

Progressive Mathematics Initiative
Mathematics Curriculum
www.njctl.org
Chapter Plan

Title: Numbers and Operations

Grade Level: 8

Length of Time: 4 weeks

Chapter Summary: This chapter starts off reviewing skills learned in 7th grade/ This unit will then allow students to evaluate squares and radicals. They will explore how to simplify and approximate square roots to help solve expressions. The chapter will also introduce different properties of exponents and solving equations using them. These skills will be necessary when solving problems involving Pythagorean Theorem or exponential notations.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ■ Additional Clusters

Domain: The Number System

Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.

Standard #s:	Standards:
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).

Domain: Expressions and Equations

Cluster: Expressions and Equations work with radicals and integer exponents.

Standard #s:	Standards:
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

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.
Chapter Essential Question: <ul style="list-style-type: none"> What is the difference between rational and irrational numbers? 	Chapter Enduring Understanding: <ul style="list-style-type: none"> Squares and Radicals can help solve real world problems. Squares and Radicals affect the numbers that are being used within an operation.
Chapter Objectives: <ul style="list-style-type: none"> <i>Students will be able to find the squares and square roots of both rational and irrational numbers.</i> <i>Students will know the perfect squares. They will also be able to simplify perfect square radical expressions as well as non-perfect square radicands.</i> <i>Students will use the perfect squares to approximate square roots.</i> <i>Students will understand the properties of exponents and will use them to solve equations with perfect square and cube roots.</i> 	
Evidence of Learning	
Formative Assessments: <ul style="list-style-type: none"> SMART Response questions used throughout the chapter. 5 Quizzes 	
Summative Assessment: <ul style="list-style-type: none"> Chapter Test 	
Lesson Plan	
Topics	Timeframe
Presentation Part 1	
Topic #1: Addition, Natural Numbers & Whole Numbers	0.5 day
Topic #2: Addition, Subtraction and Integers	0.5 day
Topic #3: Multiplication and Division of Integers	0.5 day
Topic #4: Operations with Rational Numbers	0.5 day
Topic #5: Converting Repeating Decimals to Fractions	2 days
Quiz #1	
Topic #6: Exponents, Squares, Square Roots and Perfect Squares <i>Activity: A Penny for Your Thoughts</i>	1 day
Quiz #2	
Presentation Part 2	
Topic #7: Squares of Numbers Greater than 20	1 day

Topic #8: Simplifying Perfect Square Radical Expressions Quiz #3	2 days
Topic #9: Approximating Square Roots <i>Activity: Root Race</i>	1 day
Topic #10: Rational & Irrational Numbers Quiz #4	1 day
Topic #11: Real Numbers	0.5 day
Topic #12: Properties of Exponents <i>Activity: Laws of Exponents</i> Quiz #5	2 days
Chapter Test	1 day
Curriculum Development Resources:	
<ul style="list-style-type: none"> • http://njctl.org/courses/math/8th-grade-math/ 	
Lesson Components	
21st Century Skills <ul style="list-style-type: none"> • Financial, Economic, Business, and Entrepreneurial Literacy 21st Century Themes <ul style="list-style-type: none"> • Critical Thinking and Problem Solving • Communication and Collaboration • Life and Career Skills 	

Progressive Mathematics Initiative

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Mathematics Curriculum

Chapter Plan

Title: 2D Geometry

Grade Level: 8

Length of Time: 4 weeks

Chapter Summary: Students will be able to use models to show their understanding of congruent and similar one and two-dimensional figures.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ■ Additional Clusters

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: 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.

<p>Chapter Essential Questions:</p> <ul style="list-style-type: none"> • 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? 	<p>Chapter Enduring Understandings:</p> <ul style="list-style-type: none"> • Congruent figures can be formed by a series of transformations. • Similar figures can be formed by a series of transformations. • Understand angle relationships in one and two-dimensional figures.
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<p>Chapter Objectives:</p> <ul style="list-style-type: none"> • <i>Students will be able to transform figures on a coordinate plane.</i> • <i>Students will be able to use their understanding of angle relationships to find unknown angles.</i> • <i>Students will be able to describe a sequence of transformations that will result in congruent figures.</i> • <i>Students will be able to describe a sequence of transformations and dilations that will result in similar figures.</i>
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Evidence of Learning

<p>Formative Assessments:</p> <ul style="list-style-type: none"> • SMART Response questions used throughout the chapter. • 7 Quizzes

<p>Summative Assessment:</p> <ul style="list-style-type: none"> • Chapter Test
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Lesson Plan

Topics	Timeframe
Topic #1: Translations Lab: Translations Quiz #1	2 days
Topic #2: Rotations Quiz #2	2 days
Topic #3: Reflections Quiz #3	2 days
Topic #4: Dilations Lab: Dilations	2 days
Topic #5: Symmetry Quiz #4	2 days
Topic #6: Congruence & Similarity Quiz #5	2 days
Topic #7: Special Pairs of Angles Quiz #6	2 days

Topic #8: Remote Exterior Angles Quiz #7	1 day
Chapter Test	1 day
Curriculum Development Resources	
<ul style="list-style-type: none"> ● https://njctl.org/courses/math/8th-grade-math/ ● https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-overview 	
Lesson Components	
21st Century Skills	
<ul style="list-style-type: none"> ● Financial, Economic, Business, and Entrepreneurial Literacy 	
21st Century Themes	
<ul style="list-style-type: none"> ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills 	

**Progressive Mathematics Initiative
Mathematics Curriculum**

www.njctl.org

Chapter Plan

Title: Equations with Roots and Radicals

Grade Level: 8

Length of Time: 2 weeks

Chapter Summary: This chapter 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 $\sqrt{2}$ is irrational.

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.

Chapter Essential Questions:

- How do radicals and squares help solve real world problems?
- How are radicals and squares useful for solving equations and manipulating numbers?

Chapter Enduring Understanding:

- 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.

Chapter 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:

- SMART Response questions used throughout the chapter.
- 3 Quizzes

Summative Assessment:

- Chapter Test

Lesson Plan

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 <i>Activity: Radical Makeover</i> Quiz #2	2 days
Topic #4: Solving Equations with Perfect Square & Cube Roots Quiz #3	2 days
Chapter Test	1 day

Curriculum Development Resources:

- <http://njctl.org/courses/math/8th-grade-math/>

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

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Chapter Plan

Title: Pythagorean Theorem, Distance and Midpoints

Grade Level: 8

Length of Time: 3 weeks

Chapter Summary: This chapter 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

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.

Domain: Standards for Math Practice

Standard #s:

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.

Chapter Essential Question:

- How does the Pythagorean Theorem help solve real world problems?
- How do we compute the distance and midpoint within problems?

Chapter Enduring Understanding:

- The Pythagorean Theorem can be used to solve real world problems.
- The Pythagorean Theorem aids in solving problems involving right triangles.

Chapter 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:

- SMART Response questions used throughout the chapter.
- 2 Quizzes

Summative Assessment:

- Chapter Test

Lesson Plan

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

Curriculum Development Resources:

- <http://njctl.org/courses/math/8th-grade-math/>

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

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 Chapter Plan

Title: Scientific Notation

Grade Level: 8

Length of Time: 3 weeks

Chapter Summary: This chapter 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.

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.

<p>Chapter Essential Question:</p> <ul style="list-style-type: none"> • 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? 	<p>Chapter Enduring Understanding:</p> <ul style="list-style-type: none"> • 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.
<p>Chapter Objectives:</p> <ul style="list-style-type: none"> • 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. 	
<p>Evidence of Learning</p>	
<p>Formative Assessments:</p> <ul style="list-style-type: none"> • SMART Response questions used throughout the chapter. • 5 Quizzes 	
<p>Summative Assessment:</p> <ul style="list-style-type: none"> • Chapter Test 	
<p>Lesson Plan</p>	
<p>Topics</p>	<p>Timeframe</p>
<p>Topic #1: Purpose of Scientific Notation Lab: RAFT – One in a Million Quiz #1</p>	<p>1 day</p>
<p>Topic #2: How to Write Numbers in Scientific Notation</p>	<p>1 day</p>
<p>Topic #3: How to convert between Scientific Notation and Standard Form Quiz #2</p>	<p>2 days</p>
<p>Topic #4: Magnitude Quiz #3</p>	<p>1 day</p>
<p>Topic #5: Comparing Numbers in Scientific Notation Quiz #4</p>	<p>1 days</p>
<p>Topic #6: Multiply and Divide with Scientific Notation</p>	<p>2 days</p>
<p>Topic #7: Addition and Subtraction with Scientific Notation Quiz #5</p>	<p>2 days</p>

Chapter Test	1 day
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Curriculum Development Resources: <ul style="list-style-type: none">• https://njctl.org/courses/math/8th-grade-math/• http://www.raftbayarea.org/ideas/One%20in%20a%20Million.pdf

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Evidence of Learning	
Formative Assessments:	
<ul style="list-style-type: none"> • SMART Response questions used throughout the chapter. • 3 Quizzes 	
Summative Assessment:	
<ul style="list-style-type: none"> • Chapter Test 	
Lesson Plan	
Topics	Timeframe
Topic 1: Review of Two-Step Equations	1 day
Topic 2: Multistep Equations	2 days
Topic 3: Solving Equations that Contain Fractions	2 days
Quiz – Multistep Equations	1 day
Topic 4: Equations with the Same Variable on Both Sides	2 days
Topic 5: Comparing Expressions with the Same Variable	1 day
Quiz – Equations with the Same Variable on Both Sides	1 day
Topic 6: Writing & Solving Algebraic Equations	2 days
Topic 7: Translating and Solving Consecutive Integer Problems	2 days
Quiz – Writing & Solving Algebraic Equations including Consecutive Integers	1 day
Lab: RAFT – Occasions for an Equation	2 days
Topic 8: Transforming Formulas	2 days
Chapter Test	1 day
Curriculum Development Resources:	
<ul style="list-style-type: none"> • https://njctl.org/courses/math/8th-grade-math/ • http://www.raftbayarea.org/ideas/Occasions%20for%20an%20Equation.pdf 	
Lesson Components	
21st Century Skills	
<ul style="list-style-type: none"> • Financial, Economic, Business, and Entrepreneurial Literacy 	
21st Century Themes	
<ul style="list-style-type: none"> • Critical Thinking and Problem Solving • Communication and Collaboration • Life and Career Skills 	

Progressive Mathematics Initiative Mathematics Curriculum www.njctl.org Chapter Plan	
Title: Graphing Linear Equations	
Grade Level: 8	Length of Time: 4 weeks
Chapter Summary: This chapter covers how to graph and write linear equations. Students will develop the relationship of the slope and points on a line and write linear equations in Point-Slope form and Slope-Intercept form. Students will also learn how write the equation of a line with different given quantities. They can use these different graphs to solve the equation as well.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ■ Additional Clusters	
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.
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.

<p>Chapter Essential Questions:</p> <ul style="list-style-type: none"> • 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? • How can real world situations be modeled by proportional relationships? • How can solutions be found within an equation? 	<p>Chapter Enduring Understanding:</p> <ul style="list-style-type: none"> • Various methods can be used to solve equations and the solution to an equation can be checked by substituting into the original equation. • Linear relationships can be graphed to help solve real world problems and make predictions.
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<p>Chapter Objectives:</p> <ul style="list-style-type: none"> • <i>Students will be able to identify point on a line given its equation.</i> • <i>Students will be able to graph a line given different forms of the equation.</i> • <i>Students will be able to describe how slope relates to horizontal and vertical lines.</i> • <i>Students will be able to relate similar triangles to slope.</i> • <i>Students will be able to identify a linear function from a table.</i> • <i>Students will be able to use proportional relationships to solve real world problems.</i> • <i>Students will be able to solve linear equations for desired variables and values.</i>
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Evidence of Learning

<p>Formative Assessments:</p> <ul style="list-style-type: none"> • SMART Response questions used throughout the chapter. • 6 Quizzes
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<p>Summative Assessment:</p> <ul style="list-style-type: none"> • Chapter Test

Lesson Plan

Topics	Timeframe
Topic #1: Linear Equations Quiz #1	1 day
Topic #2: Graphing Linear Equations Using Intercepts Quiz #2	2 days
Topic #3: Horizontal and Vertical Lines	1 day
Topic #4: Slope of a Line Quiz #3	3 days

Topic #5: Slope and Similar Triangles Quiz #4	2 days
Topic #6: Point-Slope Form Quiz #5	2 days
Topic #7: Slope-Intercept Form Labs: Select one of the following - Connect Three - Slippery Slopes! - Marble Masters Quiz #6	3 days
Lab: Proportional Relationships Topic #8: Proportional Relationships	1 day
Topic #9: Solving Linear Equations	2 days
Chapter Test	2 days
Curriculum Development Resources:	
<ul style="list-style-type: none"> • https://njctl.org/courses/math/8th-grade-math/ • http://www.raftbayarea.org/ideas/Connect%20Three.pdf • http://www.raftbayarea.org/ideas/Slippery%20Slopes.pdf • http://www.raftbayarea.org/ideas/Marble%20Masters.pdf 	
Lesson Components	
21st Century Skills <ul style="list-style-type: none"> ● Financial, Economic, Business, and Entrepreneurial Literacy 21st Century Themes <ul style="list-style-type: none"> ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills 	

Progressive Mathematics Initiative www.njctl.org Mathematics Curriculum Chapter Plan # 8	
Title: Systems of Equations	
Subject: 8 th Grade Math	Length of Time: 3 weeks
Unit Summary: The unit 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: Grade 8: Expressions & Equations	
Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations	
Standard#:	Standard:
8.EE.8	Analyze and solve pairs of simultaneous linear equations. <ul style="list-style-type: none"> a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair
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.
Unit Essential Question:	Unit Enduring Understandings:
<ul style="list-style-type: none"> ● How can real world situations be modeled by systems? How can solutions be found to a system? 	<ul style="list-style-type: none"> ● The point at which lines intersect is the solution to the system with those lines.
Unit Objectives:	
<ul style="list-style-type: none"> ● <i>Students will be able to graph systems of linear equations to find a solution.</i> ● <i>Students will be able to solve a system of equations by using substitution and elimination.</i> ● <i>Students will be able to translate real world problem into a system.</i> 	
Evidence of Learning	
Formative Assessments:	
<ul style="list-style-type: none"> ● SMART Response questions used throughout the unit. ● 2 Quizzes 	

Summative Assessment:

- Unit Test

Lesson Plan

Topics	Timeframe
PhET Lab: Exploring Systems of Linear Equations Topic #1: Solving Systems by Graphing	3 days
Topic #2: Solving Systems by Substitution	2 days
Quiz #1	1 day
Topic #3: Solving Systems by Elimination	2 days
Topic #4: Choosing a Strategy	1 day
Quiz #2	1 day
Topic #5: Writing Systems to Model Situations	1 day
Chapter Test	1 day

Curriculum Resources:

- <https://njctl.org/courses/math/8th-grade-math/>
- <https://phet.colorado.edu/en/contributions/view/4072>
- <https://phet.colorado.edu/en/simulation/graphing-slope-intercept>

Lesson Components**21st Century Skills**

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Progressive Mathematics Initiative Mathematics Curriculum www.njctl.org Chapter Plan	
Title: Functions	
Grade Level: 8	Length of Time: 2 weeks
Unit Summary: This chapter 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.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters	
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.
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.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.
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.
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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.
Unit Essential Question: <ul style="list-style-type: none"> · What is a function? · How are functions represented? · What can a relationship between numbers tell about a problem? 	Unit Enduring Understanding: <ul style="list-style-type: none"> · Properties of functions and their graphs are similar but not identical. · Slope-intercept form is an easy way of graphing functions.
Unit Objectives: <ul style="list-style-type: none"> · 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. 	
Evidence of Learning	
Formative Assessments: <ul style="list-style-type: none"> · SMART Response questions used throughout the unit. · 3 Quizzes 	
Summative Assessment: <ul style="list-style-type: none"> · Chapter Test 	
Lesson Plan	
Topics	Timeframe
Lab – Funky Functions	2 days
Topic #1: Relationships and Functions	
Topic #2: Domain and Range	1 day
Lab – Functions in Action	
Quiz #1	
Topic #3: Vertical Line Test	2 days
Quiz #2	
Topic #4: Linear Vs. Non-Linear Functions	2 days

Quiz #3	
Chapter Test	1 day
Curriculum Development Resources:	
<ul style="list-style-type: none"> ● https://njctl.org/courses/math/8th-grade-math/ ● https://phet.colorado.edu/en/simulation/function-builder-basics ● https://phet.colorado.edu/en/contributions/view/4444 	

Lesson Components
<p>21st Century Skills</p> <ul style="list-style-type: none"> ● Financial, Economic, Business, and Entrepreneurial Literacy <p>21st Century Themes</p> <ul style="list-style-type: none"> ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

**Progressive Mathematics Initiative
Mathematics Curriculum
Chapter Plan**

Title: 3D Geometry

Grade Level: 8 **Length of Time:** 3 weeks

Chapter Summary: This chapter will allow students to learn about 3-dimensional solids and how to calculate their volume. They will also use these formulas to solve real world problems.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters

Domain: Geometry

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Standard #:	Standard:
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

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.

<p>Chapter Essential Question:</p> <ul style="list-style-type: none"> • 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? 	<p>Chapter Enduring Understanding:</p> <ul style="list-style-type: none"> • There are different formulas that can be used when solving for the volume of a 3-dimensional figure.
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Chapter Objectives:

- *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:

- SMART Response questions used throughout the chapter.
- 2 Quizzes

Summative Assessment:

- Chapter Test

Lesson Plan

Topics	Timeframe
Topic #1: 3-Dimensional Solids Quiz #1	3 days
Lab #1: Volume Activity Topic #2: Volume-Prisms and Cylinders	3 days
Topic #3: Volume-Pyramids, Cones & Spheres Lab: RAFT – Volume Verification Quiz #2	3 days
Chapter Test	1 day

Curriculum Development Resources:

- <https://njctl.org/courses/math/8th-grade-math/>
- <http://www.njctl.org/courses/math/8th-grade-math/3d-geometry/volume-activity/>
- <http://www.raftbayarea.org/ideas/Volume%20Verification.pdf>

Lesson Components**21st Century Skills**

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills