Mathematics Department

Grade 8 Foundations of Algebra

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Effective Date: September 2024

Scope and Sequence

Month	GRADE 8 Foundations of Algebra
September	***Assessment: Baseline Assessment*** **UNIT 1 Part 1** **Topic: Exponents & Roots - Chapter 1 (22 days) (12 days)** **Prerequisites:** ● Interpreting the real number system ● Adding, subtracting, multiplying and dividing integers **Objectives:** ● Understand exponential notation and use it to evaluate exponential expressions ● Add, subtract, multiply, and divide expressions with integer exponents using all properties of exponents ○ Eliminate word problems and geometry applications for 1.2. ○ Minimal multi-step with negative exponents ○ For 1.6, only teach square and cube roots. Eliminate volume and surface application problems. **Additional Notes:** ● Review integer operations ● Math-Lib, Scavenger Hunt ● Exponents Reference Sheet (Highlight as property as you learn it) ● Celebrity Exponents Quiz

October	**Objectives: Exponents & Roots - Chapter 1 (Continued):** ● Add, subtract, multiply, and divide expressions with integer exponents using all properties of exponents ● Recite the first 20 perfect squares and the first 10 perfect cubes. ● Evaluate and estimate square and cube roots. ● Solve equations involving square and cubes of variables ● Solve Real-World Problems involving squares and cubes ● Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. ● Order all real numbers, including irrationals, on a real number line. ● Compare irrational numbers by using rational approximations **Additional Notes:** ● Flash Cards-Perfect Squares Around the World Activity ● Timed (5 minutes) Perfect Squares and Cubes Quiz (Google Forms) ● Number Lines with Frankenstein ● *Skip Compound Interest in 1.6 ● Be sure to teach how to find volumes of 3-dimensional figures **Chapter 1 Assessment** **UNIT 1 Part 2** **Topic: Scientific Notation - Chapter 2 (15 days)** **Prerequisites:** ● Multiplying and dividing decimals by positive powers of 10 **Objectives:** ● Express large and small numbers in scientific notation. ● Write numbers in standard form. ● Compare numbers in scientific Notation ● Add and subtract numbers in scientific notation ● Apply scientific notation to real-world situations. **Additional Notes:** ● Skip prefix system in 2.2 ● Find Someone Who Has… Activity **Chapter 2 Assessment**
November	**Objectives: Scientific Notation - Chapter 2 (Continued)** ● Multiply and divide numbers in scientific notation **UNIT 2 Part 1** **Topic: Linear Equations - Chapter 3 (28 days, including pre-skill review)** **Prerequisites:** ● Solve Linear Equations with One Variable

	● Understand Equivalent Equations ● Solve Real-World Problems Involving Linear Equations with One Variable ● Represent fractions as repeating decimals **Objectives:** ● Solve multi-step linear equations with one variable, including equations with rational number coefficients ● Solve real-world problems involving linear equations with one variable **Additional Notes:** ● Before starting Ch.3, take 5-7 days to review one-step, two-step, and multi-step equations, including distributive property, combining like terms, and variables on both sides. Include two-step word problems in one variable. ● Scavenger Hunts, Math-Libs, Face-ing Math ● Eliminate equations like problems pg. 102 #9-12 where there is an expression with multiple terms in the numerator of a fraction ● Eliminate repeating decimal problems that cannot be converted to fractions with the 9s trick.
December	**UNIT 2 Part 1 (Continued)** **Topic: Linear Equations - Chapter 3 (Continued)** **Objectives:** ● Identify Linear Equations with no solution and infinitely many solutions ● Represent a relationship between two variable using a linear equation and using a table of values ● Solve for a variable in a two variable linear equation **Additional Notes:** ● In 3.2, do not include the terms “inconsistent,” “consistent,” and “identity” - students just need to be able to identify one solution, no solution, and infinitely many solutions ● The goal of 3.4 is to teach students how to “solve for y” in a two-variable equation in order to be able to graph lines in slope-intercept form in chapter 4. **Chapter 3 Assessment**
January	**UNIT 3** **Topic: Linear Relationships - Chapter 4 (20 days)** **Prerequisites:** ● Interpreting direct proportion in an equation and on a graph **Objectives:** ● Find the slope of all types of lines ● Use the slope formula ● Use similar triangles to explain why the slope is the same between any two

	distinct points on a non-vertical line ● Explore the relationship between the lines y = mx and y = mx + b ● Use the slope-intercept form to write an equation of a line. ● Identify and write equations of parallel lines ● Identify and write linear functions. (Ex. Given: slope and point, two points, point & parallel equation) ● Graph linear functions (Ex. Given m and b, given m and a point) ● Explain slope and y-intercept in the content of real-world problems **Additional Notes:** ● Scavenger Hunts, Math-Libs, Group Task Cards, Station Activity ● Watch Slope Dude ● Celebrity Slope Quiz **Chapter 4 Assessment**
February	**UNIT 2 Part 2** **Topic: Systems of Linear Equations - Chapter 5 (15 Days)** **Prerequisites**: ● Graphing linear equations using a table of values ● Solving real-world problems algebraically **Objectives:** ● Solve systems using the graphical method ● Solve systems using table of values ● Solve systems using the elimination method ● Interpret the solution of a system of equations as being the point of intersection of two lines on a graph because the point satisfies both equations simultaneously ● Solve simple systems by inspection to identify when the system has no solution or infinitely many solutions ● Write and solve systems to solve real-world problems **Additional Notes:** ● Teach Chapter 5 in this order: section 5.4, 5.1 (very basic), 5.2, 5.5, 5.3 ● *Do not teach solving linear systems by substitution ● Do not do graphing problems when the solution is not an integer ordered pair ● Include rational number solutions for the elimination method (ex. 0.5) ● Teach all algebraic methods of solving before doing word problems. Include “frames” on word problems Day 1. ● In 5.5, do not include the terms “inconsistent” and “dependent” - students just need to be able to identify one solution, no solution (parallel lines), and infinitely many solutions (same line)

	● Scavenger Hunts, Math-Libs **Chapter 5 Assessment** **Algebra Benchmark Assessment**
March	**UNIT 4** **Topic: Graphs & Functions - Chapter 6 (14 days)** **Prerequisites:** ● Writing algebraic expressions to represent unknown quantities ● Evaluating algebraic expressions **Objectives:** ● Understand relations and functions ● Know that when a relation is a function, each input is assigned to exactly one output ● Represent relations using mapping diagrams ● Identify functions graphically including the vertical line test ● Translate verbal descriptions of functions into algebraic, numerical, and graphical forms ● Identify a linear function from a table and a graph ● Use graphs to describe functions qualitatively ● Compare two linear functions represented in the same form and represented in different forms ● Identify if a function is linear or nonlinear from a table, from a graph, and from an equation. **Additional Notes:** ● Identifying Functions Activity ● In 6.1, skip identifying the different types of relations (For example: one to one, one to many) ● Use Hands-on activity on pg.275 **Chapter 6 Assessment** **UNIT 5** **Topic: Geometric Measurement (Pythagorean Theorem)- Chapter 7 (8 days)** **Prerequisites:** ● Understand and evaluate squares, square roots, cubes, and cubic roots ● Find the length of horizontal and vertical lines on the coordinate plane ● Find the volume of a solid **Objectives:** ● Discover the Pythagorean Theorem and the converse of the Pythagorean Theorem ● Solve real-world problems involving the Pythagorean Theorem

	● Use the Pythagorean Theorem to find the distance between two points on the coordinate plane ● Use the Pythagorean Theorem to find the volume of solids **Additional Notes:** ● Use Hands-on Activity (Rearrangement) on pg. 7 of textbook B to show relationship between legs and hypotenuse in a right triangle. ● Include right triangles that have two variables, where you have to solve for one in order to solve for the other. ● In section 7.2, do not use the distance formula. Instead, show how to find the distance between two points by creating a right triangle on the coordinate plane and using the Pythagorean Theorem. **Chapter 7 Quiz**
April	**UNIT 6** **Topic: Geometric Transformations - Chapter 8 (12 days)** **Prerequisites:** ● Recognize a symmetric point on the coordinate plane ● Identify directly proportional quantities **Objectives:** ● Understand the concept of a translation, reflection, rotation, and dilation ● Draw images after translations, reflections, rotations, and dilations ● Find the coordinates of points after translations, reflections, and dilations ● Find the dimensions of figures after dilations ● Find the center of a dilation ● Compare translations, reflections, rotations, and dilations **Additional Notes:** ● Use transformations flip-book as a study guide tool. ● Geoboards activities ● Use videos that show the movement of transformations ● Use Transformations Reasoning Packet, which includes multiple choice and select all that apply problems **Chapter 8 Assessment** **UNIT 6 (Continued)** **Topic: Congruence and Similarity - Chapter 9 & Grade 8 NJSLS Performance Coach Book Lesson 22-23 (12 days- will continue into May)** **Prerequisites:** ● Identifying the scale factor in diagrams ● Solving problems involving scale drawings or model

	● Finding measures of angles formed by parallel lines ● Find angle measures using angle pair relationships, including vertical angles, adjacent angles, complementary angles, and supplementary angles **Objectives:** ● Understand the concept of congruence and similarity ● Apply the concept of congruence and similarity ● Use tests for congruent and similar triangles ● Relate congruent figures and similar figures using geometric transformations ● Describe a sequence of transformations ● Relate congruent and similar figures using a sequence of transformations ● Finding the measures of the interior and exterior angles of a triangle ● Use informal arguments to establish facts about the angle sum and exterior angles of triangles ● Find angle measures using angle pair relationships formed by parallel lines cut by a transversal **Additional Notes:** ● Use Grade 8 NJSLS Performance Coach Book to teach angle pair relationships formed by parallel lines when cut by a transversal. **Chapter 9 Assessment**
May	**Summative Spring Assessment*** **NJSLA** **UNIT 7** **Topic: Statistics - Chapter 10 (15 days)** **Prerequisites:** ● Finding relative frequencies **Objectives:** ● Construct a scatter plot given two sets of quantitative data. ● Identify patterns of association between two sets of quantitative data ● Identify outliers in a scatter plot ● Understand the line of best fit and write and use a linear equation for a line of best fit **Additional Notes:** ● Student project: students will gather their own data involving two quantitative variables that they want to find the relationship between, and use it to create a scatter plot and draw conclusions. ● Hands-on activity on pg.186

	● Do not do problems that require the use of a graphing calculator
June	**UNIT 7** **Topic: Statistics - Chapter 10 (Continued)** **Prerequisites:** ● Finding relative frequencies **Objectives:** ● Read a two-way table ● Construct and interpret a two-way table ● Convert data to relative frequencies in a two-way table **Additional Notes:** ● In 10.3, combine two-way tables with probability of simple events **Chapter 10 Assessment**

Unit 1

Exponents, Roots, and Scientific Notation

Summary and Rationale

In this unit students will learn the basic skills involving exponents and powers. The students will know the first 20 perfect squares and the first 10 perfect cubes by the end of the unit. They will simplify real number expressions using integer exponents and the laws of exponents. They also will learn how to operate with numbers in scientific notation. Students will learn to approximate the values of irrational numbers by estimating square and cube roots. Students will solve real-world volume and surface area problems where exponents are involved.

Recommended Pacing

For recommended specific pacing refer to the scope and sequence.
Approximately 37 days (this includes time for review, quizzes and tests)

Standards

The Number System	
8.NS.A.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.A.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., $\pi 2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
8.NS.A.3	Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and the product of a nonzero rational number and an irrational number is irrational.
Expressions and Equations	
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27$.
8.EE.A.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.
8.EE.A.2a	Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
8.EE.A.2b	Simplify numerical radicals, limiting to square roots (i.e. non perfect squares). For example, simplify

	√8 to 2√2.
8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109 , and determine that the world population is more than 20 times larger.
8.EE.A.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.
Geometry	
8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
NJSLS Science	
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
There are rules for operating with numerical expressions involving exponents. Exponents are used to express very large and very small	How are the rules of multiplying and dividing powers helpful? How can we tell when quantities are equal?

<table>
<tr><td>numbers in scientific notation.
There are rules for operating with square and cube roots.
There is an inverse relationship between squares and square roots.
There is a difference between estimation and actual value.
If a positive integer is not a perfect square, then its square root is irrational.
Irrational numbers are non-terminating, non-repeating decimals.</td><td>What are irrational quantities?
How can the properties of exponents be used to simplify expressions?
How can roots and exponents be used to solve real-world problems?</td></tr>
<tr><td colspan="2">Evidence of Learning (Assessments)</td></tr>
<tr><td colspan="2">Ongoing observation
Class Participation
Classwork
Problem of the Day/Week
Exit Tickets
Homework
Quizzes/Tests
Projects</td></tr>
<tr><td colspan="2">Objectives (SLO)</td></tr>
<tr><td>Students will know:
Exponents
Roots
Laws of exponents
Scientific notation.</td><td>Students will be able to:
Understand exponential notation and use it to evaluate exponential expressions
Add, subtract, multiply, and divide expressions with integer exponents using all properties of exponents
Recite the first 20 perfect squares and the first 10 perfect cubes.
Evaluate and estimate square and cube roots.
Solve equations involving square and cubes of variables
Solve Real-World Problems involving squares and cubes
Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Order all real numbers, including irrationals, on a real number line.
Compare irrational numbers by using rational approximations
Express large and small numbers in scientific notation.
Write numbers in standard form.
Compare numbers in scientific Notation
Add and subtract numbers in scientific</td></tr>
</table>

	notation ● Apply scientific notation to real-world situations. ● Multiply and divide numbers in scientific notation

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 1: Exponents
-Math In Focus Resources Chapter 2: Scientific Notation
-Teacher-made materials (such as square root flashcards, scientific notation matching game etc.), geoboards, white boards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:
Small group instruction within the classroom
Differentiation through content, process, product,and environment
Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.
Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-
Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.
● Allow additional time for skill mastery.
● Provide small group/ individualized instruction.
● Allow use of assistive technology.
● Anticipate needs; pre-teach if needed.
● Have student repeat directions to check for understanding.
● Highlight text/ visual presentation.
● Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .
ML-
● Provide additional wait time for student responses to questions
● Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.
● Speak clearly, using a normal tone and rate of speed, or slightly slower.
● Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading
Gifted and Talented-

● Advance, accelerate, or compact content
● Support abstract and advanced higher-level thinking through differentiated questioning
● Allowance for adapting of content for individual student interests
● Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-

Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.

● Provide additional time for in-class assignments and assessments
● Allow for computer with voice output, spelling and grammar checker
● Offer individual help throughout the lesson
● Modify readings and primary source documents

At Risk-

● Provide small group instruction for identified areas for growth
● Allow for alternate pathways for completion of assignments.
● Provide additional wait time for student responses to questions
● Pair oral instruction with visuals
● Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☐ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions
- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 2

Linear Equations & Systems of Equations

Summary and Rationale

In this unit, students will learn how to use the properties of real numbers to rewrite complex expressions involving parentheses and like terms. They will find solutions to application problems using algebraic equations. They will use these properties to solve multi-step equations, including those with variables on both sides. Finally, students will determine if an ordered pair is a solution to a system of equations and be able to solve a system of equations.

Recommended Pacing

For recommended specific pacing refer to the scope and sequence for topics of Algebraic Linear Equations and Systems of Equations.
Algebraic Linear Equations: Approximately 28 days
Systems of Equations: Approximately 15 days
(This includes time for a review of 7th grade multi-step equations, review, quizzes and tests)

Standards

Expressions and Equations	
8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
8.EE.C.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
8.EE.C.8a	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.
8.EE.C.8b	Solve systems of two linear equations in two variables using the substitution method 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. Solve 3x + y = 30 and y = 2x using the substitution method; Solve y= 3x + 1 and y = -2x + 7 using the substitution method.
8.EE.C.8c	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.
Functions	
8.F.B.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.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.1.8.CP.1	Compare prices for the same goods or services.
9.1.8.FP.6	Compare and contrast advertising messages to understand what they are trying to accomplish.
9.1.8.PB.4	Construct a simple personal savings and spending plan based on various sources of income and different stages of life (e.g. teenager, young adult, family)
9.1.8.PB.6	Construct a budget to save for short-term, long term, and charitable goals.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
The strategy for solving multi-step equations and equations with variables on both sides is overall the same for solving equations. The properties of real numbers can be used to rewrite complex expressions involving parentheses and like terms and to solve multi-step equations.	How are mathematical properties helpful in simplifying expressions and equations? Why is using equations to solve problems useful?

A system of equations is a set of two or more equations that each involves the same set of two or more variables. A solution of a system of equations is a set of values that are solutions of all of the equations in the system.	
Evidence of Learning (Assessments)	
Ongoing observation Class Participation Classwork Problem of the Day/Week Exit Tickets Homework Quizzes/Tests Projects	
Objectives (SLO)	
Students will know: ● Multi-step equations ● Complex expressions involving parentheses ● Systems of equations .	Students will be able to: ● Apply the distributive property to rewrite algebraic expressions. ● Combine like terms in an expression. ● Use the properties of Equality to solve multi-step equations. ● Solve equations with variables on both sides of the equal sign. ● Solve multi-step linear equations with one variable, including equations with rational number coefficients ● Solve real-world problems involving linear equations with one variable ● Identify Linear Equations with no solution and infinitely many solutions ● Represent a relationship between two variables using a linear equation and using a table of values ● Solve for a variable in a two variable linear equation ● Solve systems using the graphical method ● Solve systems using table of values ● Solve systems using the elimination method ● Interpret the solution of a system of equations as being the point of intersection of two lines on a graph because the point satisfies both equations simultaneously ● Solve simple systems by inspection to identify when the system has no solution or infinitely many solutions ● Write and solve systems to solve real-world problems

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 3: Algebraic Linear Equations
-Math In Focus Resources Chapter 5: Systems of Equations
-Teacher-made materials (such as equation matching game, equation jeopardy, find someone who, etc.), whiteboards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:
Small group instruction within the classroom
Differentiation through content, process, product,and environment
Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.
Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-
Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.
● Allow additional time for skill mastery.
● Provide small group/ individualized instruction.
● Allow use of assistive technology.
● Anticipate needs; pre-teach if needed.
● Have student repeat directions to check for understanding.
● Highlight text/ visual presentation.
● Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .

ML-
● Provide additional wait time for student responses to questions
● Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.
● Speak clearly, using a normal tone and rate of speed, or slightly slower.
● Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading

Gifted and Talented-
● Advance, accelerate, or compact content
● Support abstract and advanced higher-level thinking through differentiated questioning
● Allowance for adapting of content for individual student interests
● Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-
Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.
● Provide additional time for in-class assignments and assessments

● Allow for computer with voice output, spelling and grammar checker
● Offer individual help throughout the lesson
● Modify readings and primary source documents

At Risk-

● Provide small group instruction for identified areas for growth
● Allow for alternate pathways for completion of assignments.
● Provide additional wait time for student responses to questions
● Pair oral instruction with visuals
● Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☑ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions
- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 3

Linear Relationships

Summary and Rationale

This unit focuses on linear equations and linear functions. Students will identify constant rates of change to distinguish proportional and nonproportional relationships. They will solve multi-step problems involving direct variation. Students will interpret the slope and x- and y-intercepts when graphing a linear equation. They will learn to symbolically represent and solve real-world situations that involve linear equations. Students will be able to write a linear equation and make a prediction if given a table, graph, or verbal description. Through the use of tables and graphs, students will represent, analyze, and solve real-world problems related to linear equations and systems of linear equations. Students will translate among verbal, tabular, graphical, and algebraic representations of linear functions.

Recommended Pacing

For recommended specific pacing refer to the scope and sequence.
Approximately 20 days (this includes time for review, quizzes and tests)

Standards

Expressions and Equations	
8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.
Functions	
8.F.A.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a

	linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.B.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.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
NJSLS Science	
MS-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.1.8.CP.1	Compare prices for the same goods or services.
9.1.8.FP.6	Compare and contrast advertising messages to understand what they are trying to accomplish.
9.1.8.PB.4	Construct a simple personal savings and spending plan based on various sources of income and different stages of life (e.g. teenager, young adult, family)
9.1.8.PB.6	Construct a budget to save for short-term, long term, and charitable goals.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**

If an equation is linear, then a constant change in the x-value corresponds to a constant change in the y-value. The slope of a linear equation represents the rate of change. The slope of a line may be calculated by finding the ratio of the rise to the run for any two points on the line. Horizontal lines have a slope of zero since the rise is zero for any run, and zero divided by a nonzero number is zero. Vertical lines have a slope that is undefined because any two points on the line will have a run of zero, and division by zero is undefined. The x-intercept of a line is the value of x where the line crosses the x-axis (where y = 0) and the y-intercept of a line is the value of y where the line crosses the y-axis (where x = 0). The slope-intercept form for a linear equation is y = mx + b where m is the slope and b is the y-intercept. Parallel lines have the same slope and perpendicular lines have slopes that are the negative reciprocals of each other. There are zero, one, or infinitely many solutions to a system of equations, depending on whether the lines are parallel, intersecting, or coincident. If a function has a constant rate of change then it is a linear function. A direct variation is a special type of linear function that can be written in the form y = kx where k is a nonzero constant. A linear relationship can be represented as verbal descriptions, functions, graphs, and tables	Why does graphing a linear equation result in a straight line? Where in the real world can you find and what are the important attributes of linear patterns and linear relationships?
Evidence of Learning (Assessments)	
Ongoing observation Class Participation Classwork Problem of the Day/Week Exit Tickets Homework Quizzes/Tests Projects	
Objectives (SLO)	
Students will know: ● Linear equations ● Functions ● Graphing ● Slope	Students will be able to: ● Find the slope of all types of lines ● Use the slope formula ● Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line ● Explore the relationship between the lines y =

.	mx and y = mx + b ● Use the slope-intercept form to write an equation of a line. ● Use the slope and intercepts to write and graph linear equations. ● Identify and write equations of parallel lines ● Identify and write linear functions. (Ex. Given: slope and point, two points, point & parallel equation) ● Graph linear functions (Ex. Given m and b, given m and a point) ● Explain slope and y-intercept in the content of real-world problems ● Recognize direct variation by graphing tables of data and checking for constant ratios. ● 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. ● Compare linear functions represented in different ways.

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 4: Lines and Linear Equations
-Teacher-made materials (such as celebrity quizzes, flip books, matching games, stations, etc.), geoboards, white boards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:
Small group instruction within the classroom
Differentiation through content, process, product,and environment
Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.
Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-

Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.

- Allow additional time for skill mastery.
- Provide small group/ individualized instruction.
- Allow use of assistive technology.
- Anticipate needs; pre-teach if needed.
- Have student repeat directions to check for understanding.
- Highlight text/ visual presentation.
- Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .

ML-

- Provide additional wait time for student responses to questions
- Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.
- Speak clearly, using a normal tone and rate of speed, or slightly slower.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading

Gifted and Talented-

- Advance, accelerate, or compact content
- Support abstract and advanced higher-level thinking through differentiated questioning
- Allowance for adapting of content for individual student interests
- Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-

Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.

- Provide additional time for in-class assignments and assessments
- Allow for computer with voice output, spelling and grammar checker
- Offer individual help throughout the lesson
- Modify readings and primary source documents

At Risk-

- Provide small group instruction for identified areas for growth
- Allow for alternate pathways for completion of assignments.
- Provide additional wait time for student responses to questions
- Pair oral instruction with visuals
- Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☑ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions
- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 4	
Graphs and Functions	
Summary and Rationale	
In this unit students will locate ordered pairs of rational numbers on a coordinate plane. They will be introduced to expressions, relations, and functions. They will learn to generate different representations of data using tables, graphs, and equations. Lastly, students will use functions to describe relationships among data.	
Recommended Pacing	
For recommended specific pacing refer to the scope and sequence. Approximately 14 days (this includes time for review, quizzes and tests)	
Standards	
Functions	
8.F.A.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.A.2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
8.F.A.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 = s2 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.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.B.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.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.1.8.CP.1	Compare prices for the same goods or services.
9.1.8.FP.6	Compare and contrast advertising messages to understand what they are trying to accomplish.
9.1.8.PB.4	Construct a simple personal savings and spending plan based on various sources of income and different stages of life (e.g. teenager, young adult, family)
9.1.8.PB.6	Construct a budget to save for short-term, long term, and charitable goals.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
Ordered pairs of rational numbers can be located on a coordinate plane. Functions can be used to describe relationships among data. Relations can be used to assign members of one set to members of another set. A function, a specific type of relation, assigns each member of one set to a unique number of another set. Relationships can be	Why do we need to study the relationship between two numbers? How are ordered pairs, graphs, and tables used to represent relationships between two quantities? What could be understood from a function by examining its multiple representations?

described and generalizations made for mathematical situations that repeat in a predictable way. These generalizations can then be represented in a variety of forms including tables, graphs, equations, and in words.	
Evidence of Learning (Assessments)	
Ongoing observation Class Participation Classwork Problem of the Day/Week Exit Tickets Homework Quizzes/Tests Projects	
Objectives (SLO)	
Students will know: ● Functions ● Graphing lines ● Relationships between numbers ● Depiction of relationships between quantities .	Students will be able to: ● Write solutions of equations in two variables as ordered pairs. ● Understand relations and functions ● Know that when a relation is a function, each input is assigned to exactly one output ● Represent relations using mapping diagrams ● Represent functions with tables, graphs, and equations. ● Identify functions graphically including the vertical line test ● Translate verbal descriptions of functions into algebraic, numerical, and graphical forms ● Identify a linear function from a table and a graph ● Use graphs to describe functions qualitatively ● Compare two linear functions represented in the same form and represented in different forms ● Identify if a function is linear or nonlinear from a table, from a graph, and from an equation.
Suggested Resources/Technology Tools	

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 6: Functions
-Teacher-made materials (such as matching games, identifying functions, reasoning problems, etc.), geoboards, whiteboards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:
Small group instruction within the classroom
Differentiation through content, process, product,and environment
Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.
Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-
Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.
● Allow additional time for skill mastery.
● Provide small group/ individualized instruction.
● Allow use of assistive technology.
● Anticipate needs; pre-teach if needed.
● Have student repeat directions to check for understanding.
● Highlight text/ visual presentation.
● Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .

ML-
● Provide additional wait time for student responses to questions
● Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.
● Speak clearly, using a normal tone and rate of speed, or slightly slower.
● Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading

Gifted and Talented-
● Advance, accelerate, or compact content
● Support abstract and advanced higher-level thinking through differentiated questioning
● Allowance for adapting of content for individual student interests
● Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-
Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.
● Provide additional time for in-class assignments and assessments
● Allow for computer with voice output, spelling and grammar checker
● Offer individual help throughout the lesson
● Modify readings and primary source documents

At Risk-

- Provide small group instruction for identified areas for growth
- Allow for alternate pathways for completion of assignments.
- Provide additional wait time for student responses to questions
- Pair oral instruction with visuals
- Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☑ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions
- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 5

Geometric Measurement

Summary and Rationale

In this unit students will use the Pythagorean Theorem to solve problems with right triangles. Finally, students will use the Pythagorean Theorem to find the distance between points on a coordinate plane and solve real-life problems. Students will also focus on using formulas to solve problems involving geometric figures. They will use these formulas to find the volume of prisms, cylinders, pyramids, cones, and spheres. They will build upon their experience with polygons to develop these formulas.

Recommended Pacing

For recommended specific pacing refer to the scope and sequence.
Approximately 8 days (this includes time for review, quizzes and tests)

Standards

Geometry	
8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
8.G.B.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.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
NJSLS Social Studies	
6.2.8.D.3.c	Evaluate the importance and enduring legacy of the major achievements of Greece, Rome, India, and China over time.

Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
The Pythagorean Theorem is an historically and practically important application of squares and square roots. The Pythagorean Theorem and its converse can be used to calculate lengths of line segments in 2- and 3- dimensional geometric objects. The Pythagorean Theorem can be used to find the distances between points on the coordinate plane and able to find real-world distances. Prior experience with polygons can be used to develop formulas for the volume of prisms, cylinders, pyramids, and cones. Pyramids and cones are 1/3 the volume of prisms and cylinders of the same base and height. An understanding of cylinder and cone volumes gives the opportunity to explore Archimedes' formula for the volume of a sphere. Finding the volume of three-dimensional objects with or without curved surfaces is useful in solving problems.	In what situations will we need to solve problems dealing with measurements of right triangles? What attributes of three-dimensional objects are important to be able to measure and quantify and why? Why must you know the area of the base to find the volume of prisms, cylinders, pyramids, and cones?

Evidence of Learning (Assessments)

Ongoing observation
Class Participation
Classwork
Problem of the Day/Week
Exit Tickets
Homework
Quizzes/Tests
Projects

Objectives (SLO)	
Students will know: ● Pythagorean Theorem ● Volume of Composite Solids .	Students will be able to: ● Discover the Pythagorean Theorem and the converse of the Pythagorean Theorem ● Solve real-world problems involving the Pythagorean Theorem ● Use the Pythagorean Theorem to find the distance between two points on the coordinate plane ● Use the Pythagorean Theorem to find the volume of solids

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items)
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 7: The Pythagorean Theorem
-Teacher-made materials (such as square hands-on activity, matching game, etc.), geoboards, white boards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards
Book: What's Your Angle, Pythagoras? By Julie Ellis

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:
Small group instruction within the classroom
Differentiation through content, process, product,and environment
Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.
Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-
Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.
● Allow additional time for skill mastery.
● Provide small group/ individualized instruction.
● Allow use of assistive technology.
● Anticipate needs; pre-teach if needed.
● Have student repeat directions to check for understanding.
● Highlight text/ visual presentation.

● Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .

ML-

● Provide additional wait time for student responses to questions

● Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.

● Speak clearly, using a normal tone and rate of speed, or slightly slower.

● Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading

Gifted and Talented-

● Advance, accelerate, or compact content

● Support abstract and advanced higher-level thinking through differentiated questioning

● Allowance for adapting of content for individual student interests

● Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-

Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.

● Provide additional time for in-class assignments and assessments

● Allow for computer with voice output, spelling and grammar checker

● Offer individual help throughout the lesson

● Modify readings and primary source documents

At Risk-

● Provide small group instruction for identified areas for growth

● Allow for alternate pathways for completion of assignments.

● Provide additional wait time for student responses to questions

● Pair oral instruction with visuals

● Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☐ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions
- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 6

Geometric Transformations

Summary and Rationale

In this unit students will solve problems involving angles created by parallel lines cut by transversals: vertical, alternate interior, alternate exterior, and corresponding angles. They will demonstrate that the sum of the angles in a triangle is 180 degrees. Students will apply transformations (translations, reflections, and rotations) to plane figures in the coordinate plane. They will learn how the transformation of a figure affects the location on the coordinate plane. Also, in this unit students will study congruence and similarity. They will use proportional relationships in similar figures to find missing measurements. They will use similar triangles to solve problems that include height and distance. Students will generate similar figures using dilations. Students will use critical attributes to define congruence. They will learn how the transformation of a figure affects its congruence.

Recommended Pacing

For recommended specific pacing refer to the scope and sequence for topics of Geometric Transformations and Congruence and Similarity
Geometric Transformations: Approximately 12 days
Congruence and Similarity: Approximately 12 days
(This includes time for review, quizzes and tests)

Standards

Geometry	
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are transformed to lines, and line segments to line segments of the same length. b. Angles are transformed to angles of the same measure. c. Parallel lines are transformed to parallel lines.
8.G.A.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.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.A.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.A.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.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.
Interdisciplinary Connections	

NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
When parallel lines are cut by a transversal congruent angles are formed. The sum of the angles in a triangle always equals 180° and it can be proven by the Triangle Sum Theorem. Students will learn how the transformation of a figure affects the location on the coordinate plane. Transformational geometry can be used to describe motions, patterns, designs, and properties of shapes in the real world. When a figure (preimage) is rotated, the vertex and its image are the same distance from the center of rotation and all the angles formed by the vertex, the center of rotation, and the image of that vertex are congruent. When a figure is reflected, each vertex and its image are an equal, perpendicular distance from the line of reflection. When a figure is translated, each point in the pre-image moves the same distance and in the same direction.	Describe the relationship between two parallel lines cut by a transversal and the angles that are formed. How can we copy shapes and make precise drawings without measuring tools? How can proportional reasoning be applied to problem-solving situations involving similar figures? How are the results of a transformation different from the original figure? How are they similar?

If two figures are similar one is an enlargement or reduction of the other. Two polygons are similar if corresponding angles are congruent and corresponding sides are proportional. Given two similar figures, it is often possible to find an unknown side length in one of the figures by setting up and solving a proportion. After a dilation, the image is similar to the original figure. The scale factor in a dilation determines precisely how much the size changes. Figures with the same shape and size are congruent. If we know that corresponding sides and angles are congruent, we can conclude that the polygons are congruent. Two figures are congruent if one figure can be transformed into the other through a series of translations, reflections, and rotations.	

Evidence of Learning (Assessments)

Ongoing observation
Class Participation
Classwork
Problem of the Day/Week
Exit Tickets
Homework
Quizzes/Tests
Projects

Objectives (SLO)

Students will know: ● Geometric relationships ● Transformations ● Angles ● Parallel lines ● Transversal ● Angle pair relationships ● Translation ● Preimage, image ● Reflection, line of reflection ● Rotation, center of rotation, angle of rotation, clockwise, counter-clockwise ● Dilation ● Congruence ● Similarity	Students will be able to: ● Understand the concept of a translation, reflection, rotation, and dilation ● Draw images after translations, reflections, rotations, and dilations ● Find the coordinates of points after translations, reflections, and dilations ● Find the dimensions of figures after dilations ● Find the center of a dilation ● Compare translations, reflections, rotations, and dilations ● Understand the concept of congruence and similarity ● Apply the concept of congruence and

• Proportional relationships • Similar triangles • Corresponding angles, corresponding sides • Statement of congruence, statement of similarity .	similarity • Use tests for congruent and similar triangles • Relate congruent figures and similar figures using geometric transformations • Describe a sequence of transformations • Relate congruent and similar figures using a sequence of transformations • Identify the image of a figure after a combined transformation is performed, and determine whether the final image is similar or congruent to the original. • Finding the measures of the interior and exterior angles of a triangle • Use informal arguments to establish facts about the angle sum and exterior angles of triangles • Find unknown angles and identify possible side lengths in triangles. • Find angle measures using angle pair relationships formed by parallel lines cut by a transversal

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 8: Geometric Transformations
-Math In Focus Resources Chapter 9: Congruence and Similarity
-NJSLS Grade 8 Mathematics Performance Coach Lesson 22: Finding Measures of Angles Formed by Transversals Intersecting Parallel Lines
-NJSLS Grade 8 Mathematics Performance Coach Lesson 23: Exploring Angles of Triangles
-Teacher-made materials (such as transformations flip book, identifying types of transformations, transformations reasoning problems, etc.), geoboards, whiteboards
-NJSLS Grade 8 Mathematics Performance Coach Workbook
-FACEing Math activity book
-www.brainpop.com
-Teacher Pay Teachers Resources: scavenger hunts, math-libs, task cards
-Book: Cut Down to Size at High Noon By Scott Sundby

Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;

General Modifications for students struggling to learn:

Small group instruction within the classroom

Differentiation through content, process, product,and environment

Individual feedback and praise towards what is done correctly based upon effort, attitude and strategy.

Help students manage individual stressors for the student and plan alternate pathways for completion of assignments.

Special Education-

Modifications and accommodations must be aligned to students' IEPs and uphold expectations of the plan lawfully.

- Allow additional time for skill mastery.
- Provide small group/ individualized instruction.
- Allow use of assistive technology.
- Anticipate needs; pre-teach if needed.
- Have student repeat directions to check for understanding.
- Highlight text/ visual presentation.
- Modify assessment/assignment content, format, length (benchmarks, tests and quizzes) .

ML-

- Provide additional wait time for student responses to questions
- Provide simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase.
- Speak clearly, using a normal tone and rate of speed, or slightly slower.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading

Gifted and Talented-

- Advance, accelerate, or compact content
- Support abstract and advanced higher-level thinking through differentiated questioning
- Allowance for adapting of content for individual student interests
- Provide assignments geared to development in areas of affect, creativity, cognition, and research skills

504-

Modifications and accommodations must be aligned to the 504 plan and uphold expectations of the plan lawfully.

- Provide additional time for in-class assignments and assessments
- Allow for computer with voice output, spelling and grammar checker
- Offer individual help throughout the lesson
- Modify readings and primary source documents

At Risk-

- Provide small group instruction for identified areas for growth
- Allow for alternate pathways for completion of assignments.
- Provide additional wait time for student responses to questions
- Pair oral instruction with visuals
- Utilize manipulatives

For a full list of Accommodations and Modifications, please click here.

Career Readiness, Life Literacies, and Key Skills NJSLS

Please select all standards that apply to this unit of study:

- ☑ Act as a responsible and contributing community members and employee
- ☐ Attend to financial well-being
- ☐ Consider the environmental, social and economic impacts of decisions

- ☑ Demonstrate creativity and innovation
- ☑ Utilize critical thinking to make sense of problems and persevere in solving them
- ☐ Model integrity, ethical leadership and effective management
- ☑ Plan education and career paths aligned to personal goals
- ☑ Use technology to enhance productivity increase collaboration and communicate effectively
- ☑ Work productively in teams while using cultural/global competence

Suggestions on integrating these standards can be found at: https://www.nj.gov/education/standards/clicks

Unit 7	
Statistics	
Summary and Rationale	
In this unit students will organize and construct scatter plots. They will construct lines of best fit. They will select and construct appropriate displays to convey information and make conjectures about possible relationships amongst two different variables.	
Recommended Pacing	
For recommended specific pacing refer to the scope and sequence for topics of Statistics Statistics: Approximately 15 days (This includes time for review, quizzes and tests)	
Standards	
Statistics and Probability	
8.SP.A.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.A.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 (e.g. line of best fit) by judging the closeness of the data points to the line
8.SP.A.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.A.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?
Functions	
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of

	change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.B.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.
Interdisciplinary Connections	
NJSLS ELA	
A.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
RL.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
Integration of Technology	
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
Career Readiness, Life Literacies and Key Skills	
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., 6.SP.B.5)
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.
9.4.8.IML 3	Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b)
9.4.8.IML 4	Ask insightful questions to organize different types of data and create meaningful visualizations.
9.4.8.IML 5	Analyze and interpret local or public data sets to summarize and effectively communicate the data
9.4.8.TL 1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Instructional Focus

Enduring Understandings:	**Essential Questions:**

A scatter plot is a graph that shows bivariate data; that is, data for which there are two variables for each observation, such as height and weight. If a correlation exists within data plotted on a scatter plot, a line of best fit (trend line) can be drawn and a linear equation formulated. A two-way table displays two-variable data by collecting it into rows and columns. Collecting and analyzing data can answer some questions, and the question to be answered determines the data that needs to be collected, how best to collect it, and how to visually represent it.	How do scatter plots and lines of best fit enable you to make predictions about data? What are the ways in which data can be collected, analyzed, and represented to answer questions that are important to us?

Evidence of Learning (Assessments)

Ongoing observation
Class Participation
Classwork
Problem of the Day/Week
Exit Tickets
Homework
Quizzes/Tests
Projects

Objectives (SLO)

Students will know: ● Scatter plots ● Data analysis ● Making predictions using data ● Lines of best fit .	Students will be able to: ● Construct a scatter plot given two sets of quantitative data. ● Identify patterns of association between two sets of quantitative data ● Identify outliers in a scatter plot ● Understand the line of best fit and write and use a linear equation for a line of best fit ● Use the line of best fit to solve problems and make predictions ● Read a two-way table ● Construct and interpret a two-way table ● Convert data to relative frequencies in a two-way table

Suggested Resources/Technology Tools

-Textbooks, workbooks, and assessment aides
-Online textbook
-NJSLA Practice Tests and Released Items
-Khan Academy; www.insidemathematics.org/performanceassessment-tasks
-Calculators when specified
-Google Classroom
-Math In Focus Resources Chapter 10: Statistics
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