

Pre-Algebra Curriculum



Pre-Algebra

Full Year

Pre-Algebra is intended for students in 8th grade who are not taking Algebra 1 or Geometry. The course is fully aligned with the Math 8 NJSLs. Pre-Algebra covers the following three main topics, as described in the NJSLs:

- 1) Formulating and reasoning about expressions and equations
- 2) Grasping the concept of a function and using functions to describe quantitative relationships
- 3) Analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Curriculum Writers

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Unit 1: Real Numbers

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Math Unit 1 Theme/Topic: Real Numbers Duration: 7 Weeks
Unit Summary Enduring Understanding	<i>Students will understand that...</i> - Repeating decimals can be represented as an equivalent rational number - Every real number is either a rational number or an irrational number - Rational and irrational numbers can be compared and ordered using number lines - To find the square root of a number, find the factor whose square is equal to that number - To find a cube root, find the factor whose cube is equal to that number - Solve equations with squares by taking the square root of each side of the equation - Solve equations with cubes by taking the cube root of each side of the equation - The properties of exponents are used to simplify expressions by adding or dividing either the base or the exponents - Any nonzero number raised to the power of zero is equal to 1. Any number raised to a negative power is equal to its multiplicative reciprocal - An estimate of a very small or very large quantity can be written as a power of ten - Scientific notation is an efficient way to write very small or very large numbers - Many real-world problems can be represented with a mathematical model, but a model does not represent a real-world situation exactly - Operating with numbers in scientific notation is an efficient way to add, subtract, multiply, or divide very large or very small numbers.
Essential Questions	- What are real numbers? - How are real numbers used to solve problems?
Misconceptions <i>Areas that students typically struggle to understand or misunderstand.</i>	<i>Students may not understand...</i> - Decimal place values and how to use them to help determine which decimal is greater or less - How to use the distributive property to eliminate repeating decimals and/or write values in scientific notation - What happens to a decimal value when multiplied by 10 - How to write an equivalent fraction form that is useful in answering problems - That rational numbers can be written in the form a/b where a and b are integers and b is not equal to zero. - How to multiply decimals - Students may need to review the concept of expressions with exponents - Students may need additional time to understand and interpret negative numbers
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of</i>	<i>Students will be able to use what they learn to...</i> Later in Grade 8: - Students will use what they have learned about squares, square roots, and the number pi to calculate the surface area of solids, calculate the volume of cylinders, and spheres, or find the missing length of the radius of a circle In Grade 9: - Students will explain why the sum or product of two rational numbers is rational

<i>transfer suffice here.</i>	will justify that the sum of a rational and irrational number is irrational. They will recognize that the product of a nonzero rational number and an irrational number is irrational. Students will connect their understanding of rational numbers to their understanding of irrational numbers. They will learn about rational exponents. They will write and evaluate expressions involving rational and irrational exponents using the properties of exponents.
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: Irrational number, perfect square, square root, cube root, Product of Powers Property, Product of Powers Property, Quotient of Powers Property, Exponent Property, Zero Exponent Property, scientific notation Key Concepts: - Rational numbers as decimals - Understand irrational numbers - Compare and order real numbers - Evaluate square roots and cube roots - Solve equations using square roots and cube roots - Use properties of integer exponents - Use powers of 10 to estimate quantities - Understand scientific notation

Standards

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed at the bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and talented).

8.EE.A		Work with radicals and integer exponents.
	8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$
	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. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
	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 3×10^8 and the population of the world as 7×10^9 , and determine that the world population is more than 20 times larger.
	8.EE.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 for length).

		per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
8.NS.A		Know that there are numbers that are not rational, and approximate them by rational numbers.
	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., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approaches
- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for a
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through the warmups, exit tickets, classwork, and other modalities listed below:

- Rational numbers as decimals
- Understand irrational numbers
- Compare and order real numbers
- Evaluate square roots and cube roots
- Solve equations using square roots and cube roots
- Use properties of integer exponents
- Use powers of 10 to estimate quantities
- Understand scientific notation

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
3. **Warm-Up/Do Now Activities** - Short tasks at the start of class.
4. **Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
5. **Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
6. **Error Analysis** - Students analyze incorrect solutions.
7. **Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
8. **Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit 1 Quiz given at the midpoint of the unit covering: Rational numbers as decimals

- Understand irrational numbers

- Compare and order real numbers
- Evaluate square roots and cube roots
- Solve equations using square roots and cube roots

Summative Assessment

Unit 1 Summative Assessment covering:

- Rational numbers as decimals
- Understand irrational numbers
- Compare and order real numbers
- Evaluate square roots and cube roots
- Solve equations using square roots and cube roots
- Use properties of integer exponents
- Use powers of 10 to estimate quantities
- Understand scientific notation

. The assessment will have a mix of multiple-choice, short-answer, and student-constructed response questions and Content-Specific Standards as well as the NJ Mathematical Practice Standards.

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of o Assessment. The alternative assessments will assess: Rational numbers as decimals

- Understand irrational numbers
- Compare and order real numbers
- Evaluate square roots and cube roots
- Solve equations using square roots and cube roots
- Use properties of integer exponents
- Use powers of 10 to estimate quantities
- Understand scientific notation

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific distinguishing claims that are supported by reasons and evidence from claims that are not. (Students evidence in competing design solutions which claim to maintain biodiversity and ecosystem services

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.

- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the events, scientific procedures/ experiments, or technical processes) to examine a topic and convey information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others’ ideas and clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education	Student-specific, based on IEP, and may include: Presentation Modifications 1. Use of Visual Aids Number lines, color-coded operations, fraction circles, bar models 2. Step-by-step Instructions Break down multi-step problems into smaller, manageable parts 3. Math Scaffolds and Anchor Charts Posted rules (e.g., "Keep, Change, Flip" for dividing fractions) 4. Highlighting Key Information Circle or highlight operations or negative signs in problems 5. Use of Manipulatives Integer tiles, two-color counters, and fraction tiles Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problems 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts Pre-teach terms: Irrational number, perfect square, square root, Power of Products Property, Product of Powers Property, Quotient of Powers Property, Negative Exponent Property, Zero Exponent Property, scientific notation Response Modifications
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	1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide integer rules or notes)
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	● Response to intervention examples in the textbook ● Additional supports that may be helpful: ○ Color-coded number lines ○ Step-by-step worked-out examples ○ Integer rules written out ○ Graphic organizers ○ Use of guided worksheets
ML	● English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding ● Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word wall. ○ Pre-teach terms: Irrational number, perfect square, square root, perfect cube, Power of Products Property, Product of Powers Property, Negative Exponent Property, Zero Exponent Property, scientific notation ○ Use of a bilingual glossary specific to the unit in the student edition with the vocabulary word above. ○ Sentence stems ○ Use of bilingual directions or pictures to accompany directions
Gifted	● enVision STEM Projects ● Pick a Project ● Enrichment Examples ● Challenge Items
Resources: Digital and Print	

Teaching Resources • Reteach to Build Understanding • Additional Vocabulary Support • Build Mathematical Literacy • Enrichment • Math Diagnosis and Intervention System (MDIS) Assessment Resources • Lesson Quiz Digital Lesson Courseware • Today's Challenge • Visual Learning Animation Plus • Key Concepts • Additional Examples • 3-Act Mathematical Modeling • Online Practice powered by: MathXL for Schools • Adaptive Practice • Virtual Nerd Video Tutorials • Animated Glossary • Digital Math Tools • Online Math Games	Lesson Support for Teachers • Listen and Look for PD Lesson Video • Topic Overview Video • ExamView Test Generator Student's Edition • Review what you know • Language Development Activities • Mid-Topic Checkpoint and performance task • Topic review • Fluency practice activity • EnVision STEM project • Pick a project Assessment Resources • Topic Readiness Assessment • Mid-Topic Assessment • Topic Assessment • Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.
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Unit 2: Analyze and Solve Linear Equations

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Math Unit 2 Theme/Topic: Analyze and Solve Linear Equations Duration: 7 Weeks
Unit Summary Enduring Understanding	<i>Students will understand that...</i> - Combining like terms that are on one side of an equation makes it easier to solve by using inverse operations - To solve a linear equation that has variable terms on both sides of the equation, use inverse operations to move all variable terms to one side of the equation and all constant terms to the other. Then isolate the variable. - The Distributive Property is an important tool for simplifying expressions with multiple terms - Equations with one variable can have zero, one, or infinitely many solutions - Proportional relationships can be represented using different models, including tables, graphs, and equations - Slope is the measure of the steepness of a line and is equal to the ratio of the change in y to the change in x quantities. - In a proportional relationship, slope is the same as the unit rate and represents the constant of proportionality. - The y-intercept of a line is the y-coordinate of the point where the line intersects the y-axis. Its meaning depends on the context of the graph. - The slope-intercept form of an equation, $y=mx+b$, gives information about a line. It indicates that the point $(0,b)$ is on the graph of the line and shows the slope m.
Essential Questions	How can we analyze connections between linear equations and functions?
Misconceptions <i>Areas that students typically struggle with or misunderstand.</i>	<i>Students may not understand...</i>
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn to...</i> Later in Grade 8: - Students will use functions to model relationships. They will use linear equations and slopes to construct functions to model linear relationships. - Students will analyze and solve systems of linear equations by graphing and elimination In Grade 9: - Students will represent functions using graphs and algebraic expressions. They will interpret functions in real-world contexts and build mathematical models from functions.
Important Facts and Key Concepts	<i>Students will know...</i>

This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.

Vocabulary: slope, y-intercept, slope-intercept form

Key Concepts:

- Combine like terms to solve equations
- Solve equations with variables on both sides
- Solve multi-step equations
- Equations with no solutions or infinitely many solutions
- Compare proportional relationships
- Connect proportional relationships and slope
- Analyze Linear Equations: $y=mx+b$
- Understand the y-intercept of a line
- Analyze linear equations: $y=mx+b$

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8.EE.B		Understand the connections between proportional relationships, lines, and linear 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. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i>
	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 .
8.EE.C		Analyze and solve linear equations and pairs of simultaneous linear equations.
	8.EE.C.7	Solve linear equations in one variable
	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.8	Analyze and solve pairs of simultaneous linear equations.
	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.8.b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i>
	8.EE.C.8.c	Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i>

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 - Comparing conjectures with previously established results
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Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for analysis.
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- Solve multi-step equations
- Equations with no solutions or infinitely many solutions
- Compare proportional relationships
- Connect proportional relationships and slope
- Analyze Linear Equations: $y=mx+b$
- Understand the y-intercept of a line
- Analyze linear equations: $y=mx+b$

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
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9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit 2 Quiz given at the midpoint of the unit covering: Rational numbers as decimals

- Combine like terms to solve equations
- Solve equations with variables on both sides
- Solve multi-step equations
- Equations with no solutions or infinitely many solutions

Summative Assessment

Unit 2 Summative Assessment covering:

- Combine like terms to solve equations
- Solve equations with variables on both sides

- Solve multi-step equations
- Equations with no solutions or infinitely many solutions
- Compare proportional relationships
- Connect proportional relationships and slope
- Analyze Linear Equations: $y=mx+b$
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Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

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Presentation Modifications

1. Use of Visual Aids
slope, y-intercept, slope-intercept form
2. Step-by-step Instructions
Break down multi-step problems into smaller, manageable parts
3. Math Scaffolds and Anchor Charts
Posted rules
4. Highlighting Key Information
Circle or highlight operations or negative signs in problems
5. Use of Manipulatives
Integer tiles, two-color counters, and fraction tiles

Access/Delivery Modifications

1. Read-Aloud or Audio Versions for directions or word problems
2. Fewer Problems Per Page
3. Simplified Language
4. Preview Vocabulary and Concepts: slope, y-intercept, slope-intercept form

Response Modifications

1. Allow Use of Calculators
2. Multiple Modalities for Responses
3. Graphic Organizers

Timing Modifications

1. Extended Time

	2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide integer rules or number lines)
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	• Response to intervention examples in the textbook • Additional supports that may be helpful: ○ Color-coded number lines ○ Step-by-step worked-out examples ○ Integer rules written out ○ Graphic organizers ○ Use of guided worksheets
ML	• English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding • Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word wall. ○ Pre-teach terms: slope, y-intercept, slope-intercept form ○ Use of a bilingual glossary specific to the unit in the student edition with the vocabulary word above. ○ Sentence stems ○ Use of bilingual directions or pictures to accompany directions
Gifted	• enVision STEM Projects • Pick a Project • Enrichment Examples • Challenge Items
Resources: Digital and Print	
Teaching Resources • Reteach to Build Understanding • Additional Vocabulary Support • Build Mathematical Literacy • Enrichment • Math Diagnosis and Intervention System (MDIS) Assessment Resources	Lesson Support for Teachers • Listen and Look for PD Lesson Video • Topic Overview Video • ExamView Test Generator Student's Edition • Review what you know • Language Development Activities • Mid-Topic Checkpoint and performance task

• Lesson Quiz Digital Lesson Courseware • Today’s Challenge • Visual Learning Animation Plus • Key Concepts • Additional Examples • 3-Act Mathematical Modeling • Online Practice powered by: MathXL for Schools • Adaptive Practice • Virtual Nerd Video Tutorials • Animated Glossary • Digital Math Tools • Online Math Games	• Topic review • Fluency practice activity • EnVision STEM project • Pick a project Assessment Resources • Topic Readiness Assessment • Mid-Topic Assessment • Topic Assessment • Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.
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Unit 3: Use Functions to Model Relationships

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Math Unit 3 Theme/Topic: Use Functions to Model Relationships Duration: 5 Weeks
Unit Summary Enduring Understanding	<i>Students will understand that...</i> - Identify whether a relation is a function - Interpret a function - Identify functions in different representations: equations, tables, and graphs - Identify linear and nonlinear functions in different representations - Compare properties of linear functions in different representations - Compare properties of linear and nonlinear functions in different representations - Construct a linear function to model a relationship using an equation - Describe quantitatively the behavior of a function by analyzing its graph - Describe the graph of a function at each interval - Draw a quantitative graph of a function based on a verbal description - Analyze and interpret the sketch of a graph of a function
Essential Questions	How can you use functions to model linear relationships
Misconceptions <i>Areas that students typically struggle or misunderstand.</i>	<i>Students may not understand...</i> - The meaning of each value in an ordered pair - How to plot ordered pairs on a coordinate plane - How proportional relationships relate to equations - How to graph a function using ordered pairs
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn to...</i> Later in Grade 8: - Students will connect linear equations and linear functions as representations of data - They use their growing understanding of linear equations and functions to explore linear associations in scatter plots In High School: - Students will study a range of functions, including linear, quadratic, and logarithmic. - Students will see that all functions have certain properties that
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: relation, function, constant rate of change, initial value, slope, function, interval Key Concepts: - Understand relations and functions - Connect representations of functions

- Compare linear and nonlinear functions
- Construct functions to model linear relationships
- Intervals of increase and decrease
- Sketch functions from verbal descriptions

Standards

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed. bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and ta

8.FA		Define, evaluate, and compare functions.
	8.FA.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.FA.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). <i>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.</i>
	8.FA.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. <i>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.</i>
8.FB		Use functions to model relationships between quantities.
	8.FB.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 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.FB.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.

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving appro

- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for a
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through te warmups, exit tickets, classwork, and other modalities listed below:

- Understand relations and functions
- Connect representations of functions
- Compare linear and nonlinear functions

- Construct functions to model linear relationships
- Intervals of increase and decrease
- Sketch functions from verbal descriptions

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
3. **Warm-Up/Do Now Activities** - Short tasks at the start of class.
4. **Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
5. **Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
6. **Error Analysis** - Students analyze incorrect solutions.
7. **Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
8. **Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit 3 Quiz given at the midpoint of the unit covering: Rational numbers as decimals

- Understand relations and functions
- Connect representations of functions
- Compare linear and nonlinear functions

Summative Assessment

Unit 3 Summative Assessment covering:

- Understand relations and functions
- Connect representations of functions
- Compare linear and nonlinear functions
- Construct functions to model linear relationships
- Intervals of increase and decrease
- Sketch functions from verbal descriptions

. The assessment will have a mix of multiple-choice, short-answer, and student-constructed response questions and Content-Specific Standards as well as the NJ Mathematical Practice Standards.

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of o Assessment. The alternative assessments will assess:

- Understand relations and functions
- Connect representations of functions
- Compare linear and nonlinear functions
- Construct functions to model linear relationships
- Intervals of increase and decrease
- Sketch functions from verbal descriptions

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. (Students analyze evidence in competing design solutions which claim to maintain biodiversity and ecosystem services)

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the narration of events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas and information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing one's own clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education

Student-specific, based on IEP, and may include:

Presentation Modifications

1. Use of Visual Aids
Graph with visual aids
2. Step-by-step Instructions
Break down multi-step problems into smaller, manageable parts
3. Math Scaffolds and Anchor Charts
Posted rules
4. Highlighting Key Information
Circle or highlight operations or negative signs in problems
5. Use of Manipulatives

	Integer tiles, two-color counters, and fraction tiles Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problems 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts: relation, function, constant rate of change, value, linear function, nonlinear function, interval Response Modifications 1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide integer rules or number lines)
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	• Response to intervention examples in the textbook • Additional supports that may be helpful: ○ Color-coded number lines ○ Step-by-step worked-out examples ○ Integer rules written out ○ Graphic organizers ○ Use of guided worksheets
ML	• English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding • Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word bank. Pre-teach terms: relation, function, constant rate of change, value, linear function, nonlinear function, interval ○ Use of a bilingual glossary specific to the unit in the student manual

	with the vocabulary word above. ○ Sentence stems ○ Use of bilingual directions or pictures to accompany di
Gifted	● enVision STEM Projects ● Pick a Project ● Enrichment Examples ● Challenge Items
Resources: Digital and Print	
Teaching Resources ● Reteach to Build Understanding ● Additional Vocabulary Support ● Build Mathematical Literacy ● Enrichment ● Math Diagnosis and Intervention System (MDIS) Assessment Resources ● Lesson Quiz Digital Lesson Courseware ● Today's Challenge ● Visual Learning Animation Plus ● Key Concepts ● Additional Examples ● 3-Act Mathematical Modeling ● Online Practice powered by: MathXL for Schools ● Adaptive Practice ● Virtual Nerd Video Tutorials ● Animated Glossary ● Digital Math Tools ● Online Math Games	Lesson Support for Teachers ● Listen and Look for PD Lesson Video ● Topic Overview Video ● ExamView Test Generator Student's Edition ● Review what you know ● Language Development Activities ● Mid-Topic Checkpoint and performance task ● Topic review ● Fluency practice activity ● EnVision STEM project ● Pick a project Assessment Resources ● Topic Readiness Assessment ● Mid-Topic Assessment ● Topic Assessment ● Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.

Unit 4: Investigate Bivariate Data

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Unit 4 Theme/Topic: Investigate Bivariate Data Duration: 4 weeks
Unit Summary Enduring Understandings	<i>Students will understand that...</i> • A scatterplot is a graph on a coordinate plane that uses points to show paired data. These points visually display any clusters, gaps, or outliers. • A trend line on a scatterplot approximates the linear association between two variables. Scatterplots can show a linear or nonlinear association, or no association. • Trend lines in linear models can help with making predictions about the equation of a linear model, predictions of an outcome can be made. • Data can be displayed in a two-way frequency table, making it easier to compare categories. Categories can also be compared to sub-categories to make evidence. • Data can be organized in a two-way frequency table and then used to create a relative frequency table. Relative frequency can be determined for the rows and columns for the whole table. • Many real-world situations can be represented with a mathematical model, but not all models represent a real-world situation exactly.
Essential Questions	• How can you represent the relationship between paired data and use it to make predictions.
Misconceptions <i>Areas that students typically struggle with or misunderstand.</i>	<i>Students may not understand....</i> • The information provided by a scatterplot. • How to correctly classify scatterplots with positive or negative associations. Students be reminded of the difference between a line with a positive slope and a negative slope. • The slope formula and how to solve for an unknown. • How to properly interpret tables. • When to find the ratio of the data to the entire set, versus to a row or column.
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn ...</i> • In high school, students will extend their understanding of statistics by applying appropriate measurement data to a normal distribution in order to calculate percentages. • In high school, students will continue to create and analyze scatterplots and trend lines to evaluate how well a trend line fits their data and extend their understanding to include exponential and quadratic associations. • In high school, students will continue their work with two-way frequency tables and relative frequency tables for categorical data to understand joint and conditional relative frequencies.
Important Facts and Key Concepts	<i>Students will know...</i>

This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.

Vocabulary: cluster, gap, measurement, data, negative, association, association, scatter plot, trend line, categorical data, relative frequency

Key Concepts:

- **Paired Data:** students construct and analyze scatter plots of paired quantities to determine what type of association may be present between whether positive or negative, linear or nonlinear, or no association.
- **Linear Associations and Models:** students use trend lines to further to have a linear association. They find the equations of trend lines and use these as linear models in order to make predictions about the data.
- **Frequency Tables:** students create and analyze two-way frequency tables for paired categorical data. They learn to examine inferences about possible associations between the two data sets.

Standards

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed at the bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and talented).

NJSL Content Specific Student Learning Standard - 8th Grade

[8.SP.A.1-](#) . Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two variables, 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 show 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. For example, use 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 increase of 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 the table to calculate row and column relative frequencies and interpret them as measures of association between the two variables. For example, collect data from students on whether they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have curfews also have chores?

[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 $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains points that 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 in terms of the situation it models, and in terms of its graph or a table of values.

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approaches

- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for a
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through te warmups, exit tickets, classwork, and other modalities listed below:

- Scatterplots
- Linear Associations
- Linear Models
- Predictions

- Frequency Tables
- Relative Frequency Tables

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
3. **Warm-Up/Do Now Activities** - Short tasks at the start of class.
4. **Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
5. **Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
6. **Error Analysis** - Students analyze incorrect solutions.
7. **Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
8. **Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit Quiz given at the midpoint of the unit covering: Scatterplots, Linear Associations, Linear Models, Predictions.

Summative Assessment

Unit Summative Assessment covering: Scatterplots, Linear Associations, Linear Models, Predictions, Frequency Tables. The assessment will have a mix of multiple-choice, short-answer, and student-constructed response questions. Content-Specific Standards as well as the NJ Mathematical Practice Standards.

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of or as an alternative to the Unit Assessment. The alternative assessments will assess: Scatterplots, Linear Associations, Linear Models, Predictions, Frequency Tables

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. (Students will analyze evidence in competing design solutions which claim to maintain biodiversity and ecosystem services)

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies, science, subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the description of events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas and information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education

Student-specific, based on IEP, and may include:

Presentation Modifications

1. Use of Visual Aids
Models to represent two- and three-dimensional figures
2. Step-by-step Instructions
Break down multi-step problems into smaller, manageable parts
3. Math Scaffolds and Anchor Charts
Vocabulary terms and definitions
4. Highlighting Key Information
Within word problem and within samples

Access/Delivery Modifications

1. Read-Aloud or Audio Versions for directions or word problems
2. Fewer Problems Per Page
3. Simplified Language
4. Preview Vocabulary and Concepts

Response Modifications

1. Allow Use of Calculators
2. Multiple Modalities for Responses
3. Graphic Organizers

Timing Modifications

1. Extended Time
2. Frequent Checks for Understanding

	Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide vocabulary words and formulas, not necessarily definitions))
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	• Response to intervention examples in the textbook • Additional supports that may be helpful: ○ Step-by-step worked-out examples ○ Vocabulary Definitions ○ Graphic organizers ○ Use of guided worksheets
ML	• English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding • Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word wall. Pre-teach terms like "complementary angles" or "cross angles." ○ Use of a bilingual glossary specific to the unit in the student edition with the vocabulary word above. ○ Sentence stems (such as "This number is greater because...") ○ Use of bilingual directions or pictures to accompany directions
Gifted	• enVision STEM Projects • Pick a Project • Enrichment Examples • Challenge Items
Resources: Digital and Print	
Teaching Resources • Reteach to Build Understanding • Additional Vocabulary Support • Build Mathematical Literacy • Enrichment • Math Diagnosis and Intervention System (MDIS) Assessment Resources • Lesson Quiz Digital Lesson Courseware • Today's Challenge	Lesson Support for Teachers • Listen and Look for PD Lesson Video • Topic Overview Video • ExamView Test Generator Student's Edition • Review what you know • Language Development Activities • Mid-Topic Checkpoint and performance task • Topic review • Fluency practice activity

• Visual Learning Animation Plus • Key Concepts • Additional Examples • 3-Act Mathematical Modeling • Online Practice powered by: MathXL for Schools • Adaptive Practice • Virtual Nerd Video Tutorials • Animated Glossary • Digital Math Tools • Online Math Games	• EnVision STEM project • Pick a project Assessment Resources • Topic Readiness Assessment • Mid-Topic Assessment • Topic Assessment • Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.
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Unit 5: Systems of Linear Equations

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Math Unit 5 Theme/Topic: Analyze and Solve Systems of Linear Equations Duration: 3 Weeks
Unit Summary Enduring Understanding	<i>Students will understand that...</i> • A system of linear equations can have no solution, one solution, or infinitely many solutions; the number of solutions is based on the number of intersection points of the lines. • The number of solutions can be determined by comparing the slopes of the lines. • The solution to a system of equations is the point or points at which the lines intersect. • Substitution can be used for solving systems of linear equations. • The process of elimination can be used to solve a system of linear equations.
Essential Questions	• What does it mean to solve a system of linear equations?
Misconceptions <i>Areas that students typically struggle or misunderstand.</i>	<i>Students may not understand...</i> • That infinitely many solutions exist when the lines are the same • Students may have difficulty with graphing and interpreting decimal solutions • The connections between different forms of equations; they may need to convert equations for y to get them into slope-intercept form • How to solve an equation for a variable and/or what variable to solve for • Students may need to review the least common multiple before eliminating
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn to...</i> In Algebra: • Students will write equations in two or more variables to represent relationships between quantities, and graph the equations in the coordinate plane • They will continue to work with systems of equations, solving systems of linear and one quadratic equation in two variables both graphically and algebraically
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: system of linear equations, solution of a system of linear equations Key Concepts: • Estimate solutions to systems of equations by inspection • Solve systems of equations by graphing • Solve systems of equations by substitution • Solve systems of equations by elimination
Standards	

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and ta

8.EE.C		Analyze and solve linear equations and pairs of simultaneous linear equations.
	8.EE.C.8	Analyze and solve pairs of simultaneous linear equations.
	8.EE.C.8.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.
	8.EE.C.8.b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i>
	8.EE.C.8.c	Solve real-world and mathematical problems leading to two linear equations in two variables. <i>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.</i>

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approach
- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for a
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through warmups, exit tickets, classwork, and other modalities listed below:

- Estimate solutions to systems of equations by inspection
- Solve systems of equations by graphing
- Solve systems of equations by substitution
- Solve systems of equations by elimination

Formative Assessments Types - will vary based on lesson needs

- 1. Observations:** Teachers watch students as they solve problems or engage in math discussions.
- 2. Exit Tickets** - Quick problems or questions at the end of a lesson.
- 3. Warm-Up/Do Now Activities** - Short tasks at the start of class.
- 4. Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
- 5. Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
- 6. Error Analysis** - Students analyze incorrect solutions.
- 7. Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
- 8. Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
- 9. Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
- 10. Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit 4 Quiz given at the midpoint of the unit covering:

- Estimate solutions to systems of equations by inspection
- Solve systems of equations by graphing

Summative Assessment

Unit 4 Summative Assessment covering:

- Estimate solutions to systems of equations by inspection
- Solve systems of equations by graphing
- Solve systems of equations by substitution
- Solve systems of equations by elimination

The assessment will have a mix of multiple-choice, short-answer, and student-constructed response questions and will assess the Content-Specific Standards as well as the NJ Mathematical Practice Standards.

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of the Unit 4 Summative Assessment. The alternative assessments will assess:

- Estimate solutions to systems of equations by inspection
- Solve systems of equations by graphing
- Solve systems of equations by substitution
- Solve systems of equations by elimination

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. (Students will analyze evidence in competing design solutions which claim to maintain biodiversity and ecosystem services.)

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies, science, subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education	Student-specific, based on IEP, and may include: Presentation Modifications 1. Use of Visual Aids Graph with visual aids 2. Step-by-step Instructions Break down multi-step problems into smaller, manageable parts 3. Math Scaffolds and Anchor Charts Posted rules 4. Highlighting Key Information Circle or highlight operations or negative signs in problems 5. Use of Manipulatives Integer tiles, two-color counters, and fraction tiles Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problems 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts: system of linear equations linear equations Response Modifications 1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide integer rules or formulas)
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.

At Risk/ I&RS	● Response to intervention examples in the textbook ● Additional supports that may be helpful: ○ Color-coded number lines ○ Step-by-step worked-out examples ○ Integer rules written out ○ Graphic organizers ○ Use of guided worksheets
ML	● English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding ● Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word wall. Pre-teach terms: system of linear equations, solution of a system of linear equations ○ Use of a bilingual glossary specific to the unit in the student edition with the vocabulary word above. ○ Sentence stems ○ Use of bilingual directions or pictures to accompany directions
Gifted	● enVision STEM Projects ● Pick a Project ● Enrichment Examples ● Challenge Items
Resources: Digital and Print	
Teaching Resources ● Reteach to Build Understanding ● Additional Vocabulary Support ● Build Mathematical Literacy ● Enrichment ● Math Diagnosis and Intervention System (MDIS) Assessment Resources ● Lesson Quiz Digital Lesson Courseware ● Today's Challenge ● Visual Learning Animation Plus ● Key Concepts ● Additional Examples	Lesson Support for Teachers ● Listen and Look for PD Lesson Video ● Topic Overview Video ● ExamView Test Generator Student's Edition ● Review what you know ● Language Development Activities ● Mid-Topic Checkpoint and performance task ● Topic review ● Fluency practice activity ● EnVision STEM project ● Pick a project Assessment Resources ● Topic Readiness Assessment

• 3-Act Mathematical Modeling • Online Practice powered by: MathXL for Schools • Adaptive Practice • Virtual Nerd Video Tutorials • Animated Glossary • Digital Math Tools • Online Math Games	• Mid-Topic Assessment • Topic Assessment • Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.
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Unit 6: Congruence and Similarity

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Unit 6 Theme/Topic: Congruence and Similarity Duration: 7 weeks
Unit Summary Enduring Understandings	<i>Students will understand that...</i> • A translation (slide) is a transformation that moves every point of a figure the same direction. • A reflection (flip) creates images that have the same size and shape as the preimage. • The preimage and image are the same distance from the line of reflection. • A rotation is created by moving each point of the preimage around a fixed point. The preimage and image have the same size, shape, and orientation. • When one transformation will not map a preimage into its image, a sequence of transformations is needed. • Many real-world situations can be represented with a mathematical model, but a model does not represent a real-world situation exactly. • A sequence of translations, reflections, and rotations can map one figure onto another without changing its shape or size. • A dilation is a transformation that changes the size of a figure. • In a dilation, the preimage and image have the same shape, angle measures, and parallel lines. • Two-dimensional figures are similar if there is a sequence of translations, reflections, rotations, and dilations that map one figure onto the other. • If parallel lines are intersected by a transversal, then corresponding angles are congruent, and same-side interior angles are supplementary. • The measure of an exterior angle of a triangle is equal to the sum of the two remote interior angles. • If two angles in one triangle are congruent to two angles in another triangle, then the triangles are similar.
Essential Questions	• How can you show that two figures are either congruent or similar?
Misconceptions <i>Areas that students typically struggle or misunderstand.</i>	<i>Students may not understand....</i> • That the only change in a translation is the placement of the shape. • How to determine which axis a figure is reflected over. • When describing a rotation, a counterclockwise rotation yields a positive angle measurement and a clockwise rotation yields a negative angle measurement and both are measured from the positive x-axis. • The properties of each type of transformation with regard to changing size, shape, and orientation, etc. • The properties of translations and rotations. • Multiplication by a scale factor (fraction). • Whether to reflect the preimage or the new dilated image when combining transformations. • How to identify the angle pairs created by a transversal. • Generalizing the relationship between remote interior angles and the exterior angle. • The relationship between angles when two parallel lines are crossed by a transversal.
Transfer: <i>What students learn in this unit</i>	<i>Students will be able to use what they learn ...</i>

course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.	In high school, students build on concepts to experiment with plane, understand congruence in terms of rigid motions, and terms of similarity transformations.
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: transformation, translation, image, reflection, line of reflection, rotation, center of rotation, congruent, dilation, scale factor, enlargement, transversal, corresponding angles, alternate interior angles, same-side interior angles, exterior angle of a triangle Key Concepts: Transformations: students learn to translate a figure, verify the properties of transformations, identify and performing reflections, apply the properties of center of rotation to create images, describe sequences of transformations and review dilations and make sense of scale factors. Congruent and Similar Figures: students determine congruency of figures, transformations that produced two figures and understand and verify congruency. Angle Measurements: students learn about the relationships of angles of a triangle, parallel lines and a transversal, determine missing measurements of angles of a triangle, and find angle measurements using triangle similarity.
Standards	
Use this document for K-8 standards and this document for 9-12 standards, that have all the current standards listed at the bottom. Please be sure to include at least 2-3 standards from any and all relevant disciplines (including gifted and talented). NJSL Content Specific Student Learning Standard - 8th Grade 8.G.A.1 - Verify experimentally the properties of rotations, reflections, and translations 8.G.A.1a- Lines are transformed to lines, and line segments to line segments of the same length. 8.G.A.1b- Angles are transformed to angles of the same measure. 8.G.A.1c- 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 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 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 by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the angles at their vertices appear to form a line, and give an argument in terms of transversals why this is so. WIDA Standards for Multilingual Learners ELD-MA.6-8.Explain.Interpretive	

- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approach
- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for analysis.
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through the warmups, exit tickets, classwork, and other modalities listed below:

- Translations
- Reflections
- Rotations
- Dilations
- Compose Transformations
- Similarity
- Angles and Lines

Formative Assessments Types - will vary based on lesson needs

- 1. Observations:** Teachers watch students as they solve problems or engage in math discussions.
- 2. Exit Tickets** - Quick problems or questions at the end of a lesson.
- 3. Warm-Up/Do Now Activities** - Short tasks at the start of class.
- 4. Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
- 5. Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
- 6. Error Analysis** - Students analyze incorrect solutions.
- 7. Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
- 8. Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
- 9. Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
- 10. Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit Quiz given at the midpoint of the unit covering:

- Translations
- Reflections
- Rotations
- Compose Transformations

Summative Assessment

Unit Summative Assessment covering:

- Translations
- Reflections
- Rotations
- Dilations
- Compose Transformations
- Similarity
- Angles and Lines

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of o Assessment. The alternative assessments will assess:

- Translations
- Reflections
- Rotations
- Dilations
- Compose Transformations
- Similarity
- Angles and Lines

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. (Students analyze evidence in competing design solutions which claim to maintain biodiversity and ecosystem services)

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas and information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education

Student-specific, based on IEP, and may include:

Presentation Modifications

1. Use of Visual Aids
Models to represent two- and three-dimensional figures
2. Step-by-step Instructions
Break down multi-step problems into smaller, manageable parts
3. Math Scaffolds and Anchor Charts
Vocabulary terms and definitions
4. Highlighting Key Information
Within word problem and within samples

	Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problems 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts Response Modifications 1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide vocabulary words and formulas (not necessarily definitions))
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	● Response to intervention examples in the textbook ● Additional supports that may be helpful: ○ Step-by-step worked-out examples ○ Vocabulary Definitions ○ Graphic organizers ○ Use of guided worksheets
ML	● English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding ● Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word bank. ○ Pre-teach terms like "complementary angles" or "cross angles." ○ Use of a bilingual glossary specific to the unit in the student manual with the vocabulary word above. ○ Sentence stems (such as "This number is greater because...") ○ Use of bilingual directions or pictures to accompany directions.

Gifted	● enVision STEM Projects ● Pick a Project ● Enrichment Examples ● Challenge Items
Resources: Digital and Print	
Teaching Resources ● Reteach to Build Understanding ● Additional Vocabulary Support ● Build Mathematical Literacy ● Enrichment ● Math Diagnosis and Intervention System (MDIS) Assessment Resources ● Lesson Quiz Digital Lesson Courseware ● Today's Challenge ● Visual Learning Animation Plus ● Key Concepts ● Additional Examples ● 3-Act Mathematical Modeling ● Online Practice powered by: MathXL for Schools ● Adaptive Practice ● Virtual Nerd Video Tutorials ● Animated Glossary ● Digital Math Tools ● Online Math Games	Lesson Support for Teachers ● Listen and Look for PD Lesson Video ● Topic Overview Video ● ExamView Test Generator Student's Edition ● Review what you know ● Language Development Activities ● Mid-Topic Checkpoint and performance task ● Topic review ● Fluency practice activity ● EnVision STEM project ● Pick a project Assessment Resources ● Topic Readiness Assessment ● Mid-Topic Assessment ● Topic Assessment ● Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.

Unit 7: Understand/Apply the Pythagorean Theorem

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Unit 7 Theme/Topic: Understand and Apply the Pythagorean Duration: 3 weeks
Unit Summary Enduring Understandings	<i>Students will understand that...</i> - Many real-world situations can be represented with a mathematical model, but a model does not represent a real-world situation exactly. - The Pythagorean Theorem can be used to determine if a triangle is a right triangle or to find the missing side length of a triangle. - If a triangle has side length such that $a^2 + b^2 = c^2$, the triangle is a right triangle. - The Pythagorean Theorem and its converse can be used to solve problems that involve right triangles. Both can be used to determine the unknown side length or to verify whether a triangle is a right triangle. - The Pythagorean Theorem can be used to find the distance between two points in a coordinate plane by drawing a line to connect the point and using it as the hypotenuse of a right triangle where the legs are the horizontal and vertical distances.
Essential Questions	How can you use the Pythagorean Theorem to solve problems?
Misconceptions <i>Areas that students typically struggle with or misunderstand.</i>	<i>Students may not understand....</i> - How to square numbers - The necessity to square the sides before adding and squaring the hypotenuse - How to find the length of a diagonal in three dimensions. - Strategies to find absolute value or calculate distance on a coordinate plane
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn ...</i> - Later in 8th grade math, students will compute surface area and volume of a cone and use the Pythagorean Theorem to find the length of missing side length, radius, height, or slant height of a cone. - In Algebra 1, students use Pythagorean Theorem to formally prove the Pythagorean Theorem and to solve application problems.
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: hypotenuse, leg, Pythagorean Theorem, proof, Converse of the Pythagorean Theorem Key Concepts: Pythagorean Theorem: students examine the Pythagorean Theorem to find unknown side lengths of triangles and solids; learn the Converse of the Pythagorean Theorem and apply it to identify triangles and analyze shapes; apply their knowledge of the Pythagorean Theorem to solve two- and three-dimensional problems, including finding the distance between two points in a coordinate plane.

their understanding of the Pythagorean Theorem to find the distance between two points in a coordinate plane, and then use the distance to find a missing point in a coordinate plane.

Standards

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed at the bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and talented).

NJSL Content Specific Student Learning Standard - 8th Grade

- 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 dimensions.
- 8.G.B.8- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approaches
- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for analysis.
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through warmups, exit tickets, classwork, and other modalities listed below:

- Pythagorean Theorem
- Converse of the Pythagorean Theorem
- Distance between Two Points

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
3. **Warm-Up/Do Now Activities** - Short tasks at the start of class.
4. **Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
5. **Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
6. **Error Analysis** - Students analyze incorrect solutions.
7. **Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
8. **Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit Quiz given at the midpoint of the unit covering:

- Pythagorean Theorem
- Converse of the Pythagorean Theorem

Summative Assessment

Unit Summative Assessment covering:

- Pythagorean Theorem
- Converse of the Pythagorean Theorem
- Distance between Two Points

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of o

Assessment. The alternative assessments will assess:

- Pythagorean Theorem
- Converse of the Pythagorean Theorem
- Distance between Two Points

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not. (Students will analyze evidence in competing design solutions which claim to maintain biodiversity and ecosystem services)

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas and information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-one, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing one's own clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students can access the curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education

Student-specific, based on IEP, and may include:

Presentation Modifications

1. Use of Visual Aids
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2. Step-by-step Instructions
Break down multi-step problems into smaller, manageable parts
3. Math Scaffolds and Anchor Charts

	Vocabulary terms and definitions 4. Highlighting Key Information Within word problem and within samples Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problem 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts Response Modifications 1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide vocabulary words and formulas (not necessarily definitions))
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	● Response to intervention examples in the textbook ● Additional supports that may be helpful: ○ Step-by-step worked-out examples ○ Vocabulary Definitions ○ Graphic organizers ○ Use of guided worksheets
ML	● English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. ○ Entering ○ Developing ○ Expanding ● Additional supports that may be utilized: ○ Preview Vocabulary and Concepts. Make use of a word bank. ○ Pre-teach terms like "complementary angles" or "cross angles"

	○ Use of a bilingual glossary specific to the unit in the student dictionary with the vocabulary word above. ○ Sentence stems (such as “This number is greater because...”) ○ Use of bilingual directions or pictures to accompany directions
Gifted	● enVision STEM Projects ● Pick a Project ● Enrichment Examples ● Challenge Items
Resources: Digital and Print	
Teaching Resources ● Reteach to Build Understanding ● Additional Vocabulary Support ● Build Mathematical Literacy ● Enrichment ● Math Diagnosis and Intervention System (MDIS) Assessment Resources ● Lesson Quiz Digital Lesson Courseware ● Today’s Challenge ● Visual Learning Animation Plus ● Key Concepts ● Additional Examples ● 3-Act Mathematical Modeling ● Online Practice powered by: MathXL for Schools ● Adaptive Practice ● Virtual Nerd Video Tutorials ● Animated Glossary ● Digital Math Tools ● Online Math Games	Lesson Support for Teachers ● Listen and Look for PD Lesson Video ● Topic Overview Video ● ExamView Test Generator Student’s Edition ● Review what you know ● Language Development Activities ● Mid-Topic Checkpoint and performance task ● Topic review ● Fluency practice activity ● EnVision STEM project ● Pick a project Assessment Resources ● Topic Readiness Assessment ● Mid-Topic Assessment ● Topic Assessment ● Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELlevation</i>, retrieved from https://ellevation.com/login.

Unit 8: Solve Using Surface Area and Volume

Unit Plan Explanatory Document

Grade Level: 8 PreAlgebra	Content Area: Unit 8 Theme/Topic: Solve Problems Involving Surface Area Duration: 3 weeks
Unit Summary Enduring Understandings	<i>Students will understand that...</i> - Formulas for finding the areas of polygons, such as rectangles, squares, and triangles, can be used to find the surface areas of cylinders, cones, and spheres. - Finding the volume of a cylinder is an extension of finding the volume of a rectangular prism. The volume of a rectangular prism is the product of the area of its base and its height. The volume of a cylinder is equal to the product of the area of its circular base and its height. - The volume of a cone is $\frac{1}{3}$ the volume of a cylinder given that the base areas and the heights are the same. The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the circular base and h is the height of the cone. - The volumes of a sphere and cone are proportionally related. The volume of a sphere is $\frac{4}{3}\pi r^3$, where r is the radius of the sphere. - Many real-world problem situations can be represented with a mathematical model. A mathematical model may not represent a real-world situation exactly.
Essential Questions	How are the formulas for volume of a cylinder, cone, and sphere related?
Misconceptions <i>Areas that students typically struggle with or misunderstand.</i>	<i>Students may not understand....</i> - What a slant height refers to on a cone. - How to find the height or radius of a cylinder when the volume is given. - How to use the Pythagorean Theorem. - How to find the radius using the surface area formula.
Transfer: <i>What students learn in this course to stay with them and connect to other courses in multiple content areas. What should students be able to do at the end of this learning (in the real world, later in the course, or in a subsequent course) that would evidence transfer? Three to five elements of transfer suffice here.</i>	<i>Students will be able to use what they learn ...</i> - In Geometry, students will use geometric tools such as a straightedge and compass to make formal geometric constructions. They will learn the difference between informal and formal constructions. - In Geometry, students expand their knowledge of formulas for the surface area of cylinders, cones, and spheres to provide explanations for volume formulas and solve real-world problems.
Important Facts and Key Concepts <i>This is a list of subject-specific specialized vocabulary, skills, and key concepts students should know and be able to demonstrate to a degree of fluency by the end of each unit.</i>	<i>Students will know...</i> Vocabulary: cone, cylinder, sphere, composite figure Key Concepts: Surface Area of Cones, Cylinders, and Spheres: students determine the surface area of cones and cylinders by decomposing the shape into a net and finding the area of each face.

The surface area of a sphere is calculated through examination of the surface area of a cone and the surface area of a sphere.

- **Volume of Cones, Cylinders, and Spheres:** students examine the relationship between the formulas for volumes of cones and cylinders and cones and spheres.

Standards

Use [this document](#) for K-8 standards and [this document](#) for 9-12 standards, that have all the current standards listed at the bottom. Please be sure to include at least **2-3 standards** from any and all relevant disciplines (including gifted and talented).

NJSL Content Specific Student Learning Standard - 8th Grade

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.

WIDA Standards for Multilingual Learners

- ELD-MA.6-8.Explain.Interpretive
- Interpret mathematical explanations by
 - Identifying concept or entity
 - Analyzing possible ways to represent and solve a problem
 - Evaluating model and rationale for underlying relationships in selected problem-solving approaches
- ELD-MA.6-8.Explain.Expressive
- Construct mathematical explanations that
 - Introduce concept or entity
 - Share solution with others
 - Describe data and/or problem-solving strategy
 - State reasoning used to generate solution
- ELD-MA.6-8.Argue.Interpretive
- Interpret mathematics arguments by
 - Comparing conjectures with previously established results
 - Distinguishing commonalities among strategies used
 - Evaluating relationships between evidence and mathematical facts to create generalizations
- ELD-MA.6-8.Argue.Expressive
- Construct mathematics arguments that
 - Create conjecture, using definitions and previously established results
 - Generalize logic across cases
 - Justify conclusions with evidence and mathematical facts
 - Evaluate and critique others' arguments

Computer Science and Design Thinking

- 8.1.8.DA.1 : Organize and transform data collected using computational tools to make it usable for analysis.
- 8.1.8.DA.4 : Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5 : Test, analyze, and refine computational models.

Career Readiness, Life Literacies, and Key Skills

- 9.1.8.CP.1 : Compare prices for the same goods or services.

Assessment Evidence

Students will demonstrate understanding by...

How will students demonstrate what they know and are able to do?

This section is a list of how students are being assessed based on the details in the Instructional Pathway.

Formative Assessment: Students will be assessed on an ongoing basis for their mastery of the following topics through warmups, exit tickets, classwork, and other modalities listed below:

- Surface Area of Cones
- Surface Area of Cylinders
- Surface Area of Spheres
- Volume of Cylinders
- Volume of Cones
- Volume of Spheres

Formative Assessments Types - will vary based on lesson needs

1. **Observations:** Teachers watch students as they solve problems or engage in math discussions.
2. **Exit Tickets** - Quick problems or questions at the end of a lesson.
3. **Warm-Up/Do Now Activities** - Short tasks at the start of class.
4. **Think-Pair-Share** - Students think individually, discuss with a partner, then share with the class.
5. **Math Journals or Learning Log** - Students write about their problem-solving process or reflect on concepts.
6. **Error Analysis** - Students analyze incorrect solutions.
7. **Whiteboard Responses** - Students solve problems on mini whiteboards and display answers.
8. **Self-Assessment Checklists or Rubrics** - Students reflect on their performance using structured criteria.
9. **Digital Tools and Apps:** Platforms like Kahoot, Desmos, Blooket or Google Forms, and MathXL
10. **Problem-Solving Tasks:** Open-ended or real-world math problems.

Benchmark Assessment:

Unit Quiz given at the midpoint of the unit covering:

- Surface Area of Cones
- Surface Area of Cylinders
- Surface Area of Spheres
- Volume of Cylinders

Summative Assessment

Unit Summative Assessment covering:

- Surface Area of Cones
- Surface Area of Cylinders
- Surface Area of Spheres
- Volume of Cylinders
- Volume of Cones

- Volume of Spheres

Alternative Assessment

Reassessments as per district policy.

Savvas created performance task assessments or projects may be given at the discretion of the teacher in place of o Assessment. The alternative assessments will assess:

- Surface Area of Cones
- Surface Area of Cylinders
- Surface Area of Spheres
- Volume of Cylinders
- Volume of Cones
- Volume of Spheres

Interdisciplinary Connections

Describe how one content area may connect to the core content area in this unit.

Standards for Cross-Content Areas

ELA Reading Domain

- RI.CR.6.1. Close Reading: Cite textual evidence and make relevant connections to support analysis text says explicitly as well as inferences drawn from the text.
- RI.AA.6.7. Analysis of Argument: Trace the development of and evaluate the argument and specific distinguishing claims that are supported by reasons and evidence from claims that are not. (Students evidence in competing design solutions which claim to maintain biodiversity and ecosystem services

ELA Writing Domain

- W.AW.6.1. Argumentative Writing: Write arguments on discipline-specific content (e.g., social studies subjects, English/Language Arts) to support claims with clear reasons and relevant evidence.
- W.IW.6.2. Informational and Explanatory Writing: Write informative/explanatory texts (including the events, scientific procedures/ experiments, or technical processes) to examine a topic and convey id information through the selection, organization, and analysis of relevant content.

ELA Speaking and Listening Domain

- SL.PE.6.1. Participate Effectively: Engage effectively in a range of collaborative discussions (one-on-teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and clearly.

Accommodations and Modifications

Under each sub-heading, list the unit-specific accommodations and modifications that you are using so that all students curriculum. This should not be a generic list. This should connect back to elements within the unit.

Special Education

Student-specific, based on IEP, and may include:

	Presentation Modifications 1. Use of Visual Aids Models to represent two- and three-dimensional figures 2. Step-by-step Instructions Break down multi-step problems into smaller, manageable parts 3. Math Scaffolds and Anchor Charts Vocabulary terms and definitions 4. Highlighting Key Information Within word problem and within samples Access/Delivery Modifications 1. Read-Aloud or Audio Versions for directions or word problems 2. Fewer Problems Per Page 3. Simplified Language 4. Preview Vocabulary and Concepts Response Modifications 1. Allow Use of Calculators 2. Multiple Modalities for Responses 3. Graphic Organizers Timing Modifications 1. Extended Time 2. Frequent Checks for Understanding Modified Tests/Quizzes (Reduced answer choices or simplified problems) Use of Word Banks or Formula Sheets (Provide vocabulary words and formulas (not necessarily definitions))
504	Student-specific and may include use of sound speakers, preferential seating, fidget devices, ability to move around, sensory cushions, etc.
At Risk/ I&RS	● Response to intervention examples in the textbook ● Additional supports that may be helpful: ○ Step-by-step worked-out examples ○ Vocabulary Definitions ○ Graphic organizers ○ Use of guided worksheets

ML	- English Language Learner - Each unit in the manual provides questions that can be used to offer three levels of support. - Entering - Developing - Expanding - Additional supports that may be utilized: - Preview Vocabulary and Concepts. Make use of a word wall. Pre-teach terms like "complementary angles" or "cross angles." - Use of a bilingual glossary specific to the unit in the student edition with the vocabulary word above. - Sentence stems (such as "This number is greater because...") - Use of bilingual directions or pictures to accompany directions
Gifted	- enVision STEM Projects - Pick a Project - Enrichment Examples - Challenge Items
Resources: Digital and Print	
Teaching Resources - Reteach to Build Understanding - Additional Vocabulary Support - Build Mathematical Literacy - Enrichment - Math Diagnosis and Intervention System (MDIS) Assessment Resources - Lesson Quiz Digital Lesson Courseware - Today's Challenge - Visual Learning Animation Plus - Key Concepts - Additional Examples 3-Act Mathematical Modeling - Online Practice powered by: MathXL for Schools - Adaptive Practice - Virtual Nerd Video Tutorials - Animated Glossary - Digital Math Tools - Online Math Games	Lesson Support for Teachers - Listen and Look for PD Lesson Video - Topic Overview Video - ExamView Test Generator Student's Edition - Review what you know - Language Development Activities - Mid-Topic Checkpoint and performance task - Topic review - Fluency practice activity - EnVision STEM project - Pick a project Assessment Resources Topic Readiness Assessment Mid-Topic Assessment Topic Assessment Topic Performance Tasks Additional resources: New Jersey Student Learning Standards, retrieved from www.nj.gov <i>ELLlevation</i>, retrieved from https://ellevation.com/login.

