.
N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practice Standards:	
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.

MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Modifications

Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities

Interdisciplinary Connections

Science, Social Studies, Language Arts, and Technology

Integration of 21st Century Themes and Skills

21st Century Skills
- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Algebra Math 8 Curriculum
Unit 3 Part 1

Title: Systems of Linear Equations (from NJCTL Algebra I)

Subject: Algebra Math 8	**Length of Time:** 2 weeks (9.5 days)

Unit 3 Part 1 Summary: Unit 3 Part 1 uses graphing, elimination, and substitution to solve systems of equations. Situations will be modeled with systems and solved.

Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Conceptual Category: Algebra Domain: Creating Equations	
Cluster: Create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Solve systems of equations	
Standard#:	**Standard:**
A-REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A-REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
Cluster: Represent and solve equations and inequalities graphically	
A-REI.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.
Unit 3 Part 1 Essential Question: ● How can real world situations be modeled by systems? How can solutions be found to a system?	**Unit 3 Part 1 Enduring Understandings:**

	• The point at which lines intersect is the solution to the system with those lines.

Unit 3 Part 1 Objectives:

- Students will be able to graph systems of linear equations to find a solution.
- Students will be able to solve a system of equations by using substitution and elimination.
- Students will be able to translate real world problem into a system.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 2 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Solving Systems by Graphing	1 day
Topic #2: Solving Systems by Substitution	1.5 days
Quiz #1	0.5 day
Topic #3: Solving Systems by Elimination	1 day
Lab: MAP – Boomerangs	1 day
Topic #4: Choosing a Strategy	1 day
Lab: Illuminations – Supply and Demand	0.5 day
Quiz #2	0.5 day

Topic #5: Writing Systems to Model Situations	1 day
Topic #6: Extension: Solving Systems of Nonlinear Equations (This may be excluded.)	0 days
Review and Cumulative Assessment	1 day

Curriculum Resources:

- www.njctl.org/courses/math/algebra/
- http://illuminations.nctm.org/Lesson.aspx?id=2544
- http://map.mathshell.org/lessons.php?collection=8&unit=9205

Algebra Math 8 **Unit 3 Part 2**	
Title: Solving & Graphing Linear Inequalities (from Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 3 weeks (13 days)
Unit 3 Part 2 Summary: Unit 2 Part 2 builds upon the methods of solving equations and demonstrates the similarities and differences between solving equations and solving inequalities. It concludes with graphing linear inequalities and systems of linear inequalities in the coordinate plane.	
Learning Targets	
Conceptual Category: Algebra Domain: Creating Equations	
Cluster: Create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Solve equations and inequalities in one variable	
Standard#:	**Standard:**
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Cluster: Represent and solve equations and inequalities graphically.	
Standard#:	**Standard:**
A-REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Unit 3 Part 2 Essential Question: ● How can related values that are not equivalent be represented? ● How do we solve for a variable in an inequality? ● How do we graph a linear inequality in the coordinate plane? ● How do we solve a system of linear inequalities?	**Unit 3 Part 2 Enduring Understandings:** ● The vocabulary associated with inequalities. ● Steps used to solve inequalities. ● The difference between and & or statements.

Unit 3 Part 2 Objectives:

- Students will be able to write an inequality.
- Students will be able to solve one-step inequalities.
- Students will be able to solve two-step and multiple step inequalities.
- Students will be able to graph a single inequality on a number line.
- Students will be able to solve compound inequalities and graph them on a number line.
- Students will be able to explain the difference between disjunctions and conjunctions.

- Students will be able to graph a linear inequality that contains two variables in a coordinate plane.
- Students will be able to solve and graph a system of linear inequalities by graphing them in a coordinate plane.

Evidence of Learning

Formative Assessments:

- Questioning stratgies used throughout the unit.
- 3 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Simple Inequalities (add/subtraction)	1 day
Topic #2: Simple Inequalities (multi/division)	1 day
Lab: Inequality Bingo	0.5day
Quiz #1: Solving Simple Inequalities	0.5 day
Topic #3: Two-Step & Multi-Step	1 day
Topic #4: Compound Inequalities	1.5 days
Quiz #2: Multi-Step Inequalities	0.5 day
Topic #5: Special Cases of Compound Inequalities	0.5 day
Quiz #3: Compound Inequalities	0.5 day
Topic #6: Graphing Linear Inequalities in Slope-Intercept Form	2 days

Lab: Solving Inequalities	1 day
*Optional Lab: Illuminations – Dirt Bike Dilemma	*0 days
Topic #7: Solving Systems of Inequalities	2 days
Review and Cumulative Assessment	1 days
Curriculum Resources: • www.njctl.org/courses/math/algebra/ • http://www.doe.virginia.gov/testing/solsearch/sol/math/A/m_ess_a-5a.pdf • http://illuminations.nctm.org/Lesson.aspx?id=2355 HYPERLINK "http://illuminations.nctm.org/Lesson.aspx?id=2355"	

Algebra Math 8 **Unit 3 Part 3**	
Title: Solving Absolute Value Equations & Inequalities (from Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 1 weeks (5 days)
Unit 3 Part 3 Summary: Unit 3 Part 3 reviews the inverse operations used to solve equations and inequalities. Students learn to solve absolute value equations and graph their solutions on a number line. It concludes with the derivation of the compound inequalities required to graph absolute value inequalities. Word problems are also solved throughout this unit.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters	
Conceptual Category: Algebra Domain: Creating Equations	
Cluster: Create equations that describe numbers or relationships	
Standard#:	**Standard:**
A-CED.1	Create equations and inequalities in one variable and use them to solve problems.

A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Understand solving equations as a process of reasoning and explain the reasoning	
Standard#:	**Standard:**
A-REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
Cluster: Solve equations and inequalities in one variable	
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Unit 3 Part 3 Essential Question: ● How do we represent unknown quantities? ● How can the value of an unknown variable be found?	**Unit 3 Part 3 Enduring Understandings:** ● How to solve an absolute value equation in one variable. ● How to solve an absolute value inequality in one variable.

Unit 3 Part 3 Objectives:

- Students will be able to solve absolute value equations.
- Students will be able to solve absolute value inequalities.
- Students will be able to write an absolute value equation or inequality to model real-world problems.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Lessons	Timeframe

Lesson #1: Absolute Value Equations	2 days
Lesson #2: Absolute Value Inequalities	2 days
Cumulative Assessment	1 day
Curriculum Resources: • www.njctl.org/courses/math/algebra/	

Algebra Math 8 Curriculum Unit 3 Part 4	
Title: Relationships Between Quantities (from Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (10 days)
Unit 3 Part 4 Summary: Unit 2 Part 4 covers how to convert different units using conversion factors. It will also discuss how to pick the unit that is the most appropriate for a given situation, and what the most appropriate accuracy is for a given situation.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters	
Conceptual Category: Number and Quantity Domain: Quantities*	
Cluster: Reason quantitatively and use units to solve problems.	
Standard#:	**Standard:**
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 formulas; choose and interpret the scale and the origin in graphs and data displays.

N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Unit 3 Part 4 Essential Question: ● How can you convert and estimate different units to solve real world problems?	**Unit 3 Part 4 Enduring Understandings:** ● Convert one unit of measure. ● Convert multiple units of measure. ● Picking the appropriate type of unit for measurement. ● Picking the appropriate level of accuracy.

Unit 3 Part 4 Objectives:

- Students will be able to convert a unit of measurement to a different unit.
- Students will be able to convert rate of measurement to different rates.
- Students will be able to pick the appropriate type of unit for a desired measurement.
- Students will be able to construct a system of linear equations to model a given situation containing the same unit of measurement.
- Students will be able to pick the appropriate level of accuracy for a given situation.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 3 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Relationships Between Different Units of Measurement	1 day
Lab: MARS - Yogurt	1 day
Quiz #1: Relationships Between Different Units of Measurement	1 day

Topic #2: Picking the Appropriate Level of Measure	1 day
Topic #3: Systems of Equations with Different Units of Measurement	2.5 days
Quiz #2: Picking the Appropriate Unit of Measure	0.5 day
Topic #4: Choosing the Appropriate Level of Accuracy	1.5 day
Quiz #3: Choosing the Appropriate Level of Accuracy	0.5 day
Review and Cumulative Assessment	1 day

Curriculum Resources:
www.njctl.org/courses/math/algebra/
http://map.mathshell.org/materials/tasks.php?taskid=272&subpage=apprentice HYPERLINK "http://map.mathshell.org/materials/tasks.php?taskid=272&subpage=apprentice"

Algebra Math 8 Curriculum **Unit 4 (2 Parts)**	
Title: Functions and Exponential Functions	
Subject: Algebra Math 8	**Length of Time:** 4 Weeks (19 days)
Unit 4 Summary: Part 1 will allow students to understand how functions operate and relates to a graph. They will compare properties of two functions and represent functions in multiple ways. They will be introduced to slope-intercept form and recognize that the graph will be a straight line. Part 1 defines the key features of functions, and uses explicit and recursive formulas to define sequences. Part 1 also explores and compares the multiple representations of functions and transformations of linear functions. Part 2 examines exponential growth and decay.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters	

Standard#:	Standard:
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.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.
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.
HS F.IF.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 input x. The graph of *f* is the graph of the equation y = f(x).
HS F.IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
HS F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of integers. For example, the Fibonacci sequence is defined recursively by $f(0) = 1, f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
HS F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
HS F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, of by verbal description).
HS F.BF.1	Write a function that describes the relationship between two quantities

HS F.BF.2 (Algebra II)	Write arithmetic & geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
HS F.BF.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
HS F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
HS F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
HS F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
HS F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
HS F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
HS F.LE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
HS F.LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

HS F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.
Domain: Standards for Math Practice	
Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.
Modifications	
Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities	
Interdisciplinary Connections	
Science, Language Arts, and Technology	
Integration of 21st Century Themes and Skills	

21st Century Skills
- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Algebra Math 8 Curriculum **Unit 4 Part 1**	
Title: Functions (Combined 8th and Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (9 days)
Unit 4 Part 1 Summary: Part 1 will allow students to understand how functions operate and relates to a graph. They will compare properties of two functions and represent functions in multiple ways. They will be introduced to slope-intercept form and recognize that the graph will be a straight line. This part also defines the key features of functions, and uses explicit and recursive formulas to define sequences. This part explores and compares the multiple representations of functions and transformations of linear functions.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters	
Domain: Functions	
Cluster: Define, evaluate, and compare functions.	
Standard #s:	**Standards:**
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.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.
Cluster: Use functions to model relationships between quantities	
Standard #s:	**Standards:**
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.
Conceptual Category: Functions: Interpreting Functions	
Cluster: Understand the concept of a function and the function notation.	
Standard#:	**Standard:**
HS F-IF.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 input x. The graph of *f* is the graph of the equation y = f(x).
HS F-IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
HS F-IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of integers. For example, the Fibonacci sequence is defined recursively by $f(0) = 1, f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
Cluster: Interpret functions that arise in applications in terms of the context.	
Standard #	**Standard:**
HS F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
Cluster: Analyze function using different representations.	
HS F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, of by verbal

	description).
Conceptual Category: Functions: Building Functions	
Cluster: Build a function that describes the relationship between two quantities	
Standard #	**Standard:**
HS F.BF.1	Write a function that describes the relationship between two quantities
HS F.BF.2 (in Algebra II)	Write arithmetic & geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
Cluster: Build new functions from existing functions.	
HS F.BF.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Unit 4 Part 1 Essential Question:	**Unit 4 Part 1 Enduring Understanding:**
· What is a function? · How are functions represented? · What can a relationship between numbers tell about a problem? · How do you use a formula to identify the terms of a sequence? · What are the multiple ways a function can be represented? · How do you write a linear function after a given transformation?	· Properties of functions and their graphs are similar but not identical. · Slope-intercept form is an easy way of graphing functions. · The definition of a function. · The difference between the domain and range. · Know how to evaluate functions. · How to generate explicit and recursive formulas. · Know how to find the rate of change.

Unit 4 Part 1 Objectives:

- Students will understand what a function is and its corresponding graph.
- Students will compare properties of different functions and relate the information to real world situations.
- Students will graph slope-intercept form of a line.
- Students will be able to define a function and identify its domain and range.

- Students will be able to evaluate functions.
- Students will be able to write recursive and explicit formulas.
- Students will be able to compare the rate of change of multiple representations of functions.
- Students will be able to write a linear function after a given transformation.
- Students will be able to determine the transformation(s) that occur between 2 linear functions.

Evidence of Learning

Formative Assessments:

· Questioning strategies used throughout the unit.
· 6 Quizzes

Summative Assessment:

· Cumulative Assessment

Lesson Plan

Topics	Timeframe
Topic #1: Relationships and Functions Lab – Intro to Functions (either group or individual)	1 day
Topic #2: Domain and Range Lab: Domain and Range Matching (A1) **Quiz #1 Domain and Range**	1 day
Topic #3: Vertical Line Test **Quiz #2**	1 day
Topic #4: Linear Vs. Non-Linear Functions **Quiz #3**	1 day

Topic #5: Evaluating Functions	1 day
Topic # 6: Explicit and Recursive Functions **Quiz #4: Evaluating, Explicit vs. Recursive**	1 day
Topic # 7: Multiple Representation of Functions Lab: MARS – Functions and Everyday Situations **Quiz #5: Multiple Representations of Functions**	1 day
Lab: Investigation of Transformations with Linear Functions Topic #8: Transformations with Linear Functions **Quiz #6: Transformations with Linear Functions**	1 day
Review and Assessment	1 day
Curriculum Development Resources: • https://njctl.org/courses/math/8th-grade-math/ • www.njctl.org/courses/math/algebra/ • http://www.apsva.us/cms/lib2/VA01000586/Centricity/Domain/2317/S1%20Domain-Range%20Matching.pdf • http://map.mathshell.org/materials/download.php?fileid=1259	

Algebra Math 8 Curriculum Unit 4 Part 2	
Title: Exponential Functions (from NJCTL Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (10 days)
Unit 4 Part 2 Summary: Part 2 examines exponential growth and decay.	
Learning Targets	

PARCC ■ Major Clusters; ▣ Supporting Clusters; ○ Additional Clusters	
Conceptual Category: Functions: Interpreting Functions	
Cluster: Interpret functions that arise in terms of the context.	
Standard#:	**Standard:**
HS F-IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
HS F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
HS F-IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Cluster: Analyze functions using different representations.	
Standard#:	**Standard:**
HS F-IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
HS F-IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
Cluster: Analyze functions using different representations.	
Standard#:	**Standard:**
HS F-IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Conceptual Category: Functions: Building Functions	
Cluster: Build a function that describes the relationship between two quantities	
Standard#:	**Standard:**
HS F-BF.1	Write a function that describes a relationship between two quantities.
Conceptual Category: Functions: Linear Quadratic & Exponential Models	
Cluster: Construct and compare linear, quadratic, and exponential models and solve problems.	
Standard#:	**Standard:**
HS F-LE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
HS F-LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
Cluster: Interpret expressions for functions in terms of the situation they model.	
Standard#:	**Standard:**
HS F-LE.5	Interpret the parameters in a linear or exponential function in terms of a context.

Unit 4 Part 2 Essential Question: · How do exponential functions differ from linear functions?	**Unit 4 Part 2 Enduring Understandings:** · Know what exponential growth is. · The difference between growth rate and a growth factor. · Know what exponential decay is.

Unit 4 Part 2 Objectives:

- Students will be to identify exponential relationships from fro a table, a graph, and an equation.
- Students will be able to calculate growth rates and factors.
- Students will be able identify exponential decay.
- Students will be able to simplify expressions using rules of exponents.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 5 Quizzes

Summative Assessment:

- Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Exponential Growth Intro	0.5 day
Topic #2: Exponential Relationship in Equations, Tables & Graphs	1.25 days
Quiz #1 Exponential Relationships	0.25 day
Topic #3: Growth Rates and Growth Factors	0.5 day
Quiz #2 Growth Rates and Growth Factors	0.5 day
Lab: Elimination	1 day
Topic #4: Exponential Decay	1 day
Quiz #3 Exponential Decay	0.25 day

Topic #5: Exponential vs. Linear	1.25 day
Quiz #4 Exponential vs. Linear	0.5 day
Topic #6: Writing & Solving Model Equations	1.5 day
Quiz #5 Writing & Solving Model Equations	0.5 day
Review & Test	1 day

Curriculum Resources:

· www.njctl.org/courses/math/algebra/

Algebra Math 8 Curriculum Unit 5 (2 Parts)	
Title: Polynomials and Quadratics	
Subject: Algebra Math 8	**Length of Time:** 5 weeks (23 days)
Unit Summary: Unit 5 Part 1 explores operations that can be done with polynomials. Students will first learn how to describe monomials and polynomials, then they will learn to add, subtract and multiply them. Unit 4 Part 1 also explores various methods of factoring. Unit 5 Part 2 builds on the quadratic polynomials studied in Unit 5 Part 1. Unit 5 Part 2 looks at the quadratic polynomials graphically, examining the different methods to find the zeros of the graph.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Standard#:	**Standard:**
A-SSE.2	Use the structure of an expression to identify ways to rewrite it.
A-SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
A-APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

A-SSE.1	Interpret expressions that represent a quantity in terms of its context.*
A-REI.4	Solve quadratic equations in one variable.
A-APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
F-IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
F-IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
F-IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
Mathematical Practice Standards:	
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.
Modifications	
Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities	

Interdisciplinary Connections
Science, Social Studies, Language Arts, and Technology
Integration of 21st Century Themes and Skills
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Algebra Math 8 Curriculum Unit 5 Part 1	
Title: Polynomials	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (9 days)
Unit 5 Part 1 Summary: Unit 4 Part 1 explores operations that can be done with polynomials. Students will first learn how to describe monomials and polynomials, then they will learn to add, subtract and multiply them. Unit 4 Part 1 also explores various methods of factoring.	
Learning Targets	
PARCC ■ Major Clusters; ▣ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Conceptual Category: Algebra Domain: Seeing Structure in Expressions	
Cluster: Interpret the structure of expressions	
Standard#:	**Standard:**
A-SSE.2	Use the structure of an expression to identify ways to rewrite it.
Cluster: Write expressions in equivalent forms to solve problems	
Standard#:	**Standard:**

A-SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
Conceptual Category: Algebra Domain: Arithmetic with Polynomials and Rational Expressions	
Cluster: Perform arithmetic operations on polynomials	
Standard#:	**Standard:**
A-APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Unit 5 Part 1 Essential Question: · How can factoring help to simplify a polynomial?	**Unit 5 Part 1 Enduring Understandings:** · To add or subtract polynomials, only like terms can be combined. · To multiply polynomials, each term of the terms of one polynomial is multiplied to each term of the second polynomial. · Factoring is another way of rewriting a polynomial.

Unit 5 Part 1 Objectives:

· Students will be able to describe and identify monomials, polynomials, and degrees.
· Students will be able to add and subtract polynomials.
· Students will be able to multiply a polynomial by a monomial.
· Students will be able to multiply two polynomials.
· Students will be able to recognize and factor monomials out of a polynomial.
· Students will be able to factor trinomials.
· Students will be able to factor a polynomial with 4 terms using the grouping method.

Evidence of Learning

Formative Assessments:

· Questioning strategies used throughout the unit.
· 7 Quizzes

Summative Assessment:

· Cumulative Assessment	
Lesson Plan	
Topics	**Timeframe**
Topic #1: Definitions of Monomials, Polynomials, and Degrees Topic #2: Adding & Subtract Polynomials **Quiz 1 Intro to & Operations of Polynomials**	1 day
Topic #3: Multiplying a Polynomial by a Monomial Topic #4: Multiplying a Polynomial by a Polynomial	1 day
Topic #5: Special Binomial Products **Quiz 2 Multiplying Polynomials**	1 day
Topic #6: Factors and GCF Topic #7: Factoring out GCF's **Quiz 3 Factoring GCF**	1 day
Topic #8:Factoring using Special Patterns **Quiz 4 Factoring Special Patterns**	1 day
Topic #9: Identifying & Factoring x^2+bx+c **Quiz 5 Factoring with a=1**	1 day
Topic #10: Factoring Trinomials ax^2+bx+c Topic#11: Factoring 4 term polynomials	1 day
Quiz 6 Factoring a1 Topic #12: Mixed Factoring **Lab: RAFT – Polynomial Pancakes** **Quiz 7 Factoring**	1 day
Review and Cumulative Assessment	1 day

Curriculum Resources:

- https://njctl.org/courses/math/algebra-i/
  - http://www.raftbayarea.org/ideas/Polynomial%20Pancakes.pdf
  - HYPERLINK "http://www.raftbayarea.org/ideas/MoMs%20Playoffs.pdf" http://www.raftbayarea.org/ideas/MoMs%20Playoffs.pdf

Algebra Math 8 Curriculum **Unit 5 Part 2**	
Title: Quadratics	
Subject: Algebra Math 8	**Length of Time:** 3 weeks (14 days)
Unit 5 Part 2 Summary: Unit 5 Part 2 builds on the quadratic polynomials studied in the previous unit. Unit 5 Part 2 looks at the quadratic polynomials graphically, examining the different methods to find the zeros of the graph.	
Learning Targets	
PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters + Additional Standard	
Conceptual Category: Algebra Domain: Seeing Structure in Expressions	
Cluster: Interpret the structure of expressions	
Standard#:	**Standard:**
A-SSE.1	Interpret expressions that represent a quantity in terms of its context.*
A-SSE.2	Use the structure of an expression to identify ways to rewrite it.
Cluster: Write expressions in equivalent forms to solve problems	
Standard#:	**Standard:**
A-SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

Conceptual Category: Algebra Domain: Reasoning with Equations and Inequalities	
Cluster: Solve equations and inequalities in one variable	
Standard#:	**Standard:**
A-REI.4	Solve quadratic equations in one variable.
Conceptual Category: Algebra Domain: Arithmetic with Polynomials & Rational Expressions	
Cluster: Understand the relationship between zeros and factors of polynomials	
Standard#:	**Standard:**
A-APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
Conceptual Category: Function Domain: Interpreting Functions	
Cluster: Interpret functions as they arise in applications in terms of context	
Standard#:	**Standard:**
F-IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
Cluster: Analyze functions using different representations	
Standard#:	**Standard:**
F-IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
F-IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
* indicates a modeling standard	
Unit 5 Part 2 Essential Question:	**Unit 5 Part 2 Enduring Understandings:**

· How can factoring help to solve an equation? · In what ways can the zeros of a quadratic be found and can this help us find when an object is in free-fall?	· The characteristics and properties of a graph of a quadratic (parabola) · What it means to solve a quadratic. · If the product of two factors is zero, one of the factors is zero. · The quadratic formula and the discriminant.

Unit 5 Part 2 Objectives:

· Students will be able to identify the parts of quadratics.
· Students will be able to calculate the axis of symmetry and vertex of a quadratic function when it is in standard form.
· Students will be able to find the zeros of a quadratic function by graphing it in a coordinate plane.
· Students will be able to solve quadratic equations using the zero product property.
· Students will be able to solve quadratic equations and polynomials by factoring.
· Students will be able to solve quadratic equations using square roots.
· Students will be able to solve quadratic equations by completing the square.
· Students will be able to identify the nature of the roots of a quadratic using the discriminant.
· Students will be able to solve quadratic equations using the quadratic formula.
· Students will be able to solve polynomial equations using u-substitution.
· Students will be able to solve application problem using methods for solving quadratic equations.

Evidence of Learning

Formative Assessments:

· Questioning strategies used throughout the unit.
· 5 Quizzes

Summative Assessment:

· Cumulative Assessment

Pacing Guide

Topics	Timeframe
Topic #1: Characteristics of a Quadratic Equations **Quiz 1: Characteristics of Quadratic Equations**	1 day
Topic #2: Graphing Quadratic Equations	1 day
Topic #3: Solve Quadratic Equations by Graphing	1 day

Lab: Illuminations – Building Connections	0.75 day
Quiz 2 Graphing & Solving Quadratic Equations by Graphing	0.25 day
Topic #4: Solving Equations with the Zero Product Property	0.5 day
Topic #5: Solve Quadratic Equations by Factoring	0.5 day
Topic #6: Solve Quadratic Equations by using Square Roots	1 day
Topic #7: Solve Quadratic Equations by Completing the Square	0.75 day
Quiz 3 Solving by Factoring, Square Roots and Completing the Square	0.25 day
Topic #8: Intro to the Quadratic Formula & The Discriminant	1 day
Topic #9: Solve Quadratic Equations by using the Quadratic Formula	0.75 day
Quiz 4 Quadratic Formula and Discriminant	0.25 day
Topic #10: Solving Polynomial Equations using U-Substitution	1 day
Topic #11: Solving Applications Problems	1 day
Lab: RAFT – Aquatic Quadratics	0.75 day
Quiz 5 Solving Polynomial Equations using U-Substitution and Solving Application Problems	0.25 day
Lab: Illuminations – Egg Launch Contest	1 day
Review and Cumulative Assessment	1 day
Curriculum Resources: · Textbook and online resources www.njctl.org/courses/math/algebra/ · http://www.raftbayarea.org/readpdf?isid=661 · http://illuminations.nctm.org/Lesson.aspx?id=1091 · HYPERLINK "http://illuminations.nctm.org/Lesson.aspx?id=2650" http://illuminations.nctm.org/Lesson.aspx?id=2650	

Algebra Math 8 Curriculum
Unit 6 (2 Parts)

Title: Nonlinear Functions and Statistics	
Subject: Algebra Math 8	**Length of Time:** 5 weeks
Unit 6 Summary: Unit 6 Part 1 defines the parts of quadratic functions, and the multiple ways to graph a parabola. The unit compares features of multiple functions. Unit 6 Part 2 will allow students to examine scatter plots and interpret data into a graph. They will be able to understand different patterns and lines of best fit within graphs. They will use linear models and two variable data to explain real life situations. They also will examine frequencies and bivariate data. introduces the concepts and misconception of statistics. This part reviews central tendencies and presents ways in which data can be displayed. Misleading graphs will also be examined.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters	
Standard#:	**Standard:**
F-IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quantities and sketch graphs, showing key features in given a verbal description of the relationship.
F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
F-IF.6	Calculate the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change of the graph.
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, of by verbal description).
F.BF.1	Write a function that describes relationship between two quantities.

F.BF.3	Identify the key effect on the graph of replacing f(x) by f(x) + k, f(kx), and f(x + k) for specific values of k (both positive and negative; find the value of k given the graphs. Experiment with cases and illustrate and explanation of the effects of the graph using technology.
F.LE. 3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
F.LE. 5	Interpret the parameters in a linear or exponential function in terms of a context.
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
8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?
S-ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
S-ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S-ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
S-ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S-ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
S-ID.9	Distinguish between correlation and causation.
Domain: Standards for Math Practice	
Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.
Modifications	
Standards-based grading, reassessments, differentiate assignments, scaffold instruction, study guides, peer/teacher tutoring assistance, tiered assignments, student choice, modify pace, lesson tutorial videos, performance assessments, modified rubrics, assessment modified for IDEA, add enrichment activities, add extension activities to projects, challenge activities	
Interdisciplinary Connections	
Science, Language Arts, and Technology	

Integration of 21st Century Themes and Skills
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Algebra Math 8 Curriculum Unit 6 Part 1	
Title: Non-Linear Functions (from NJCTL Algebra I)	
Subject: Algebra Math 8	**Length of Time:** 2 weeks (10 days)
Unit 6 Part 1 Summary: Unit 6 Part 1 defines the parts of quadratic functions, and the multiple ways to graph a parabola. This part compares features of multiple functions.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters	
Conceptual Category: Functions: Interpreting Functions	
Cluster: Interpret functions that arise in applications in terms of the context.	
Standard#:	**Standard:**
F-IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quantities and sketch graphs, showing key features in given a verbal description of the relationship.

F-IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
F-IF.6	Calculate the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change of the graph.
Cluster: Analyze function using different representations.	
Standard #	**Standard:**
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, of by verbal description).
Conceptual Category: Functions: Building Functions	
Cluster: Build a function that models a relationship between two quantities.	
F.BF.1	Write a function that describes relationship between two quantities.
F.BF.3	Identify the key effect on the graph of replacing f(x) by f(x) + k, f(kx), and f(x + k) for specific values of k (both positive and negative; find the value of k given the graphs. Experiment with cases and illustrate and explanation of the effects of the graph using technology.
Conceptual Category: Functions: Linear, Quadratic, and Exponential Models	
Cluster: Construct and compare linear, quadratic, and exponential models and solve problems.	
F.LE. 3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
Cluster: Interpret expressions for functions in terms of the situation they model.	

F.LE. 5	Interpret the parameters in a linear or exponential function in terms of a context.

Unit 6 Part 1 Essential Question:	**Unit 6 Part 1 Enduring Understandings:**
● What are the key features of a quadratic equation? How do you graph a quadratic function in standard form, vertex form, and intercept form?	● The parts of a parabola. ● Know how to graph a quadratic function. ● How to determine and write the transformations of a parabola. ● How to compare features of functions.

Unit 6 Part 1 Objectives:

- Students will be able to identify the key features of a parabola.
- Students will be able to graph a parabola when the equation is in standard form.
- Students will be able to graph a quadratic function using intercept form.
- Students will be able to graph a quadratic function using vertex form
- Students will be able to solve application problems by writing a quadratic function in its desired form.
- Students will be able to calculate the roots of a quadratic equation when it is in vertex form.
- Students will be able to determine the transformations of a parabola from its parent function.
- Students will be able to determine the equation of a new function after its parent function went through a transformation.
- Students will be able to graphically analyze the behavior of non-linear functions.
- Students will be able to compare key features of linear, quadratic, and exponential functions.

Evidence of Learning

Formative Assessments:

- Questioning strategies used throughout the unit.
- 5 Quizzes

Summative Assessment:

- Cumulative Assessment

Lesson Plan

Lessons	Timeframe
Topic # 1: Review: Characteristics of Quadratic Functions	0.25 day

Topic # 2: Review: Graphing Quadratic Functions in Standard Form	0.5 day
Quiz #1: Quadratics Review	0.25 day
Topic # 3: Graphing Quadratic Functions in Intercept Form	1.5 days
Quiz # 2: Graphing Quadratic Functions in Intercept Form	0.5 day
Topic #4: Graphing Quadratic Functions in Vertex Form	1.25 days
Topic #5: Calculating the Roots of a Quadratic in Vertex Form	0.5 day
Quiz # 3: Graphing & Calculating the Roots for Quadratics in Vertex Form	0.25 day
Lab: Investigation of Transformations w/ Quadratic Functions Topic #6: Transformations w/ Quadratic Functions	1.75 days
Quiz # 4: Transforming and Translating	0.25day
Topic # 7: Analyzing the Graphs of Non-Linear Functions	1 day
Topic #8: Comparison of Types of Functions	0.75 day
Quiz # 5: Analyzing & Comparing Functions	0.25 day
Topic # 9: Review and Unit Test	1 day

Curriculum Resources:

- Textbook and Online Resources
- https://njctl.org/courses/math/algebra-i/